FAU
BOARD OF TRUSTEES
Florida Atlantic University

Item: AS: A-2

COMMITTEE ON ACADEMIC AND STUDENT AFFAIRS

Tuesday, June 2, 2020

SUBJECT: REQUEST FOR APPROVAL OF A NEW DEGREE PROGRAM - CIP 26.0102

PROPOSED BOARD ACTION

Request for approval of the following New Degree Program – CIP 26.0102:

- Bachelor of Science in Medical Biology

BACKGROUND INFORMATION

The proposed program is a Bachelor of Science in Medical Biology. The program will offer students pursuing professional/graduate studies (including Medical, Veterinary, Dental, Pharmacy and Physician Assistant) the rigor expected for admittance and content which will support their successful completion of such programs. This market is currently not being well-served by FAU's programs. Students may pursue pre-professional studies with the B.S. in Biology, but there is no clear 4-year track for students to be best prepared for entrance exams and the rigors of professional schools. There are over 2,800 declared biology majors at FAU. According to the College of Science advising office, over 500 incoming first-time-in-college freshmen identify as "pre-health" every fall and the proposed degree will capture and support these students.

The need for skilled medical professionals and biomedical researchers remains high worldwide. The proposed program, by nature of its course content, will also prepare students to enter a number of other careers, for example: laboratory technicians, forensic technicians, forensic analysts, toxicologists, genetic technologists, clinical scientists, clinical trial managers, public health microbiologists, biomedical research advisors, technical writers, science journalists, science advisors in business, industry and government, educators, pharmaceutical salespersons, health product managers, transplant coordinators, patent agents, occupational health and safety specialists, etc.

IMPLEMENTATION PLAN/DATE

Effective Fall 2020, pending approval by the Florida Atlantic University Board of Trustees.

FISCAL IMPLICATIONS

The BS in Medical Biology degree program is a repackaging of existing course offerings at FAU. As such, we anticipate that minimal, if any, new resources will be required to implement this program.

Supporting Documentation: New Degree Proposal Form
Presented by: Dr. Bret Danilowicz, Vice President for Academic Affairs & Provost
Phone: 561-297-6350

Board of Governors, State University System of Florida

Request to Offer a New Degree Program

(Please do not revise this proposal format without prior approval from Board staff)

Florida Atlantic University	**Fall 2020**
University Submitting Proposal	**Proposed Implementation Term**
CES College of Science	**Department of Biological Sciences**
Name of College(s) or School(s)	**Name of Department(s)/ Division(s)**
Biomedical Sciences	**BS in Medical Biology**
Academic Specialty or Field	**Complete Name of Degree**
26.0102 Biomedical Sciences, General	
Proposed CIP Code	

The submission of this proposal constitutes a commitment by the university that, if the proposal is approved, the necessary financial resources and the criteria for establishing new programs have been met prior to the initiation of the program.

Date Approved by the University Board of Trustees	**President**	**Date**
Signature of Chair, Board of Trustees	**Date**	**Vice President for Academic Affairs**	**Date**

Provide headcount (HC) and full-time equivalent (FTE) student estimates of majors for Years 1 through 5. HC and FTE estimates should be identical to those in Table 1 in Appendix A. Indicate the program costs for the first and the fifth years of implementation as shown in the appropriate columns in Table 2 in Appendix A. Calculate an Educational and General (E&G) cost per FTE for Years 1 and 5 (Total E&G divided by FTE).

Implementation Timeframe	Projected Enrollment (From Table 1)		Projected Program Costs (From Table 2)				
	HC	FTE	E&G Cost per FTE	E&G Funds	Contract & Grants Funds	Auxiliary Funds	Total Cost
Year 1	570	456	555	253,088	0	0	253,088
Year 2	943	754.4					
Year 3	1244	995.2					
Year 4	1549	1239					
Year 5	1780	1424	595	1,058,664	0	0	1,058,664

Note: This outline and the questions pertaining to each section must be reproduced within the body of the proposal to ensure that all sections have been satisfactorily addressed. Tables 1 through 4 are to be included as Appendix A and not reproduced within the body of the proposals because this often causes errors in the automatic calculations.

INTRODUCTION

I. Program Description and Relationship to System-Level Goals

A. Briefly describe within a few paragraphs the degree program under consideration, including (a) level; (b) emphases, including majors, concentrations, tracks, or specializations; (c) total number of credit hours; and (d) overall purpose, including examples of employment or education opportunities that may be available to program graduates.

The Bachelor of Science in Medical Biology (CIP 26.0102), will offer students pursuing professional/graduate studies (including Medical, Veterinary, Dental, Pharmacy and Physician Assistant) the rigor expected for admittance and content which will support their successful completion of such programs. The curriculum will fulfill prerequisites of medically-focused schools by guiding the selection of additional advanced relevant courses and considering Pre-Professional entrance exams. The curriculum was established by a departmental (Biology) subcommittee comprised of faculty members with appropriate background and expertise (e.g. Dr. H. Jay Lyons previously served as Associate Professor and Chairman of the Department of Physiology and Pharmacology at Southeastern College of Osteopathic Medicine, Dr. Kailiang Jia's credentials include an MS in Medical Genetics, an MD in Clinical Medicine and a PhD in Genetics and Molecular Biology, etc.). The committee considered existing baccalaureate level programs under the proposed CIP, MCAT exam content, and didactic medical school curricula in assembling the proposed curriculum. Completion of this undergraduate degree program will require a minimum of 120 credits.

FAU currently offers a B.S. in Biology (CIP 26.0101), a flexible and holistic degree designed to train biologists. In this degree, students select specializations, including for example, ecology, marine science, environmental science, animal behavior and microbiology. Students currently may pursue Pre-Professional studies with the B.S. in Biology, but there is no clear 4-year track for students to be best prepared for entrance exams and the rigors of professional schools. FAU also offers a B.A. in Health Science (CIP 51.000) which was designed for students wishing to pursue careers as dieticians/nutritionists, health educators, athletic trainers, exercise physiologists, recreational specialists, social and community service managers, music therapists, counselors, etc. The newly proposed program is a focused degree program meant to serve the interests of medical and professional school hopefuls and will allow students pursuing professional and graduate programs in biomedicine to differentiate themselves with a diploma that reads Medical Biology. The focused curriculum will also support students and advisors throughout the university to more effectively chart academic plans of study specific to students' future goals upon student entry to the university, which will bolster timely degree completion.

Currently, there is a market not being well-served by FAU's programs. There are over 2,800 declared biology majors at FAU. According to the Associate Dean of Undergraduate Studies, over 500 incoming first-time-in-college freshmen identify as "pre-health" every fall. The proposed degree will capture and support these students. We anticipate that, at its peak, the program will house approximately half (1,400) of the current biology major population (2,800), leaving 1,400 or more majors in the existing Biology CIP. We do not expect that the exponentially growing Health Science B.A., which currently has a population of > 800 students, to be impacted by establishment of the proposed Medical Biology BS, as students in the Health Science program are not preparing for entrance into medical, veterinary, or other professional schools. Although students can complete the proposed Medical Biology curriculum by making appropriate course selections within the existing Biology degree program options, the B.S. in Medical Biology curriculum has been specifically designed to guide students into the advanced coursework that will support their goals. Currently FAU undergraduate students are not required to access academic advising services or self-identify as pre-health majors. Enrollment by otherwise unidentified pre-health students in a designated major specific to their educational objectives will facilitate us in identifying and disseminating to them information pertinent to the achievement of their goals early in their academic programs. The

relatively restrictive nature of the curriculum will also support students in timely degree completion with minimal excess hours.

Although the BS in Medical Biology major has been designed to include prerequisites for medical and many other health-related professional schools such as pharmacy, dental, optometry, physician assistant, podiatry, or audiology, the program, by nature of its course content, will also prepare participants to enter a number of other careers, for example: laboratory technicians, forensic technicians, forensic analysts, toxicologists, genetic technologists, clinical scientists, clinical trial managers, public health microbiologists, biomedical research advisors, technical writers, science journalists, science advisors in business, industry and government, educators, pharmaceutical salespersons, health product managers, transplant coordinators, patent agents, occupational health and safety specialists, etc. Furthermore, the program will provide strong preparation for students wishing to pursue subsequent master's and PhD programs in the biological or biomedical sciences. Students interested in health disparities or population-based health will be well equipped to enter graduate programs in public health. Students interested in the business side of medicine could subsequently pursue a graduate degree in business administration.

This program supports the SUS's goal of increasing STEM/Health degrees and the FAU Pillars of both Healthy Aging and Neuroscience, and will supply talented students for M.S., Ph.D., M.D. and M.D./Ph.D. programs in the SUS.

B. Please provide the date when the pre-proposal was presented to CAVP (Council of Academic Vice Presidents) Academic Program Coordination review group. Identify any concerns that the CAVP review group raised with the pre-proposed program and provide a brief narrative explaining how each of these concerns has been or is being addressed.

The pre-proposal (Appendix D) was presented to the CAVP Curriculum Working Group meeting by Dr. Russ Ivy, Senior Associate Provost for Academic Affairs, on Friday, September 28, 2018. **The pre-proposal was supported by the CAVP with a directive to reconsider the proposed program name (originally put forward as BS in Pre-Health Professions).** As such, we are proposing to use the title B.S. in Medical Biology. No other concerns were voiced by the committee.

C. If this is a doctoral level program please include the external consultant's report at the end of the proposal as Appendix D. Please provide a few highlights from the report and describe ways in which the report affected the approval process at the university.

This is not a doctoral level program.

D. Describe how the proposed program is consistent with the current State University System (SUS) Strategic Planning Goals. Identify which specific goals the program will directly support and which goals the program will indirectly support (see link to the SUS Strategic Plan on the resource page for new program proposal).

The proposed BS Medical Biology is fully aligned with the SUS's Strategic Plan and strongly promotes the planning goals of Excellence, Productivity and Strategic Priorities for a Knowledge Economy. A rigorous, well-delineated, medically-oriented degree program for students pursuing competitive post-secondary programs in the health sciences directly provides *Excellence, Productivity and Strategic Priorities* in *Teaching and Learning* by ensuring the rigor of the program relative to the realities of entering professional schools. As such, this will establish a high quality, reputable program that will attract students who will graduate with STEM degrees in a timely manner.

Careers in the medical professions are considered well-paying, high satisfaction occupations. Demand for well-trained medical professionals is high, is expected to continue to grow, and new specializations, such as Genetic Counseling, are emerging. From a local and state perspective, this degree program provides for the *Strategic Priority* of *Community and Business Engagement*, by providing a pipe-line for future professional talent for public and private business, and community services. In addition, when

viewed in light of FAU's success at attracting a diverse student population, this degree program is likely to bolster participation of under-represented groups in the medical professions in Florida.

Students pursuing the B.S. in Medical Biology are also highly likely to be interested in medical research opportunities. When combined with FAU's already established distinction in undergraduate research opportunities and FAU's strategical goals of enhancing the research pillars in Aging and in Neuroscience, we expect high participation rates of Medical Biology undergraduates in quality research programs. While indirect, this is consistent with the goal of developing *Excellence* and *Productivity* in *Scholarship, Research and Innovation*.

STATE UNIVERSITY SYSTEM GOALS	**EXCELLENCE**	**PRODUCTIVITY**	**STRATEGIC PRIORITIES FOR A KNOWLEDGE ECONOMY**
TEACHING AND LEARNING	DIRECT Strengthen Quality and Reputation of Academic Programs and Universities	DIRECT Increase Degree Productivity and Efficiency	DIRECT Increase the Number of Degrees Awarded in STEM and Other Areas of Strategic Emphasis
SCHOLARSHIP, RESEARCH AND INNOVATION	INDIRECT Strengthen Quality and Reputation of Scholarship, Research and Innovation	INDIRECT Increase Research and Commercialization Activity	INDIRECT Increase Collaboration and External Support for Research Activity
COMMUNITY AND BUSINESS ENGAGEMENT	DIRECT Strengthen Quality and Recognition of Commitment to Community and Business Engagement	DIRECT Increase levels of Community and Business Engagement	DIRECT Increase Community and Business Workforce

E. If the program is to be included in a category within the Programs of Strategic Emphasis as described in the SUS Strategic Plan, please indicate the category and the justification for inclusion.

The Programs of Strategic Emphasis Categories:

1. Critical Workforce:
   - Education
   - Health
   - Gap Analysis
2. Economic Development:
   - Global Competitiveness
3. Science, Technology, Engineering, and Math (STEM)

Please see the Programs of Strategic Emphasis (PSE) methodology for additional explanations on program inclusion criteria at the resource page for new program proposal.

1. Critical Workforce:

The need for skilled medical professionals and biomedical researchers remains high worldwide and is acknowledged by the emphasis placed on increasing the number of graduates with health and STEM degrees in the SUS Strategic Plan. According to the U.S. Bureau of Labor Statistics, overall employment of physicians and surgeons is projected to grow 7 percent from 2018 to 2028, faster than the average for all other occupations, due to increased demand for healthcare services by a growing and aging

population (https://www.bls.gov › ooh › healthcare › physicians-and-surgeons). The tailored education received by program participants will make them strong candidates to enter graduate and professional programs in health and medicine.

2. Economic Development:

A Labor Assessment and Portfolio Review conducted by Hanover Research in 2017 (Appendix C) compared growing occupations in the surrounding counties with FAU program offerings. According to the report, Healthcare Practitioners and Technical Occupations represent the fastest growing and largest occupation classification within the local area (Palm Beach and Broward counties) (p. 6) "revealing a sustained need for pre-professional programs" (p. 3). Increasing the numbers of healthcare providers will contribute to economic development; according to the U.S. Bureau of Labor Statistics, wages in the U.S. for physicians and surgeons is equal to or greater than $208,000 per year or $100.00 per hour (https://www.bls.gov › ooh › healthcare › physicians-and-surgeons). The proposed B.S. in Medical Biology will supply talented students for M.S., Ph.D., M.D. and M.D./Ph.D. programs in the SUS.

3. Science, Technology, Engineering, and Math (STEM)

The B.S. in Medical Biology will offer students pursuing professional/graduate schools (including Medical, Veterinary, Dental, Pharmacy and Physician Assistant) the rigor expected for admittance through a program core that spans the hard science disciplines and a pool of restricted electives in health/medically-related foundational courses (for example Immunology, Biology of Cancer, Medical Bacteriology). The curriculum will fulfill prerequisites of medically-focused schools, include recommended additional advanced courses, and consider Pre-Professional entrance exams.

F. Identify any established or planned educational sites at which the program is expected to be offered and indicate whether it will be offered only at sites other than the main campus.

The complete curriculum is available on our main campus in Boca Raton. The complete upper division program components are currently available on our satellite campus in Davie. A portion of the upper division program components are currently available on our satellite campus in Jupiter with an expansion of the Jupiter course suite to match upper division course availability in Davie already underway.

INSTITUTIONAL AND STATE LEVEL ACCOUNTABILITY

II. Need and Demand

A. Need: Describe national, state, and/or local data that support the need for more people to be prepared in this program at this level. Reference national, state, and/or local plans or reports that support the need for this program and requests for the proposed program which have emanated from a perceived need by agencies or industries in your service area. Cite any specific need for research and service that the program would fulfill.

From its southern- to northernmost campus locations, FAU serves five Florida counties (approximately 5,534 square miles of land): Broward, Palm Beach, St. Lucie, Martin, and Indian River. According to 2017 data from the United States Census Bureau, the combined population of these five counties exceeds 4 million. This is larger than the population of Connecticut and just short of the population of Oregon.

According to the Association of American Medical College's (AAMC) most current Florida Physician Workforce Profile which provides data for the 2018 calendar year, (https://www.aamc.org/system/files/2019-11/state-physician-Florida-2019_0.pdf), there were 56,484 total active physicians in Florida servicing a total state population of 21,299,325 at the release of the report. According to the Florida Department of Economic Opportunity, statewide, the top 5 fastest growing occupations between 2018 and 2026 will be in health or health-related fields (Physician

Assistant, Home Health Aide, Nurse Practitioner, Personal Care Aides, and Medical Assistants). Of the top 20 occupations projected to grow most rapidly statewide by 2026, 11 will be in health or health-related fields (http://www.floridajobs.org/workforce-statistics/data-center/statistical-programs/employment-projections). The Department of Labor projects that healthcare practitioners and related occupations will increase 15.3% to 23.6% as the fastest growing occupations in the US from 2016-2026 (https://www.bls.gov/emp/tables/emp-by-major-occupational-group.htm). Further, Hanover Research found that pre-med degrees are associated with the fastest and largest growing occupations in FAU's surrounding areas (Appendix C: Labor Assessment and Portfolio Review, Prepared for FAU, 2017).

Older adults make up a large percentage of the Florida population, According to the Florida Department of Elder Affairs (DOEA) (http://elderaffairs.state.fl.us/doea/pubs/stats/County_2017_projections/Counties/Florida.pdf), people over the age of 60 make up over 25 percent of the state's population and the United States Census Bureau (https://www.census.gov/) estimates that this group will make up 32.5 percent of the population by the year 2030. Older Floridians face many health issues related to aging. According to the Administration for Community Living's (ACL) most recent (2018) Profile of Older Americans, "most older persons have at least one chronic condition and many have multiple conditions" (https://acl.gov/sites/default/files/Aging%20and%20Disability%20in%20America/2018OlderAmericansProfile.pdf). In the 2016 results of the American Community Survey, 35.2% of respondents aged 65 and older reported having a disability (https://disabilitycompendium.org/sites/default/files/user-uploads/2017_AnnualReport_2017_FINAL.pdf). South Florida's large and growing elderly population will require the support of many more skilled medical professionals than currently practice in the state.

The B.S. in Medical Biology is a degree in the STEM/Health field that will be coveted by FAU's pre-med students and will supply workforce and economic needs. Students with this degree that wish to continue onto graduate professional or research degrees will supply talent to the M.S., Ph.D., M.D. and M.D./Ph.D. programs in the SUS and elsewhere. Students that decide not to pursue graduate education will supply talented employees to research institutes, which locally include The Scripps Research Institute and the Max Planck Florida Institute. Students that pursue graduate education will supplement the local, state, national and international communities with physicians, veterinarians, dentists, pharmacists and physician assistants. FAU's efforts to satisfy local needs that revolve around Healthy Aging (wellness, geriatrics, drug discovery and health policy) and Neuroscience (dementia, aging disorders involving the nervous system, cognitive and mental needs) will be energized by students graduating with this degree. A larger pool of high-achieving students graduating with the B.S. in Biomedical Sciences that get involved with the Charles E. Schmidt Colleges of Science and/or Medicine as skilled workers at the Bachelor's level or that pursue graduate education as Ph.D. or M.D. scientists will support research efforts and increase research funding at FAU.

At the national level, according to the Occupational Outlook Handbook "Employment of healthcare occupations is projected to grow 14 percent from 2018 to 2028, much faster than the average for all occupations, adding about 1.9 million new jobs. Healthcare occupations are projected to add more jobs than any of the other occupational groups. This projected growth is mainly due to an aging population, leading to greater demand for healthcare services.". The proposed BS Medical Biology will prepare students to enter the masters, doctoral and professional degree programs required to gain entry to numerous healthcare occupations including: audiologists, chiropractors, dentists, genetic counselors, occupational therapists, optometrists, orthotists and prosthetists, pharmacists, physical therapists, physician assistants, physicians and surgeons, podiatrists, speech-language pathologists, and veterinarians. Long term occupational projections for these fields (2016-2026) in Florida demonstrate a need for programs of this type (https://www.bls.gov/ooh/healthcare/home.htm and https://projectionscentral.com/Projections/LongTerm):

OccupationName	Projected Percent Change 2016-2026	Avg Annual Openings
Audiologists	25	60

Chiropractors	19.6	140
Dentists, All Other Specialists	16.2	20
Dentists, General	24	390
Genetic Counselors	36.4	10
Occupational Therapists	28.2	550
Optometrists	23.5	120
Orthodontists	26.6	40
Orthotists and Prosthetists	26.5	30
Pharmacists	14.2	1300
Physical Therapists	31.8	1070
Physician Assistants	49.5	620
Physicians and Surgeons, All Other	19.9	1080
Podiatrists	15.2	60
Speech-Language Pathologists	22.3	590
Veterinarians	30.4	310

B. Demand: Describe data that support the assumption that students will enroll in the proposed program. Include descriptions of surveys or other communications with prospective students.

Students wishing to pursue graduate education at professional schools (including Medical, Veterinary, Dental, Pharmacy and Physician Assistant) will be extremely interested in the B.S. in Medical Biology. This degree will thoroughly prepare students with the prerequisites to apply and be accepted into competitive graduate and professional schools. FAU currently offers a B.S. in Biology (CIP 26.0101), a flexible and holistic degree designed to train biologists. In this degree, students select specializations such as ecology, marine science, environmental science, animal behavior or microbiology. FAU also offers a B.A. in Health Science (CIP 51.000) which was designed for students wishing to pursue careers as dieticians/nutritionists, health educators, athletic trainers, exercise physiologists, recreational specialists, social and community service managers, music therapists, counselors, etc. The B.A. in Health Science (CIP 51.000) degree, however, does not offer the rigorous prerequisite courses for entry into medical, dental, or veterinary school.

Currently, there's a market not being served by FAU's existing programs. In any given year, there are an average of 2,800 declared biology majors at FAU and we gain approximately 1,000 new biology majors each year (including first-time-in-college freshmen (FTIC), Transfer, Postbach, and Early Admit). According to the Associate Dean of Undergraduate Studies for the College of Science, over 500 incoming students identify as "pre-health" each year. On this basis, we can estimate that approximately half of future would be Biology majors will choose the B.S. in Medical Biology over the existing Biology degree programs. This would leave a healthy population (approximately 1,400 majors) in existing biology degree programs and eventually populate the proposed Medical Biology degree program with an estimated student body of 1,400. While students can currently complete the pre-professional requirements in the existing B.S. in Biology degree program, as members of the existing major, these professional school-oriented students are not identifiable as a separate population with specific advising needs and course requirements. Undergraduate advising is not currently compulsory at FAU and, without appropriate support and direction, students attempting to pursue professional and graduate programs in the medical sciences through our existing program options may at times find themselves at a loss as to how to proceed, taking inappropriate coursework, and/or returning to FAU post-graduation to complete missing prerequisites prior to moving on to the next phase of their academic careers. Identifying students interested in continuing into professional health degree programs when they enter FAU will allow us to better serve this pool of students and promote timely degree completion.

Annual informal surveys of students enrolled in Genetics (PCB 3063), indicate that greater than 50% (70% if we treat all non-responses as disinterest in a career in healthcare) of our current and future biology majors would select this degree program rather than our existing Bachelor of Arts in Biology or Bachelor of Science in Biology degree options (both under CIP 26.0101).

Interest in Health Careers Among Enrollees in Genetics (PCB 3063) – Fall 2017 through Fall 2019

Term	Total Enrollment	Total Responses	Pursuing a degree in healthcare	Not interested in a career directly involved with healthcare	% of Respondents pursuing a career in healthcare
Fall 2017	343	278	242	36	87%
Fall 2018	345	223	194	29	87%
Fall 2019	346	251	220	31	88%

Genetics serves as our core, upper division gateway course for FAU biology majors, i.e. it is the only upper division course that has been required of **ALL** students in the major as part of the program core for many years. As such, the population in this course during any given year may be used as a representative sample of all biology majors who have enrolled in at least one major-specific course at the upper division level. Although this data would indicate that more than 50% of existing Biology majors will be interested in the B.S. Medical Biology, because the level of rigor required to complete the program may deter students, we are conservatively estimating that, if established, approximately 50% (~1,400) of future biology majors would select the proposed B.S. degree in Medical Biology which aligns with College of Science admissions data on "pre-health" students. This would leave large student numbers in the existing Biology B.S./B.A. options (~1,400 students). Given the differences in program emphasis, we do not anticipate that the establishment of the proposed program will impact the growth trajectory of the still relatively new Health Science B.A. (BAHS)—the BAHS enrollments have grown to > 800 majors in less than three years.

Further evidence for student demand for such a program is also implied by the number of health professions-oriented student organizations (founded and run by students) currently active at the university.

Pre-Health Professions Student Organizations:
http://www.science.fau.edu/student_services/pre_health/

- American Medical Student Association (AMSA)
- American Medical Woman's Association (AMWA)
- Association of Pre-Physician Assistants (APPA)
- Bioethics Society (BES)
- Blood Pressure Screening (BPSA)
- Future Health Professionals (HOSA)
- Global Medical Brigades
- Pre-Dental Society (Dental)
- Pre-Health Ambassadors (PHA)
- Pre-Optometry Professional Society (POPS)
- Pre-Veterinary Medical Association (PVMA)
- Minority Association of Pre-Medical Students (MAPS)
- Medical Missions Abroad (MMA)
- Relay for Life (RFL)

C. If substantially similar programs (generally at the four-digit CIP Code or 60 percent similar in core courses), either private or public exist in the state, identify the institution(s) and geographic location(s). Summarize the outcome(s) of communication with such programs

with regard to the potential impact on their enrollment and opportunities for possible collaboration (instruction and research). In Appendix C, provide data that support the need for an additional program.

According to the SUS, at the undergraduate (bachelor's) level, the CIP we propose to use (CIP 26.0102) is offered only at University of Central Florida in Orlando, University of South Florida in Tampa, and University of West Florida in Pensacola (https://prod.flbog.net:4445/pls/apex/f?p=136:45:7036291418400::NO). According to its website, there were 2,525 students enrolled in this program in 2015 at University of Central Florida (https://ikm.ucf.edu/) and 327 degrees were awarded in this major in 2016-17. At the University of South Florida, 160 students were enrolled in this CIP in 2018 (http://usfweb.usf.edu/DSS/INFOCENTER/) and no degrees had yet been awarded as of the 2018 data release. At University of West Florida, there were 350 students enrolled in this CIP in 2017 (https://tableau.uwf.edu/views/IR-FB-Enrollment/) and no degrees had yet been awarded as of 2017.

Of these three universities which offer undergraduate programs under the CIP we propose to use, the two located nearest to the FAU main campus where the bulk of the curriculum will be provided are between 180 and 250 miles away. As an institution that primarily serves place-bound learners, (approximately 80% of FAU's 30,000+ student population are commuter students and FAU is categorized by Carnegie Classification accordingly as a "large, primarily nonresidential" university), we do not anticipate that the development of this degree program at FAU will impact enrollments at the other institutions offering the program. Furthermore, none of the institutions represented during the CAVP Academic Program Coordination review group meeting objected to the pursuit of this program.

A Labor Assessment and Portfolio Review conducted by Hanover Research in 2017 (Appendix C) compared growing occupations in the surrounding counties with FAU program offerings. According to the report, Healthcare Practitioners and Technical Occupations represent the fastest growing and largest occupation classification within the local area (Palm Beach and Broward counties) (p. 6) "revealing a sustained need for pre-professional programs" (p. 3).

D. Use Table 1 in Appendix A (1-A for undergraduate and 1-B for graduate) to categorize projected student headcount (HC) and Full Time Equivalents (FTE) according to primary sources. Generally undergraduate FTE will be calculated as 30 credit hours per year and graduate FTE will be calculated as 24 credit hours per year. Describe the rationale underlying enrollment projections. If students within the institution are expected to change majors to enroll in the proposed program at its inception, describe the shifts from disciplines that will likely occur.

The projections in Table 1-A were made as described below.

Upper-level students who are transferring from other majors within the university: We anticipate a very modest initial influx of internal FAU junior and senior level transfer students (transferring from other majors within the university) which we expect to occur over the course of the first year of the program. We predict this population will dwindle to zero by the end of year 3 as the students within this population graduate and exit the university. We expect that the majority of these transfers will be students who are currently enrolled in the B.S. in Biological Sciences although the program may also attract some students who are currently enrolled in the B.S. in Neuroscience and Behavior, a joint degree program presented by the Departments of Biological Sciences and Psychology. We estimate that approximately 30 students will both desire to transfer AND will have already completed a sufficient proportion of their coursework in courses that fulfill the requirements of the new major to make the transition. We do not expect that upper division students who are close to completion of their current programs will transfer if a transfer would require that they complete a substantial number of additional credits in order to fulfill B.S. in Medical Biology program requirements. The proposed program has a large core and requires that students select electives from a restricted pool. Many interested

upperclassmen will find that the curriculum does not align with the coursework that they have completed thus far well enough to support a timely graduation if they were to change their majors.

Students who initially entered the university as FTIC students and who are progressing from the lower to the upper level:
Each year we gain approximately 1,000 new biology majors and close to 500 of these students are first-time-in-college freshmen (FTIC).

	Historical Enrollment of new FTIC Admits by Academic Year					
	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	5-YR AVG
Headcounts	519	666	512	468	461	525

According to the Associate Dean of Undergraduate Studies for the College of Science, over 500 incoming students identify as "pre-health" each year. We assume that it is equally likely that a FTIC and a Transfer (or other, e.g. postbach, early admit) student will identify as "pre-health" and so estimate that approximately half of existing FTIC Biology majors who are progressing from the lower to the upper division would choose the B.S. in Medical Biology over the existing Biology degree programs if given the opportunity to do so.

However, by the end of any given FTIC cohort's second year, it is typical that only approximately 320 of each original cohort of 500 students will have maintained an adequate level of achievement in the major to continue on as a student in Biology (a 20% loss in year 1 and a 20% loss in year 2). Projected enrollments across this row of Table 1-A *Projected Headcount From Potential Sources* assume that 50% of the remaining members (after two years) of any given FTIC cohort who advance from the lower level (freshman/sophomore) to the upper level (junior/senior) within the Biology major and will wish to pursue the BS Medical Biology specifically (approximately 160 students per cohort). The data in this row of Table 1-A are adjusted for historical graduation rates (approximately 40% of these majors will complete in 4 years) and, as described above, are adjusted for year one and year two attrition rates among FTICs within the rigorous Biology major.

Florida College System transfers to the upper level: Over the last 5 years, the Biology major has received an average of approximately 360 new Florida College System transfers per year according to Admissions data collected and reported by FAU's Office of Institutional Effectiveness and Analysis (360 of the total students who were accepted and who then subsequently enrolled):

	Historical Enrollment of new FL College System Transfer Admits by Academic Year					
	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	5-YR AVG
Headcounts	366	406	347	379	305	360

Based on the above headcount data and given that approximately 50% of all new incoming Biology Department majors identify as "pre-health" each year, we project an infusion of approximately 180 Florida College System transfers to the upper level in the Medical Biology B.S. program per year. We have populated this row of Table A-1 assuming 1) that 180 of these students will enter the proposed program per year, 2) that most of these students will require a minimum of four years at FAU (beyond time spent in the FLCS) to complete their degrees—the National Student Clearinghouse's Tracking

Transfer – 2017 report states that the six year graduation rate among bachelors seeking students who transfer from a community college is only 13.3% (https://nscresearchcenter.org/signaturereport13/), and 3) adjusting for an anticipated 10% rate of attrition (distributed across years 1 and 2) for any given incoming FLCS transfer cohort due to failure to maintain an adequate level of achievement in this rigorous major. We predict a 10% (or less) attrition rate for transfer students based on historical data that indicate that these students persist within our existing biology degree programs. These will be students who have already been successful in the lower division gate keeper courses and are less likely to exit the major than the FTIC students described above.

Transfers to the upper level from other Florida colleges and universities: Historical data indicate that we can expect fewer than 110 Biology Department transfers to the upper level from other Florida Colleges and Universities in any given year.

	***Historical Enrollment of New Non-FL College System, Florida School Transfer Admits to Biology by Academic Year**					
	2014-2015	**2015-2016**	**2016-2017**	**2017-2018**	**2018-2019**	**5-YR AVG**
Headcounts	82	106	64	74	74	80

***Note: published FAU IEA data distinguishes between FL College System transfers and non-FL College System transfers but does not differentiate between transfers from Non-FLCS Florida universities and transfers from outside of the state. Here we have used Florida residency status as a proxy for transfer from a Florida university that is not part of the FLCS.**

Based on the above headcount data and given that approximately 50% of all new incoming Biology Department majors identify as "pre-health" each year, we project an infusion of approximately 40 transfers to the upper level from other Florida colleges and universities in the program per year. We have populated this row of Table A-1 assuming 1) that 40 of these students will enter per year, 2) that most of these students will require approximately two years at FAU (beyond time spent at their previous institutions) to complete their degrees, and 3) adjusting for an anticipated 10% year 1 rate of attrition for any given incoming FLCS transfer cohort due to failure to maintain an adequate level of achievement in this rigorous major.

Transfers from out of state colleges and universities: FAU serves primarily commuter students (place-bound learners) in Broward and Palm Beach counties. Historical data indicate that we can expect fewer than 30 new out of state Biology Department transfers in any given year.

	***Historical Enrollment of New Out of State Transfers Admits to Biology by Academic Year**					
	2014-2015	**2015-2016**	**2016-2017**	**2017-2018**	**2018-2019**	**5-YR AVG**
Headcounts	13	31	18	27	20	22

***Note: published FAU IEA data distinguishes between FL College System transfers and non-FL College System transfers but does not differentiate between transfers from Non-FLCS Florida universities and transfers from outside of the state. Here we have used lack of Florida residency status as a proxy for transfer from an out of state school.**

Based on the above headcount data and given that approximately 50% of all incoming Biology Department majors identify as "pre-health" each year, we project an infusion of approximately 10 transfers to the upper level from other Florida colleges and universities in the program per year. We have populated this row of Table A-1 assuming 1) that 10 of these students will enter per year, 2) that most of these students will require approximately two years at FAU (beyond time spent at their previous

institutions) to complete their degrees, and 3) adjusting for an anticipated 10% year 1 rate of attrition for any given incoming out of state transfer cohort due to failure to maintain an adequate level of achievement in this rigorous major.

Other (New Incoming FTIC Students): Many incoming FAU students enter declaring an intention of attending a health professional graduate program upon graduation. While the majority will pursue a major in the sciences (primarily in Biology), we cannot assume that all will select this program; they may choose a major in, for example, Chemistry or Neuroscience and Behavior. Furthermore, only a portion of those students who select a biological/life science major will commit to the level of rigor required by the Medical Biology B.S. curriculum. Other new entrants will select majors outside of the sciences and complete professional program prerequisites toward free elective requirements of their non-science major degree programs. As such, we anticipate that, although approximately 500 incoming FTIC students identify as pre-health on entering FAU per year, approximately 150 of these students will pursue this degree option each year. Projected headcounts among this category of students across years one through five account for anticipated retention and graduation rates based on historical data on Biology majors.

FTE Calculations

Historical data demonstrate that approximately 60% of FAU Biology majors attend full-time and 40% attend part-time.

	Historical Course Loads Among Biology Majors by Academic Year					
	2014-2015	**2015-2016**	**2016-2017**	**2017-2018**	**2018-2019**	**5-YR AVG**
Full-Time Headcounts	1720	1592	1782	1764	1884	1748
Part-Time Headcounts	1262	1177	1073	1017	1078	1121
Total	2982	2769	2855	2781	2922	2862

If we assume the above distribution in completing Table 1-A, we can approach the FTE calculation in the following as described in the below example:

Where HC refers to headcount, if HC = 30, then projected full-time HC = 30 x 0.60 students (18) and projected part-time HC = 30 x 0.40 students (12). If we multiply full-time students by 30 credits per year, this equals 540 credits. If we assume part-time students are enrolling half-time (15 credits per year), we would multiply 12 students by 15 credits per year to equal 180 credits. Our total projected credits for the total population of 30 students would then equal 540 + 180 (720 total credits). In order to then determine our projected FTE, we would divide 720 total credits by 30 credits per year which equals 24.

E. Indicate what steps will be taken to achieve a diverse student body in this program. If the proposed program substantially duplicates a program at FAMU or FIU, provide, (in consultation with the affected university), an analysis of how the program might have an impact upon that university's ability to attract students of races different from that which is predominant on their campus in the subject program. <u>The university's Equal Opportunity Officer shall review this section of the proposal and then sign and date Appendix B to indicate that the analysis required by this subsection has been completed</u>.

As a minority majority institution, we do not anticipate difficulty in maintaining a diverse student body

in this program. FAU boasts the most racially, ethnically and culturally diverse student body in the Florida public university system. In 2015 FAU was ranked No. 31 by Best College Reviews in their list of the "The 50 Top Ethnically Diverse Colleges In America" (https://www.bestcollegereviews.org/features/top-ethnically-diverse-colleges/). It was one of only three Florida colleges to make the list and the only Florida public college on the list. This same year, Diversity was installed as one of the platforms in FAU's "Strategic Plan for the Race to Excellence", a Diversity Council under the Office of Equity, Inclusion and Compliance was formed to identify, promote and build institutional cross-cultural competencies, and FAU received a $620,000 NSF Advance Grant to increase the representation and advancement of women and underrepresented minorities in STEM. In 2017, FAU received designation as a Hispanic-Serving Institution (HSI) and has since established a Center for Inclusion, Diversity Education, and Advocacy (IDEAs) (https://www.fau.edu/diversity/). The Center's mission and vision statements are:

> *Mission*: The center highlights the experiences of traditionally marginalized groups through intentional interactions aimed at fostering awareness and cultivating new perspectives. By offering quality programs and educational opportunities to all students, we create a campus climate that values differences and promotes equity.
>
> *Vision*: Through the center, Florida Atlantic University will be recognized as a world-class model for diversity and inclusive excellence.

Since the achievement of the HSI designation and establishment of the Center for IDEAs, FAU has also increased entrance requirements while simultaneously deploying several new, data-informed (using Civitas) student support initiatives Some examples of new services and initiatives include the launching of a summer bridge program for incoming students, establishing plans of study for all students which provide step-by-step roadmaps through a personalized Success Network which includes access to an academic advisor, a career coach and a financial aid counselor, the introduction of a flexible Bachelor of general studies program, initiation of retention and graduation incentive programs, establishment of a nudging program, etc. Through these programs we have enhanced retention and graduation rates university-wide and the data indicate that our students who are classified as underrepresented minorities are actually outperforming white students.

Academic Progress and Retention Rates

		FALL 2011		FALL 2012		FALL 2013		FALL 2014		FALL 2015		FALL 2016		FALL 2017	
	GROUP	Progress	Retention	Progress	Retention	Progress	Retention	Progress	Retention	Progress	Retention	Progress	Retention	Progress	Retention
FAU	All	71.9%	78.6%	67.8%	74.9%	65.9%	74.6%	72.2%	77.8%	74.7%	77.1%	78.4%	80.1%	80.3%	82.2%
	FG	71.3%	77.0%	66.0%	73.8%	66.9%	76.7%	72.5%	79.1%	73.3%	76.2%	79.6%	81.1%	80.2%	82.4%
	PE	73.8%	80.3%	68.8%	76.8%	67.5%	77.0%	72.5%	78.6%	76.5%	78.9%	80.2%	82.2%	82.7%	84.8%
	FG + PE	72.1%	77.9%	66.7%	74.7%	67.1%	77.1%	73.9%	79.7%	78.0%	81.1%	80.2%	82.0%	81.1%	83.3%
Black	All	77.5%	84.8%	70.6%	79.7%	71.7%	82.4%	74.6%	81.2%	77.2%	80.3%	80.2%	83.4%	83.8%	86.1%
	FG	76.2%	83.3%	70.0%	80.8%	73.8%	85.2%	75.9%	81.3%	79.3%	83.0%	82.6%	86.0%	85.0%	87.9%
	PE	77.4%	83.9%	71.3%	80.8%	72.9%	83.7%	73.2%	80.3%	78.6%	81.3%	80.6%	84.2%	85.1%	87.5%
	FG + PE	75.7%	82.5%	67.0%	79.4%	72.2%	84.9%	76.5%	82.4%	81.6%	86.0%	83.0%	87.0%	85.4%	87.5%
Hispanic	All	75.0%	81.1%	71.2%	77.9%	65.1%	75.5%	73.4%	78.9%	77.2%	80.5%	81.5%	82.8%	80.9%	83.0%
	FG	77.9%	81.6%	73.2%	79.2%	67.6%	79.5%	73.8%	79.3%	77.6%	82.3%	81.4%	82.9%	81.9%	84.4%
	PE	76.5%	82.4%	71.0%	80.1%	63.9%	74.8%	75.1%	80.7%	78.4%	82.6%	81.9%	83.5%	84.5%	86.0%
	FG + PE	78.5%	83.5%	73.3%	80.7%	68.9%	79.7%	75.4%	80.5%	82.1%	87.0%	80.7%	82.0%	84.1%	86.0%
White	All	69.1%	75.6%	65.2%	71.8%	63.2%	70.8%	70.3%	75.9%	72.2%	73.7%	75.6%	76.9%	77.7%	79.1%
	FG	67.1%	72.6%	61.0%	68.9%	61.9%	70.0%	70.6%	78.2%	64.4%	66.0%	74.4%	75.3%	76.1%	77.2%
	PE	69.7%	75.9%	64.1%	70.3%	63.3%	70.9%	67.7%	74.0%	71.8%	72.1%	76.2%	77.7%	78.0%	79.6%
	FG + PE	65.8%	70.7%	57.7%	65.0%	57.0%	64.2%	69.6%	77.4%	66.3%	66.3%	74.5%	75.5%	71.6%	73.0%

Color Scale: High Middle Low

All - All Students

FG - First-generation students

PE - Pell-eligible students

FG + PE = first generation and pell eligible students (combined)

At the administering department level, Drs. Rod Murphey, Professor, and Evelyn Frazier, Senior Instructor, previously developed a $700,000 NSF grant for **U**ndergraduate **R**esearch and **M**entoring

(URM). The purpose of this funding was to "pilot new methods for broadening the participation of underrepresented groups in STEM fields" (https://nsf.gov/awardsearch/showAward?AWD_ID=0829250). The program served as the foundation for many of the Honors level programs in the Department of Biological Science. These derivative programs developed within our department ultimately served as the model for FAU's Quality Enhancement Plan (QEP) *Distinction through Discovery* which was lauded by reviewers during a 2013 reaffirmation of accreditation from the Southern Association of Colleges and Schools: Commission on Colleges (SACSCOC) in 2013.

More recently, Dr. Alex Keene, Associate Professor, obtained an NSF **R**esearch **E**xperience for **U**ndergraduates (**REU**) grant to fund a Summer Integrative Neuroscience Experience (SINE). Minorities and women are strongly encouraged to apply for this paid, ten-week program focused on training, mentoring, research and an overall experience for students that prepares them for graduate studies or careers in science, technology, engineering or math (STEM) disciplines (http://www.fau.edu/jupiter/research/reu-sine/). Dr. Keene has also recently submitted (with Drs. Murphey and Frazier as co-PIs) an Undergraduate Research Training Initiative for Student Enhancement (U-RISE) proposal for a diversity enhancing training program. To be eligible for this funding, the presence of sufficient potential trainees from diverse backgrounds must be demonstrated. The Funding Opportunity Purpose states:

"The goal of the Undergraduate Research Training Initiative for Student Enhancement (U-RISE) program is to develop a diverse pool of undergraduates who complete their baccalaureate degree, and transition into and complete biomedical, research-focused higher degree programs (e.g., Ph.D. or M.D./Ph.D.)" (https://grants.nih.gov/grants/guide/pa-files/PAR-19-218.html).

This proposal is currently undergoing Scientific Merit Review. Participants in the proposed Medical Biology B.S. who meet program eligibility requirements will have access to the existing SINE program and the U-RISE program should the proposal be awarded.

As stated previously, we anticipate that the vast majority of future B.S. in Medical Biology majors will be those who would have otherwise selected the B.S. in Biological Sciences major at FAU. A diversity snapshot of our existing Biology major population is provided below. We expect that the B.S. in Medical Biology population will closely resemble these distributions. This data was obtained via the Headcount Enrollments Interactive Reporting Tool (http://iea.fau.edu/reports/headcount.aspx) managed by the FAU Office of Institutional Effectiveness and Analysis and represents the gender/race/ethnicity distribution among students within the biology major during the 2017-2018 academic year (the most recent complete dataset).

	Gender		
Ethnicity	Female	Male	Total
Asian	121	74	195
Black or African American	432	178	610
Hispanic or Latino	568	245	813
American Indian or Alaska Native	4	2	6
Two or more races	72	41	113
Nonresident alien	55	22	77
Native Hawaiian or Pacific Islander	2	0	2
White	619	326	945
Race and ethnicity unknown	15	5	20
Total	1888	893	2781

The data demonstrate that 51% (610 Black or African American + 813 Hispanic or Latino + 6 American Indians or Alaska Natives) of the Biology major population would be identified as underrepresented in STEM degree attainment by the National Science Foundation's definition

(https://www.nsf.gov/statistics/2017/nsf17310/digest/introduction/). Biology is the largest academic major at FAU and this diversity data is consistent with and representative of diversity across the university.

Neither FIU nor FAMU offer a Bachelor's of Science Program in Medical Biology (CIP 26.0102). Included in Appendix B are letters from both universities confirming no conflict. Furthermore, FAU serves primarily commuter students (place-bound learners) within Broward and West Palm Beach counties and would be the only institution in Southeast Florida to present this program. The three Florida schools that currently present this program are University of Central Florida, University of South Florida, and University of West Florida.

III. Budget

A. Use Table 2 in Appendix A to display projected costs and associated funding sources for Year 1 and Year 5 of program operation. Use Table 3 in Appendix A to show how existing Education & General funds will be shifted to support the new program in Year 1. In narrative form, summarize the contents of both tables, identifying the source of both current and new resources to be devoted to the proposed program. (Data for Year 1 and Year 5 reflect snapshots in time rather than cumulative costs.)

The BS in Medical Biology degree program is a repackaging of existing course offerings in FAU's College of Science and College of Medicine. As such, we anticipate that minimal, if any, new resources will be required to implement this program. Rather than increasing our overall student population, we expect that current and future biology majors will simply redistribute themselves across available major options and their existing corresponding elective options mainly within our department based on their interests and career goals. Our total major population has remained relatively consistent over the course of the last 5 years at approximately 2,800 majors per year.

As such, Table 2 in Appendix A reflects the anticipated redistribution of faculty, staff, adjunct and teaching assistant efforts. In the case of faculty and staff, calculations have been made based on the components of a given individual worker's assignment which will be impacted by the program. For example, we have two faculty members who teach the courses BSC 1010 and BSC 1011, both of which are core program requirements for existing biology majors and will also serve as core program requirements for BS Medical Biology majors. One of these two faculty members also has a service role as the Chair of the Departmental Undergraduate Program's Committee. This committee is responsible for, among other things, reviewing petitions submitted by all undergraduate students participating in biology department degree programs—the committee will continue to perform this task as it pertains to existing biology majors and will begin to also complete it as it will pertain to BS Medical Biology majors as the program rolls out and grows. Both the teaching and service components of this faculty member's annual assignment will be impacted by implementation of the proposed BS Medical Biology, while only teaching efforts will be impacted in the case of the second faculty member. First taking into account each worker's individual effort distribution (e.g. 40% Teaching, 40% Research and 20% service), we have then looked at how those efforts within each category will or will not be impacted (e.g. which of the courses they teach will be included in the major), determined what proportion of each component of their assignment would be impacted and to what extent (based on projected enrollment shifts between the existing and newly proposed majors over years 1 through 5), and finally combined those proportions to determine a total effort redistribution and populated tables 4 and 2 accordingly.

Adjunct and teaching assistant effort redistributions were calculated differently. Since adjuncts only have teaching responsibilities, usually for only one course, we first identified those adjunct-taught courses which would be included in the new degree program's curriculum. We then projected what percentage of student enrollments in those adjunct taught courses would consist of students in the proposed versus existing degree over years 1 through 5 and redistributed the adjuncts' per relevant course salaries accordingly. In the case of teaching assistants (TAs), we pooled data by teaching groups that will be impacted by the establishment of the BS Medical Biology. Our TAs are divided into teaching groups by

the laboratory courses that they teach (e.g. a Microbiology teaching group, an Anatomy and Physiology teaching group). Only those teaching groups responsible for teaching laboratory courses that can be taken by students in the BS Medical Biology will be impacted by the establishment of this new program. For example, BS Medical Biology majors will be required to complete upper division laboratory coursework in anatomy and physiology (PCB 3703L and 3704L or PCB 4723L and ZOO 4690L) while the lower division versions of these TA-taught laboratory courses (BSC 2085L and 2086 L) will not fulfill their degree requirements. As such, the upper level physiology and anatomy teaching group will be impacted while the lower level one will not. In order to populate this portion of Table 2, we identified all TA teaching groups to be impacted by the new degree program, projected what percentage of the total student population within those laboratory sections would be BS Medical Biology majors within Years 1 and 5, and since the BS Medical Biology majors will be distributed throughout all impacted laboratory sections with all other biology majors (rather than in separate sections of the same laboratory course), we assume that equivalent percentages of the TA budget for each teaching group will be redistributed in Years 1 and 5.

B. Please explain whether the university intends to operate the program through continuing education, seek approval for market tuition rate, or establish a differentiated graduate-level tuition. Provide a rationale for doing so and a timeline for seeking Board of Governors' approval, if appropriate. Please include the expected rate of tuition that the university plans to charge for this program and use this amount when calculating cost entries in Table 2.

The university does not intend to operate the program through continuing education, seek approval for market tuition rate, or establish a differentiated graduate-level tuition.

C. If other programs will be impacted by a reallocation of resources for the proposed program, identify the impacted programs and provide a justification for reallocating resources. Specifically address the potential negative impacts that implementation of the proposed program will have on related undergraduate programs (i.e., shift in faculty effort, reallocation of instructional resources, reduced enrollment rates, greater use of adjunct faculty and teaching assistants). Explain what steps will be taken to mitigate any such impacts. Also, discuss the potential positive impacts that the proposed program might have on related undergraduate programs (i.e., increased undergraduate research opportunities, improved quality of instruction associated with cutting-edge research, improved labs and library resources).

Because this is a repackaging of existing course offerings, rather than increasing our overall student population, we expect that current and future biology majors will redistribute themselves across available major options within our department based on their interests and career goals. Because the program is based on existing course offerings, many of which are already being completed by some Pre-Professional-oriented biology majors, we do not anticipate that this degree will have a major impact on other programs. A subpopulation of our students are already enrolling in many of the program-specific courses, as BS Biology majors rather than BS Medical Biology majors.

The Department which will experience a large and direct impact is the Department of Mathematical Sciences. Participants in the BS Medical Biology will require Life Science Calculus I (MAC 2241). Existing Biology majors require the lower level Methods of Calculus course (MAC 2233). The Math Department has agreed to revive MAC 2241 (it was offered at FAU in past) to support the proposed program. As stated previously, rather than increasing our overall student population, we expect that current and future biology majors will redistribute themselves across available major options within our department based on their interests and career goals. As such, the Math Department should also see a redistribution of efforts rather than an increased load. Because we anticipate substantial enrollments in this program in the long run, the Math Department is has agreed to bring MAC 2241 back into regular rotation and has provided us with a letter of support which can be found in Appendix E.

The Department of Chemistry & Biochemistry can expect to see some increase in enrollments in Organic Chemistry II Lab (CHM 2211L) and Biochemistry I (BCH 3033) as well as in a few additional upper division chemistry elective courses (which the Chemistry & Biochemistry Department requested be included in the program curriculum) and they too have provided us with a letter of acknowledgement and support (Appendix E).

Furthermore, we have obtained confirmations of no conflict/letters of support from all other departments in FAU's College of Science as well as from the Department of Biomedicine in FAU's College of Medicine (Appendix E). Besides the host department, Biology, the Department of Physics is the only other department which will see an effort reallocation without an increase in enrollments. Due to prerequisites related to their courses which feature in the proposed curriculum, the Department of Biomedicine will likely see only small enrollment increases.

D. Describe other potential impacts on related programs or departments (e.g., increased need for general education or common prerequisite courses, or increased need for required or elective courses outside of the proposed major).

The Department of Biology maintains a population of approximately 2,800 majors in any given year.

	Final Unduplicated Headcount Enrollment: FAU Biology Majors by Academic Year				
	2014-2015	**2015-2016**	**2016-2017**	**2017-2018**	**2018-2019**
Total #s	2,982	2,769	2,885	2,781	2,922

We anticipate a redistribution (a roughly 50:50 split) of these majors rather than a dramatic growth of the total majors within the department in response to the establishment of the proposed B.S. in Medical Biology based on data from the College of Science Student Support Services and Pre-Health Professions offices which indicate that approximately 500 new incoming students identify as "pre-health" per year out of the approximately 1,000 new biology majors that enter FAU each year (totals include FTIC, Transfer, Postbach, and Early Admit).

Given overlap across the common pre-requisites for CIP 26.0101 and 26.0102, we anticipate no substantial increased need for common prerequisite courses. Nor do we predict increased need for general education courses since these requirements will not differ between the Biology and Medical Biology degree programs.

The proposed program will require that students complete Biochemistry I (BCH 3033) which currently serves as an elective for our existing majors; this course is already selected as an elective by many of our majors who wish to pursue graduate and professional programs as biochemistry is a component of professional school entrance exams. We do anticipate some increased need for seats in this course, however, the course was recently dropped from the core requirements within the B.S. in Neuroscience and Behavior (JNSB) which we co-administer with the Department of Psychology. As such, an influx of B.S. in Medical Biology majors in BCH 3033 paired with a simultaneous efflux of NSB majors may not significantly alter the overall enrollments in this course. Additionally, there is room for growth in enrollments in this course at this time. According to historical enrollment data, this course is offered year-round and currently does not fill to capacity during the spring and summer semesters.

The Department of Chemistry & Biochemistry has also collaborated with our department on this proposal and the result of these conversations was the addition of several chemistry course options to the list of program electives for the B.S. Medical Biology degree that are appropriate for the degree (Structural Chemistry, Introduction to Drug Design, Special Topics in Chemistry, and Directed Independent Study).

The FAU College of Medicine has also collaborated with our department on this proposal and the result

of these conversations was the addition of several biomedicine course options to the list of program electives for the B.S. Medical Biology degree that are appropriate for the degree (Special Topics in Biomedical Science, Directed Independent Study, and Directed Independent Research).

Both the College of Medicine and the Department of Chemistry & Biochemistry have provided us with letters of support which can be found in Appendix E.

All other program electives are offered by the Department of Biological Sciences and we will work to redistribute our teaching efforts internally as necessary to accommodate program-related shifts in student elective choices should needs exceed seats currently available in program-specific electives.

E. Describe what steps have been taken to obtain information regarding resources (financial and in-kind) available outside the institution (businesses, industrial organizations, governmental entities, etc.). Describe the external resources that appear to be available to support the proposed program.

As the proposed program is aimed primarily to direct students into coursework appropriate for those with an interest in professional schools, additional outside resources are not required. However, many of the students in this program will want to strengthen their professional school readiness by participating in undergraduate research opportunities and honor's programs. Our department has obtained and continues to seek grant funding which would support these aspects of the program. Most recently, Dr. Alex Keene, Associate Professor, obtained an NSF **R**esearch **E**xperience for **U**ndergraduates (**REU**) grant to fund a Summer Integrative Neuroscience Experience (SINE), a paid, ten-week program focused on training, mentoring, research and an overall experience for students that prepares them for graduate studies or careers in science, technology, engineering or math (STEM) disciplines (http://www.fau.edu/jupiter/research/reu-sine/). Dr. Keene has also recently submitted an Undergraduate Research Training Initiative for Student Enhancement (U-RISE) proposal for a diversity enhancing training program which is currently under review.

Additionally, internships are available through FAU's College of Science Student Services, Pre-Health, and Career Development offices. There are currently over 200 local providers affiliated with FAU's Medical Internship course.

IV. Projected Benefit of the Program to the University, Local Community, and State

Use information from Tables 1 and 2 in Appendix A, and the supporting narrative for "Need and Demand" to prepare a concise statement that describes the projected benefit to the university, local community, and the state if the program is implemented. The projected benefits can be both quantitative and qualitative in nature, but there needs to be a clear distinction made between the two in the narrative.

The large and expanding population, in particular the large aging population, in South Florida continues to generate a pressing need for more trained health professionals. This program will thoroughly prepare students for admittance to competitive graduate and professional programs in the health professions. The focused and rigorous nature of the program, student desire for such a program, and the demand for students trained in the health fields will ensure a healthy and sustainable program, as outlined below.

Quantitative Benefits:

Above average job growth is projected for Healthcare Practitioners and Technical Occupations. Average occupation growth rates in healthcare occupations across geographic areas covered in the Hanover report (local area, Palm Beach, Broward, Collier, De Soto, and Indian River counties), Standard Occupation

Classification (SOC) 290000, which includes Nurse Practitioners, Physician Assistants, Dietitians and Nutritionists, Physical Therapists, Occupational Therapists, Speech-Language Pathologists, Dentists, Physicians and Surgeons, Health Diagnosing and Treating Practitioners, Therapists, and Audiologists exceed 10% at the minimum and, in many cases, exceed 20% from now until 2024. This would suggest a sizeable job market for graduates of FAU's proposed program. The proposed B.S. in Medical Biology will supply talented students for M.S., Ph.D., D.V.M., M.D. and M.D./Ph.D. programs in the SUS. This workforce will provide solutions to healthcare needs of the south Florida community, the state of Florida, and beyond. There is expected to be significant demand for healthcare professionals locally due to both a growing and aging population in Florida.

According to the Florida Department of Elder Affairs (http://elderaffairs.state.fl.us/doea/pubs/stats/County_2017_projections/Counties/Florida.pdf), people over the age of 60 make up over 25 percent of the state's population, and the United States Census Bureau (https://www.census.gov/) estimates that this group will make up 32.5 percent of the population by the year 2030. Older Floridians and face many health issues related to aging. According to the Administration for Community Living's (ACL) most recent (2018) Profile of Older Americans, "most older persons have at least one chronic condition and many have multiple conditions" (https://acl.gov/sites/default/files/Aging%20and%20Disability%20in%20America/2018OlderAmericansProfile.pdf). In the 2016 results of the American Community Survey, 35.2% of respondents aged 65 and older reported having a disability (https://disabilitycompendium.org/sites/default/files/user-uploads/2017_AnnualReport_2017_FINAL.pdf). South Florida's large and growing elderly population will require the support of many more skilled medical professionals than currently practice in the state. As reported by the Association of American Medical College's (AAMC) most current Florida Physician Workforce Profile which provides data for the 2018 calendar year, (https://www.aamc.org/system/files/2019-11/state-physician-Florida-2019_0.pdf), there were 56,484 total active physicians in Florida servicing a total state population of 21,299,325 at the release of the report. According to the Florida Department of Economic Opportunity, statewide, the top 5 fastest growing occupations between 2018 and 2026 will be in health or health-related fields (Physician Assistant, Home Health Aide, Nurse Practitioner, Personal Care Aides, and Medical Assistants). Of the top 20 occupations projected to grow most rapidly statewide by 2026, 11 will be in health or health-related fields (http://www.floridajobs.org/workforce-statistics/data-center/statistical-programs/employment-projections). The Department of Labor projects that healthcare practitioners and related occupations will increase 15.3% to 23.6% as the fastest growing occupations in the US from 2016-2026 (https://www.bls.gov/emp/tables/emp-by-major-occupational-group.htm). In addition, the Bureau of Labor Statistics reports that at the national level, 17 of the 30 fastest growing occupations (projected change, 2018-2028) will be in healthcare fields (https://www.bls.gov/emp/tables/fastest-growing-occupations.htm).

There are likely to be significant economic benefits as well, as the median pay for Physicians and Surgeons was $208,000 in 2018, according to the Occupational Outlook Handbook (https://www.bls.gov/ooh/healthcare/physicians-and-surgeons.htm),. If a new FAU degree program can add another 15-20 graduates that worklocally, this would mean an approximate addition of 3 to 4 million dollars to the local economy. This can be expected as the majority of our students are place-bound learners, and we thus anticipate that many graduates of the proposed program would likely wish to remain in the state as they complete their subsequent professional education and enter the workforce. These students are the target population for the proposed program. The Hanover Research Labor Assessment and Portfolio Review revealed "*a sustained need for pre-professional programs*" and identified Biological Science as a degree program with growing student demand with potential for expansion. According to this report, "*healthcare and engineering represent the most promising potential program areas for expansion, due to high projected growth for multiple occupations in these fields*" and "*in health, demand is high for individuals with advanced professional credentials*". Healthcare Practitioners and Technical Occupations linked to "pre-med", nursing and exercise science degree programs are reported to be the largest and fastest growing occupations in the local area and Palm Beach and Broward Counties with median annual job openings of 26,279 (local area), 7,733 (Palm Beach), and 8,488 (Broward).

Qualitative Benefits:

FAU was designated a Hispanic Serving University in 2017 and 51% of the current Biology major population (total population of 2,781) would be identified as underrepresented in STEM degree attainment by the National Science Foundation's definition 610 Black or African American + 813 Hispanic or Latino + 6 American Indians or Alaska Natives) (https://www.nsf.gov/statistics/2017/nsf17310/digest/introduction/). Introduction of the proposed program would better support our diverse student population in achieving admittance to graduate and professional programs. As such, the program would support diversity and inclusion efforts in the health professions and enhance service to large, local underserved populations by graduates who choose to practice in Southeastern Florida following subsequent professional education. Because the majority of our students are place-bound learners, we anticipate that many graduates of the proposed program would likely wish to remain in the state as they complete their subsequent professional education and enter the workforce.

This focused program will also help to attract top students and enhance faculty scholarship and productivity through mentor-mentee research relationships with program participants. Many of the students in this program will want to strengthen their professional school applications by participating in undergraduate research opportunities and honor's programs, which supports SUS goals of achieving research and academic excellence. The presence of a designated Medical Biology degree program should also prove attractive to higher-achieving high school students, thus increasing the mean GPA of our incoming students while increasing the numbers who will graduate in only 4 years. These benefits will strengthen the quality and reputation of FAU's academic programs and of FAU as a university and, in doing so, increase the pre-eminence and ranking of Florida's State University System.

V. Access and Articulation – Bachelor's Degrees Only

A. If the total number of credit hours to earn a degree exceeds 120, provide a justification for an exception to the policy of a 120 maximum and submit a separate request to the Board of Governors for an exception along with notification of the program's approval. (See criteria in Board of Governors Regulation 6C-8.014)

The total number of credit hours to earn a degree will not exceed 120.

B. List program prerequisites and provide assurance that they are the same as the approved common prerequisites for other such degree programs within the SUS (see link to the Common Prerequisite Manual on the resource page for new program proposal). The courses in the Common Prerequisite Counseling Manual are intended to be those that are required of both native and transfer students prior to entrance to the major program, not simply lower-level courses that are required prior to graduation. The common prerequisites and substitute courses are mandatory for all institution programs listed, and must be approved by the Articulation Coordinating Committee (ACC). This requirement includes those programs designated as "limited access."

If the proposed prerequisites are not listed in the Manual, provide a rationale for a request for exception to the policy of common prerequisites. NOTE: Typically, all lower-division courses required for admission into the major will be considered prerequisites. The curriculum can require lower-division courses that are not prerequisites for admission into the major, as long as those courses are built into the curriculum for the upper-level 60 credit hours. If there are already common prerequisites for other degree programs with the same proposed CIP, every effort must be made to utilize the previously approved prerequisites instead of recommending an additional "track" of prerequisites for that CIP. Additional tracks may not be approved by the ACC, thereby holding up the full approval of the degree program. Programs will not be entered into the State University System Inventory until any

exceptions to the approved common prerequisites are approved by the ACC.

The proposed lower division program core aligns with the common prerequisites in the Common Prerequisites Manual for 2018-2019.

CIP 26.0102 Common Prerequisites per the Common Prerequisite Manual for 2018-2019	Proposed Prerequisites
BSC X010/X010L OR BSC X010C	BSC X010/X010L OR BSC X010C
BSC X011/X011L OR BSC X011C	BSC X011/X011L OR BSC X011C
CHM X045/X045L OR CHM X045C	CHM X045/X045L OR CHM X045C
CHM X046/X046L OR CHM X046C	CHM X046/X046L OR CHM X046C
CHM X210/X210L OR CHM X210C	CHM X210/X210L OR CHM X210C
CHM X211/X211L OR CHM X211C	CHM X211/X211L OR CHM X211C
PHY X053/X053L & PHY X054/X054L OR PHY X053C & PHY X054C OR PHY X048/X048L & PHY X049/X049L OR BSC X093/X093L & BSC X094/X094L OR BSC X093C & BSC X094C	PHY X053/X053L & PHY X054/X054L OR PHY X053C & PHY X054C OR PHY X048/X048L & PHY X049/X049L OR BSC X093/X093L & BSC X094/X094L OR BSC X093C & BSC X094C
MAC X241 OR MAC X281 OR MAC X311	MAC X241 OR MAC X281 OR MAC X311
MAC X242 OR MAC X282 OR MAC X312 OR STA X023 OR STAX024	MAC X242 OR MAC X282 OR MAC X312 OR STA X023 OR STAX024

C. If the university intends to seek formal Limited Access status for the proposed program, provide a rationale that includes an analysis of diversity issues with respect to such a designation. Explain how the university will ensure that Florida College System transfer students are not disadvantaged by the Limited Access status. NOTE: The policy and criteria for Limited Access are identified in Board of Governors Regulation 6C-8.013. Submit the Limited Access Program Request form along with this document.

The proposed degree program will not be Limited Access. The criteria for admission to this major will adhere to University admissions criteria.

D. If the proposed program is an AS-to-BS capstone, ensure that it adheres to the guidelines approved by the Articulation Coordinating Committee for such programs, as set forth in Rule 6A-10.024 (see link to the Statewide Articulation Manual on the resource page for new program proposal). List the prerequisites, if any, including the specific AS degrees which may transfer into the program.

The proposed program is not an AS-to-BS capstone.

INSTITUTIONAL READINESS

VI. Related Institutional Mission and Strength

A. Describe how the goals of the proposed program relate to the institutional mission statement as contained in the SUS Strategic Plan and the University Strategic Plan (see link to the SUS Strategic Plan on the resource page for new program proposal).

From the SUS Strategic Plan 2025 https://www.flbog.edu/wp-content/uploads/2025_System_Strategic_Plan_Amended_FINAL.pdf:
"To be truly great, Florida must have well-educated citizens who are working in diverse fields, from science and engineering to **medicine and bioscience** to computer science, the arts and so much more". Specifically, university goals are being set to increase the number of **graduates with degrees in the STEM** (science, technology, engineering, and math) fields, and to support students' development of the knowledge, skills, and aptitudes needed for success in the global society and marketplace.

The proposed BS in Medical Biology thus meets several important goals of the SUS Strategic Plan 2025, specifically : (1) increase the number of graduates with degrees in the STEM fields, (2) support students' development of the knowledge, skills, and aptitudes needed for success in the… marketplace, (3) increase student access and success in degree programs in the STEM/Health fields, (4) increase Bachelor's Degrees Awarded to African-Americans and Hispanic Students and (5) increase the percentage of graduates who continue their education or are found employed.

Excellence GOALS (https://www.flbog.edu/wp-content/uploads/2025_System_Strategic_Plan_2019.pdf)**:**

GOAL 2) Freshman in Top 10% of High School Class

The proposed program title, B.S. in Medical Biology, will differentiate professionally-oriented students from their biologist peers. This title, in combination with the rigorous curriculum, will serve as a draw for local, high-achieving high school students within the region FAU serves with aspirations towards professional and graduate schools. These students will want to participate in a tailored degree program designed to enhance their likelihood of success in gaining acceptance to professional and graduate programs in the health and medical sciences. Paired with other special programs offered by FAU (e.g. the FAU High School BS/MD MED DIRECT medical Pipeline Program (http://fauhigh.fau.edu/md-direct-medical-pipeline/), and research intensive programs for undergraduates interested in neuroscience and biomedical research such as the FAU-Max Planck Academy (https://maxplanckacademy.fau.edu/), and the FAU-Max Planck Honors Program (https://www.fau.edu/mphp/)), this program will support FAU and SUS initiatives to recruit and retain undergraduate students with exceptional high school records. Increasing the number of high-performing high school students attending FAu to earn this degree will also contribute to Strategic Plan Goals 5-8, below, as high achieving students are more likely to graduate in a timely manner.

GOALS 5 through 8) Average Time-to-Degree (for FTIC in 120hr programs), Four-Year Graduation Rates (for Full-Time FTIC), Six-Year Graduation rates (for Full- and Part-time FTIC), and Percent of Bachelor's Degrees Without Excess Hours.

In addition to attracting students with high GPA and entrance exam scores, the proposed program will support students in timely degree completion with minimal excess hours as it has a large core and requires that students select their electives from a restricted pool of upper divisions science courses. The somewhat restrictive nature of the curriculum has been designed so as to leave students with clear guidelines as to which coursework will support their goals. The core course requirements are offered year round on our main campus in a traditional (face-to-face format) ensuring that students can access the pre-requisites they require for the upper division portion of their degree. The majority of the restricted electives from which students can choose are offered at minimum twice per year with several

being offered year-round and across campus locations. For example, the elective Evolution (PCB 3674) is offered on our Boca campus, our Jupiter campus and our Davie campus during fall semesters, on our Boca campus and our Davie campus during spring semesters, and on our Boca campus during summer semesters.

SUS Teaching & Learning Strategic Priorities for a Knowledge Economy GOALS (https://www.flbog.edu/wp-content/uploads/2025_System_Strategic_Plan_2019.pdf):

GOALS 18 & 19) Increase the Number of Degrees Awarded in Programs of Strategic Emphasis, and Increase Number and Percent of Bachelor's Degrees in STEM & health

Programs of Strategic Emphasis are those that respond to existing, evolving, and emerging critical needs and opportunities. The proposed B.S. in Medical Biology will be an attractive STEM Degree of Strategic Emphasis as indicated by its CIP code (26.0102) which is being developed in response to existing local needs for trained health professionals and biomedical researchers. This metric is a subset of the larger Programs of Strategic Emphasis and was included in the 2011 System Strategic Plan as a separate breakout because it is widely believed that education in Science, Technology, Engineering and Mathematics (STEM) are vital to future of both the nation and the planet. In the 2014 revision of the plan, **Health has been added in recognition that healthcare is an especially key component of Florida's current and future workforce**.

SUS Teaching & Learning Productivity GOALS (https://www.flbog.edu/wp-content/uploads/2025_System_Strategic_Plan_2019.pdf)**:**

GOAL 11) **Increase Bachelor's Degrees Awarded to African-Americans and Hispanic Students**
This metric is important to the State University System because increasing the educational attainment across all of Florida's demographics is a key to the State's future workforce. The 2010 Census for 18-24 year olds shows that Florida's African-American and Hispanic/Latino populations comprise 46% of the State's population. Of FAU students majoring in the current B.S. in Biology, 51% would be considered to be underrepresented minorities in science by the NSF (~22% African-American and ~29% Hispanic). We expect that these students will distribute themselves equally between the Biology and Medical Biology degrees, thus approximately %50 of the Medical Biology degrees will be awarded to groups historically minoritized in the sciences.

SUS Scholarship, Research, & Innovation Excellence and Strategic Priorities for A Knowledge Economy Goals (https://www.flbog.edu/wp-content/uploads/2025_System_Strategic_Plan_2019.pdf)**:**

GOALS 24 & 27) Percentage of Undergraduates Engaged in Research and Number of Patents Awarded Annually
The B.S. in Medical Biology program will attract high achieving students who wish to pursue professional and graduate programs in the biomedical sciences. Many of students who enroll in this major will wish to participate in biomedical research and will be able to do so through the departments of Biology, Biomedical Science, and Chemistry as appropriate to their individual career goals. Students participating in our existing B.S. in Biology are restricted to participating in Directed Independent Research through the Department of Biological Sciences. Working with the Department of Chemistry and the College of Medicine at FAU, we expanded the research options available to students in the newly proposed program, which will allow more of the students wishing to participate in undergraduate research to do so. Currently, approximately 200 to 250 Biology majors participate annually in undergraduate research, working with faculty in the Department of Biological Sciences, and at the Max Planck Florida and Scripps Research Institutes.

A number of students within our department have achieved co-inventor status with faculty on patents and some have become involved in the establishment of related, small, spin-off biotechnology companies. Increased access to research opportunities for bright and creative undergraduate students in the B.S. Medical Biology degree program will enhance intellectual property development across FAU's

Departments of Biology, Chemistry & Biochemistry, and College of Medicine.

SUS Community and Business Engagement Strategic Priorities for A Knowledge Economy Goals (https://www.flbog.edu/wp-content/uploads/2025_System_Strategic_Plan_2019.pdf)**:**

GOAL 31) Percentage of Baccalaureate Graduates Employed and Earning $30,000+ or Continuing their Education.

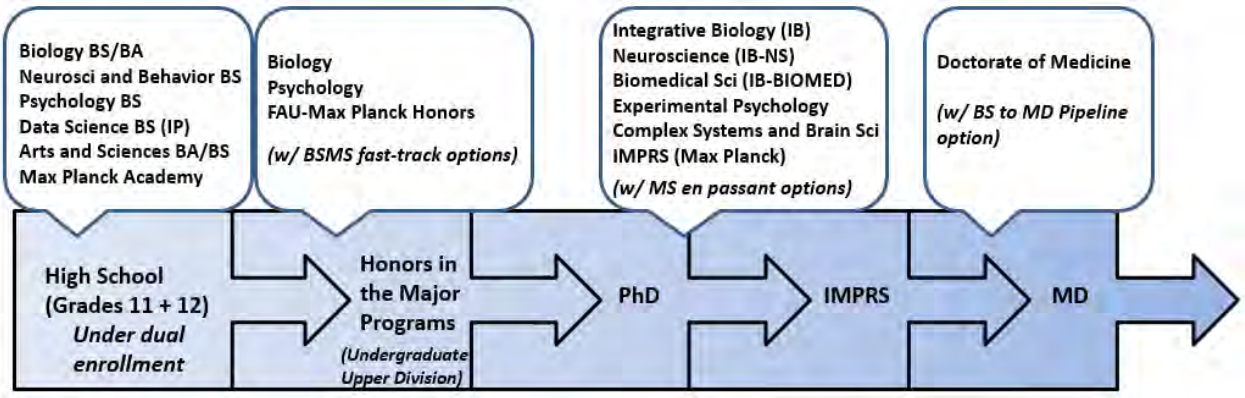
The B.S. in Medical Biology has been designed to best support students wishing to pursue professional or graduate education in pursuing those goals and will be marketed accordingly. We expect many program graduates to successfully transition to the next phase of their education upon completion of the program.

The proposed BS in Medical Biology also meets several important goals of the FAU Strategic Plan 2015-2025 (https://www.fau.edu/provost/files/approved.plan2015.pdf) Specifically, the proposed program (1) fits under two the four Pillars: Health, and Neuroscience, (2) supports the platform of diversity, (3) will elevate the levels of student success beyond graduation and (4) will align with the unique cultural, demographic and environmental characteristics of each of the campus communities.

The FAU Strategic Plan 2015-2025 (https://www.fau.edu/provost/files/approved.plan2015.pdf) defines Pillars as "institutional programs focused on creating knowledge that benefits society". Collectively, through participation from FAU's College of Science (Departments of Biological Sciences and Psychology), College of Medicine, Honors College, and College of Nursing, FAU's Health and Neuroscience Pillars emphasize health and wellness, including, healthy aging, geriatrics, and health policy, equity and economics, drug discovery, regenerative medicine, neuroscience, including cognition, dementia, and mental health/psychiatric illness, spinal cord injuries, eye disease, and communication disorders.

These foci are exemplified through a variety of FAU programs spanning high school through medical and graduate school, several of which capitalize on our partnership with the Max Planck Florida Institute for Neuroscience, in which our College and Department already participate and which the proposed B.S. Medical Biology will complement. FAU's Science and Medicine pipeline (depicted below) include Bachelors, Masters, Doctoral and Professional programs in Biological, Biomedical, Neuro-, and Data Sciences, with options for students meeting entrance criteria to participate in associated Undergraduate Upper Division Honors in the Major and BS/MS fast track programs.

FAU Science and Medicine Pipeline



We foresee the proposed B.S. in Medical Biology being especially enticing to our FAU High School students and fitting well into their typical trajectories at FAU. FAU High School is a public, dual enrollment high school located on FAU's Boca Raton campus. A typical FAU High School student will

begin to dual enroll in college coursework on our Boca Raton campus in the 10th or 11th grade year and graduate from high school having completed three years' worth of college credits towards a bachelor's degree. Approximately 60% of FAU High School students choose to pursue coursework towards bachelor's degrees in Biology, Psychology and/or (some will pursue double majors) in Neuroscience and Behavior with the intent to eventually apply to medical school. Many of these students also apply to FAU's MED DIRECT BS/MD program. We anticipate that the B.S. in Medical Biology will join these existing three undergraduate majors as a top major of choice for our dual enrolled FAU High School students.

FAU High School is currently establishing a second, science-centric location on FAU's Jupiter campus and will admit it's first students to a new, Jupiter-based program with Max Planck in Fall 2020, the Max Planck Academy (MPA). We expect that many of the anticipated medical school-oriented students selected to participate in this science-centric high school dual enrollment program will select the B.S. in Medical Biology as their major.

FAU undergraduate students wishing to pursue FAU's Integrative Biology-Biomedical Science PhD Program, Integrative Biology-Neuroscience PhD Program, Complex Systems and Brain Sciences PhD Program, Experimental Psychology PhD Program and/or the Doctor of Medicine Program will also find the B.S. in Medical Biology an attractive gateway program. Its rigorous curriculum, which contains elective options within neuroscience, will also support students in gaining entry to our highly exclusive joint programs with the Max Planck Florida Institute for Neuroscience. These FAU-Max Planck programs currently include the FAU-Max Planck Undergraduate Upper Division Honors Program, the Integrative Biology—Neuroscience PhD (IB-NS) Program, and the nation's first International Max Planck Research School for Brain and Behavior (IMPRS) and joint PhD program offered collaboratively by FAU, the Max Planck Florida Institute for Neuroscience, The Research Institute Caesar in the Max Planck Society, and the University of Bonn, Germany.

The FAU Strategic Plan 2015-2025 (https://www.fau.edu/provost/files/approved.plan2015.pdf) describes Platforms as representing "scholarly activities that apply to and support all Pillars" and defines the role of the Diversity Platform as "[identifying] and [promoting] opportunities to diversity our students, faculty, and staff – and build institutional cross-cultural competencies".

Our department and programs have a strong record of serving FAU's minority majority population. Previously, Drs. Rod Murphey, Professor, and Evelyn Frazier, Senior Instructor, developed a $700,000 NSF grant for **U**ndergraduate **R**esearch and **M**entoring (URM). The purpose of this funding was to "pilot new methods for broadening the participation of underrepresented groups in STEM fields" with an emphasis on mentoring and providing students with key skills important to success in the life science (https://nsf.gov/awardsearch/showAward?AWD_ID=0829250). The program served as the foundation for many of the ongoing honors level programs in the Department of Biological Sciences. We will continue to use, develop, and enhance this model in support of existing and the newly proposed Medical Biology bachelors degree and special programs with an aim to continue enhancing diversity and inclusivity in our programs. We will also continue to bring these principles into the larger conversation within the university through our involvement in the Health and Neuroscience pillars through the FAU .

The FAU Strategic Plan 2015-2025 (https://www.fau.edu/provost/files/approved.plan2015.pdf) describes elevating the levels of student success beyond graduation ("[achieving] high numbers of students employed in well-paying jobs after graduation" and "high placement levels in graduate, post-graduate, and post-professional educational, training, and research programs" as strategic initiatives.

The Bachelor of Science in Medical Biology (CIP 26.0102), will offer students pursuing professional/graduate studies in top programs (including Medical, Veterinary, Dental, Pharmacy and Physician Assistant) the rigor expected for admittance. The curriculum will fulfill prerequisites of medically-focused schools by guiding the selection of additional advanced relevant courses and considering Pre-Professional entrance exams.

The FAU Strategic Plan 2015-2025 (https://www.fau.edu/provost/files/approved.plan2015.pdf) also emphasizes Place, stating that "the University will deeply engage the South Florida region by aligning programs with the unique cultural, demographic and environmental characteristics of each of the campus communities." The proposed B.S. in Medical Biology will capitalize on and work to expand existing partnerships (e.g. shadowing and residency programs) between the College of Science, the College of Medicine, and the local healthcare community in support of this university initiative.

B. Describe how the proposed program specifically relates to existing institutional strengths, such as programs of emphasis, other academic programs, and/or institutes and centers.

There are many institutional strengths at FAU that support the BS in Medical Biology including Pre-health Advising Services, numerous Pre-health Professions Student Organizations, a Medical Pipeline Program, The FAU College of Medicine, The Comprehensive Center for Brain Health, the Institute for Human Health and Disease Intervention (I-HEALTH), one of the university's four Research Pillars and the FAU Brain Institute, a second FAU Research Pillar. This list is not comprehensive but illustrates the University's commitment to Health Sciences and some of the opportunities students in the program will have for mentoring, research and career pathways.

Pre Health Advising Services http://www.science.fau.edu/student_services/pre_health/

The Pre-Health Professions Office provides pre-professional students with various resources including, for example, advice on how best to prepare for the MCAT or other standardized exams, suggestions on how to enhance credentials, information about professional programs, and guidance on how to prepare for interviews and how to communicate with the health professional schools. The office hosts an annual Pre-Health Professions Week & Graduate Fair at which students have opportunities to meet admission representative from medical and professional schools, interact with current medical students through panel sessions, and participate in hands-on health workshops and activities facilitated by pre-health student organizations. The proposed Medical Biology B.S. and these existing support services will complement one another well.

Pre-Health Professions Student Organizations
http://www.science.fau.edu/student_services/pre_health/

B.S. in Medical Biology majors will have access to support and activities related to their career goals through numerous existing, recognized FAU student organizations. A short list of examples includes:

- American Medical Student Association (AMSA)
- American Medical Woman's Association (AMWA)
- Association of Pre-Physician Assistants (APPA)
- Bioethics Society (BES)
- Blood Pressure Screening (BPSA)
- Future Health Professionals (HOSA)
- Global Medical Brigades
- Pre-Dental Society (Dental)
- Pre-Health Ambassadors (PHA)
- Pre-Optometry Professional Society (POPS)
- Pre-Veterinary Medical Association (PVMA)
- Minority Association of Pre-Medical Students (MAPS)
- Medical Missions Abroad (MMA)
- Relay for Life (RFL)

FAU's Charles E. Schmidt College of Medicine http://med.fau.edu/

FAU's College of Medicine (COM) hosts multiple Graduate Degree Programs including thesis and non-thesis MS programs in Biomedical Science, a PhD track in Integrated Biology—Biomedical Science, a Doctor of Medicine program, and an MD/PhD program with The Scripps Research Institute in Jupiter, Florida. COM's programs focus on both understanding basic biological mechanisms and cultivating new strategies to combat disease. Participants in the Medical Biology B.S. will have access to research opportunities in faculty labs within the COM and access to undergraduate seats within graduate level lecture courses in biomedical science offered through the COM.

The COM also hosts a BS/MD Medical Pipeline Program called MED DIRECT (http://www.science.fau.edu/student_services/pre_health/med_direct.php).
The MED DIRECT Program at Florida Atlantic University is a collaborative effort between FAU's College of Medicine and College of Science aimed at high achieving high school seniors. Students admitted into this program will be guaranteed* a seat in FAU's College of Medicine provided they maintain the required program standards. The B.S. in Medical Biology has been vetted by FAU's COM and will fit well as a B.S. component option to this combined program.

FAU's Health and Diversity Pillars

The FAU Strategic Plan 2015-2025 (https://www.fau.edu/provost/files/approved.plan2015.pdf) defines Pillars as "institutional programs focused on creating knowledge that benefits society". Collectively, through participation from FAU's College of Science (Departments of Biological Sciences and Psychology), College of Medicine, Honors College, and College of Nursing, FAU's Health and Neuroscience Pillars emphasize health and wellness, including, healthy aging, geriatrics, and health policy, equity and economics, drug discovery, regenerative medicine, neuroscience, including cognition, dementia, and mental health/psychiatric illness, spinal cord injuries, eye disease, and communication disorders.

These foci are exemplified through a variety of FAU degree programs spanning high school through medical and graduate school, several of which capitalize on our partnership with the Max Planck Florida Institute for Neuroscience, in which our College and Department already participate and which the proposed B.S. in Medical Biology will complement. FAU's Science and Medicine pipeline (depicted below) include Bachelors, Masters, Doctoral and Professional programs in Biological, Biomedical, Neuro-, and Data Sciences, with options for students meeting entrance criteria to participate in associated Undergraduate Upper Division Honors in the Major and BS/MS fast track programs.

Institute for Human Health and Disease Intervention (The I-HEALTH Research Pillar)https://www.fau.edu/research/i-Health.php
I-HEALTH was established "to advance health through pioneering research and practical applications" with emphases on providing everyday healthcare needs of patients and communities, aging patient populations, developing clinical trials, and conducting clinical and translational research. B.S. Medical Biology majors and program graduates will access research, graduate, postgraduate, and clinical experiences through interdisciplinary work conducted by the Colleges of Science, Medicine and Nursing under the I-Health Pillar.

The **FAU Brain Institute (The I-BRAIN Research Pillar)** http://ibrain.fau.edu/
I-Brain was established "to stimulate advanced neuroscience research, to promote superior neuroscience education, to facilitate the translation of research discoveries for the benefit of society, and to enhance the public understanding of the many dimensions of brain research and its benefits". Participants in the B.S. in Medical Biology degree program will have access to programming and special seminars through the Neuroscience Student Organization supported by the Brain Institute and research opportunities in Brain Institute members' research laboratories. Graduates of the program may pursue admittance to the Brain Institute's Graduate Neuroscience Training Program (GNTP), an enrichment program to which admits to the Integrative Biology, Experimental Psychology, and Complex Systems and Brains Sciences PhD program may apply.

The proposed BS in Medical Biology also meets several important goals of the FAU Strategic Plan 2015-2025 (https://www.fau.edu/provost/files/approved.plan2015.pdf) Specifically, the proposed program (1) fits under two the four Pillars: Health, and Neuroscience, (2) supports the platform of diversity, (3) will elevate the levels of student success beyond graduation and (4) will align with the unique cultural, demographic and environmental characteristics of each of the campus communities.

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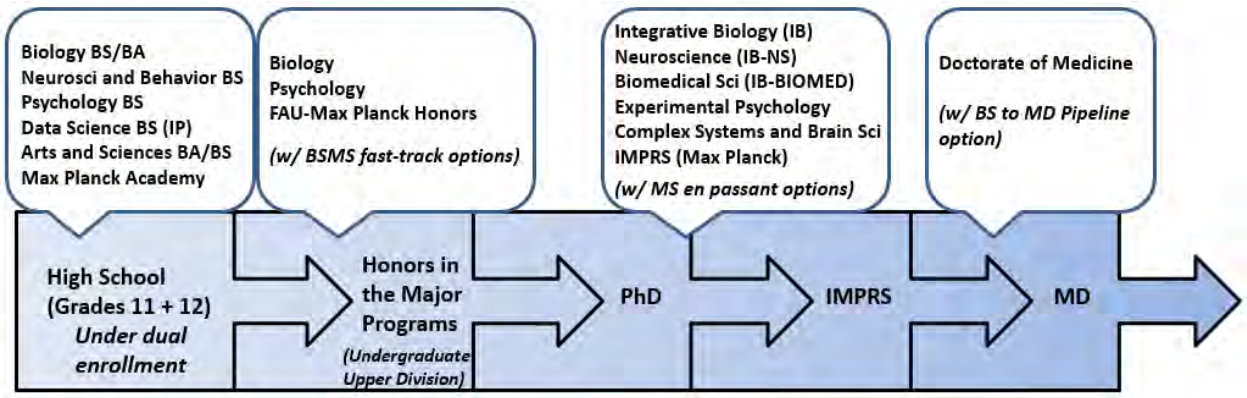
FAU Science and Medicine Pipeline



We foresee the proposed B.S. in Medical Biology being especially enticing to our FAU High School students and fitting well into their typical trajectories at FAU. FAU High School is a public, dual enrollment high school located on FAU's Boca Raton campus. A typical FAU High School student will begin to dual enroll in college coursework on our Boca Raton campus in the 10th or 11th grade year and graduate from high school having completed three years' worth of college credits towards a bachelor's degree. Approximately 60% of FAU High School students choose to pursue coursework towards bachelor's degrees in Biology, Psychology and/or (some will pursue double majors) in Neuroscience and Behavior with the intent to eventually apply to medical school. Many of these students also apply to FAU's MED DIRECT BS/MD program. We anticipate that the B.S. in Medical Biology will join these existing three undergraduate majors as a top major of choice for our dual enrolled FAU High School students.

FAU High School is currently establishing a second, science-centric location on FAU's Jupiter campus and will admit it's first students to a new, Jupiter-based program with Max Planck in Fall 2020, the Max Planck Academy (MPA). We expect that many of the anticipated medical school-oriented students selected to participate in this science-centric high school dual enrollment program will select the B.S. in

Medical Biology as their major.

FAU undergraduate students wishing to pursue FAU's Integrative Biology-Biomedical Science PhD Program, Integrative Biology-Neuroscience PhD Program, Complex Systems and Brain Sciences PhD Program, Experimental Psychology PhD Program and/or the Doctor of Medicine Program will also find the B.S. in Medical Biology an attractive gateway program. Its rigorous curriculum, which contains elective options within neuroscience, will also support students in gaining entry to our highly exclusive joint programs with the Max Planck Florida Institute for Neuroscience. These FAU-Max Planck programs currently include the FAU-Max Planck Undergraduate Upper Division Honors Program, the Integrative Biology—Neuroscience PhD (IB-NS) Program, and the nation's first International Max Planck Research School for Brain and Behavior (IMPRS) and joint PhD program offered collaboratively by FAU, the Max Planck Florida Institute for Neuroscience, The Research Institute Caesar in the Max Planck Society, and the University of Bonn, Germany.

The FAU Strategic Plan 2015-2025 (https://www.fau.edu/provost/files/approved.plan2015.pdf) describes Platforms as representing "scholarly activities that apply to and support all Pillars" and defines the role of the Diversity Platform as "[identifying] and [promoting] opportunities to diversity our students, faculty, and staff – and build institutional cross-cultural competencies".

Our department and programs have a strong record of serving FAU's minority majority population. Previously, Drs. Rod Murphey, Professor, and Evelyn Frazier, Senior Instructor, developed a $700,000 NSF grant for **U**ndergraduate **R**esearch and **M**entoring (URM). The purpose of this funding was to "pilot new methods for broadening the participation of underrepresented groups in STEM fields" with an emphasis on mentoring and providing students with key skills important to success in the life science (https://nsf.gov/awardsearch/showAward?AWD_ID=0829250). The program served as the foundation for many of the ongoing honors level programs in the Department of Biological Sciences. We will continue to use, develop, and enhance this model in support of existing and the newly proposed Medical Biology bachelors degree and special programs with an aim to continue enhancing diversity and inclusivity in our programs. We will also continue to bring these principles into the larger conversation within the university through our involvement in the Health and Neuroscience pillars through the FAU .

The FAU Strategic Plan 2015-2025 (https://www.fau.edu/provost/files/approved.plan2015.pdf) describes elevating the levels of student success beyond graduation ("[achieving] high numbers of students employed in well-paying jobs after graduation" and "high placement levels in graduate, post-graduate, and post-professional educational, training, and research programs" as strategic initiatives.

The Bachelor of Science in Medical Biology (CIP 26.0102), will offer students pursuing professional/graduate studies in top programs (including Medical, Veterinary, Dental, Pharmacy and Physician Assistant) the rigor expected for admittance. The curriculum will fulfill prerequisites of medically-focused schools by guiding the selection of additional advanced relevant courses and considering pre-professional entrance exams.

The FAU Strategic Plan 2015-2025 (https://www.fau.edu/provost/files/approved.plan2015.pdf) also emphasizes Place, stating that "the University will deeply engage the South Florida region by aligning programs with the unique cultural, demographic and environmental characteristics of each of the campus communities." The proposed B.S. in Medical Biology will capitalize on and work to expand existing partnerships (e.g. shadowing and residency programs) between the College of Science, the College of Medicine, and the local healthcare community in support of this university initiative.

C. Provide a narrative of the planning process leading up to submission of this proposal. Include a chronology in table format of the activities, listing both university personnel directly involved and external individuals who participated in planning. Provide a timetable of events necessary for the implementation of the proposed program.

Planning Process

Date	Participants	Planning Activity
March 2018	Faculty of the Department of Biology	Ad Hoc Departmental Program Planning committee established
April 2018	Rod Murphey, H. Jay Lyons, Kailiang Jia, Matthew Lovelace, David Binninger, James Hartmann, James Kumi-Diaka, Ken Dawson-Scully, W. Randy Brooks, Diane Baronas-Lowell	Meeting of the Departmental Planning Committee: CIP code selection and proposed curriculum
May – June 2018	Diane Baronas-Lowell, Rod Murphey, Michelle Cavallo	Development of pre-proposal
July 2018	Rod Murphey	Submit pre-proposal to the Office of the Provost
October 2018 – December 2018	Faculty of the Department of Biology	Review proposed curriculum and address program nomenclature
December 2018	Departmental Program Planning Committee	Revisit curriculum
December 2018	Faculty of the Department of Biology	Approval of proposed curriculum
March 2019 – August 2019	Rod Murphey and Michelle Cavallo, Department of Biological Sciences, Rainer Steinwandt and Lee Klingler, Department of Mathematical Sciences	Discussion of mathematics requirements for proposed program
August 2019	Department of Biology	Hired Dr. Carl Hansen, Professor to support establishment and administration of proposed program
March 2019 – December 2019	Rod Murphey, Sarah Milton, Michelle Cavallo, Mary Jane Saunders, Carl Hansen	Development of full proposal
September 2019	Equal Opportunity Officer	Review by and approval from Equal Opportunity Officer
October 2019	Dean of Libraries	Review and approval by Dean of Libraries
October 2019	College of Science and College of Medicine	Review for conflicts/confirmation of support for proposal
November 2019 – December 2019	Faculty of the Department of Biology	Address requests for curricular modifications from College of Science and College of Medicine
October 2019 - January 2020	Faculty of the College of Science and College of Medicine	Obtain letters of no conflict/support/acknowledgement of potential resultant effort redistributions on program implementation from Departments of Mathematics and Chemistry & Biochemistry
January 2020 – February 2020	Russel Ivy, Senior Associate Provost	Obtain confirmations of no conflict from other, potentially impacted, state universities
February 2020	Rod Murphey, Sarah Milton, Michelle Cavallo, Mary Jane Saunders, Carl Hansen	Submit final, complete proposal to FAU Biology Departmental Undergraduate Programs Committee for final approval

Events Leading to Implementation

Date	Implementation Activity
August 2018	Provost pre-proposal approval

September 2018	CAVP pre-proposal approval
December 2019	Confirmation of no conflict from potentially impacted FAU programs, colleges, departments.
February 2020	FAU College of Science Undergraduate Programs Committee full proposal approval
February 2020	FAU University Undergraduate Programs Committee full proposal approval
March 2020	FAU Faculty Senate Steering Committee full proposal approval
March 2020	FAU Faculty Senate full proposal approval
April 2020	FAU Board of Trustees full proposal approval

VII. Program Quality Indicators - Reviews and Accreditation

Identify program reviews, accreditation visits, or internal reviews for any university degree programs related to the proposed program, especially any within the same academic unit. List all recommendations and summarize the institution's progress in implementing the recommendations.

Biological Sciences:
The Biological Sciences Program Review Report (PRR) was received in March 2015. The PRR was based on the 2014 Self-Study Report and a two-day site visit in February 2015. Faculty participated in the development of the BS Strategic Goals and Action Plans that address and build upon the recommendations of the PRR**.** A progress report was submitted to FAU's College of Science on 6/20/2019, as described below:

The following goals were recommended for Biological Sciences, with accompanying responses and progress**:**

Goal 1: To continue to build research and instruction on the Boca Raton, Jupiter and Davie campuses along the lines already established.

- We have continued to shift commuter students to the Davie and Jupiter campuses to re-distribute the teaching load and to maximize the use of space. *Evolution*, *Principles of Ecology*, *Genetics* and *Genes and Development* courses are now offered on the Jupiter campus; students are only one course shy of completing their full junior and senior years in Jupiter. We are working on offering the final course there. Full junior and senior years are available on both Boca Raton and Davie campuses.
- FAU's president signed an agreement with Scripps Florida's CEO and the Max Planck Florida Institute for Neuroscience's (MPFI) CEO and Scientific Director in March 2015 fortifying our relationships, both in research and education on the Jupiter campus. "MPFI provides a vibrant, collaborative environment where scientists are provided generous ongoing support to conduct high impact research at the cutting edge."
- FAU was selected as the first International Max Planck Research School (IMPRS) in North America. IMPRS is a joint Ph.D. program between FAU, MPFI, University of Bonn and the associated Max Planck Institute in Bonn, Germany. Currently, ten FAU neuroscience faculty members in Jupiter are designated IMPRS faculty.
- FAU and the Max Planck Society established a new partnership between FAU and MPFI to establish an undergraduate honors program in neuroscience (with emphasis on physiology and genetics) that is the first of its kind across the globe. The FAU Max Planck Honors Program (FAU MPHP) started in Fall 2018 and attracts high-performing and talented students. FAU MPHP provides honors students with exclusive enrichment opportunities, including courses taught or co-taught with MPFI scientists.

Cutting-edge neuroscience training courses include technologies such as 2-photon imaging, super resolution microscopy, electron microscopy, electrophysiology and optogenetic technology.

- Recently, there have been discussions on proposing a second FAU MPHP with emphasis on data science in neuroscience.
- Starting in the 2018-2019 academic year, we began an exciting pilot program with MPFI, FAU and FAU High School called the FAU MPFI Enrichment Program. Current students in the program are completing the second of two courses, where data science approaches such as deep neural networks and other machine learning techniques are used to analyze actual MPFI neuroscience imaging data. Current students are completing research projects with mentorship from premier MPFI and FAU faculty, and each student will receive an MPFI seal on their FAU High School diploma. Students in the initial pilot cohort are studying a variety of undergraduate majors, including Neuroscience and Behavior, Biological Sciences, Physics, Mathematics, Engineering and Computer Science, and no prior programming experience is required.
- The newest partnership between FAU, MPFI and the Germany-based Max Planck Society, is the Max Planck Academy High School on the Jupiter campus. Six high-achieving FAU High students started in an Academy pilot program in the Fall 2018 semester. Nine more joined the program in the Fall 2019 Semester. Students start in their junior year of high school and complete their High School diploma and an Associate's degree in enriched, honors academic pathways in STEM in two years. The students benefit from the international presence of MPFI and the Max Planck Society, through extraordinary networking, mentorship and study abroad opportunities.
- Boca Raton faculty members developed two new concentrations for the Integrative Biology Ph.D. Program: A) Marine Science and Oceanography and B) Biomedical Science.
- A new M.S. degree program in Marine Science and Oceanography was developed between Boca Raton and Harbor Branch Oceanographic Institute (HBOI) faculty.
- We have implemented a third departmental Honors Program - "Honors in Biological Sciences – Research". This program distinguishes undergraduates with high grades, at least two semesters of DIR and a capstone project (grant application/poster/seminar) with Honors in Research.
- There is considerable on-going funding and our faculty have received numerous grants from federal agencies.

Goal 2: To develop a reliable, efficient transportation system between the different campuses for students and faculty as soon as possible.

- FAU now offers a free intercampus shuttle service between the Boca Raton and Jupiter campuses. This WiFi-enabled service operates Monday through Friday with four trips per day between the two campuses and is offered to students and staff free of charge. This shuttle service is widely used and expected to increase in the coming years.
- Transportation between the Boca Raton and Davie campuses, consisting of the South Florida Regional Transportation Authority's Tri-Rail train and FAU shuttles, was already in-place before the Program Review in 2015.

Goal 3: To support the sense of community in the Biology Department by developing institutional habits and traditions that support it, such as a monthly departmental day on the Boca Raton campus that all are expected to attend.

- BS holds biannual retreats and faculty meetings that rotate between FAU's three main sites and are programmed around curriculum discussions or seminars. Retreat and faculty meeting discussions

have covered topics including enhancing the quality of the biology majors, modifications to our curriculum, teaching assignments, and the Honors Programs.

Goal 4: To raise the threshold for entry into the B.S. in Biology Program (by considering limiting future University growth in the largest undergraduate major to enable the faculty to plan for orderly instruction in this discipline).

- The Biology Department had originally recommended to the College of Science Dean and Provost that in order to declare a major in Biology, students must meet a new threshold of requirements modeled after those required for declaring a major in FAU's Colleges of Nursing or Business.
- FAU increased the GPA requirement for early admission freshmen since the fall 2016 semester twice (from 3.5 to 3.8). We think that by increasing the overall caliber of students, an increase in the threshold for entry into our major won't be necessary.

Goal 5: To develop a first semester, one credit course that introduces first year students to exciting developments in the life sciences, explains the need for tools and concepts from the hard sciences and mathematics, and identifies career pathways in the life sciences other than pre-medicine.

- We are developing a course - *Introduction to Biology at FAU* (BSC 1013) that will be offered and recommended to incoming students. This course will work with freshmen to reduce attrition from the major in the first year of their undergraduate careers, an issue that also plagues our nation.
- Dr. Keene, with co-PIs Drs. Murphey and Evelyn Frazier, submitted an NIH U-RISE grant in May 2019. If funded, their proposed pre-U-RISE program will include a new introductory freshman course and specialized orientation for incoming students that will provide students early exposure to research opportunities at FAU.
- Additionally, our department has implemented novel course structures to increase the interaction of students and instructors, as well as, to enhance student learning and success (described below).

Goal 6. To create course sequences and major/minor combinations that lead to degrees in Biology/public policy, Biology/law, Biology/business and finance and non-profits.

This goal was not considered as it would be difficult to implement due to the very large student population in biology and the biology faculty workload.

Goal 7. To hire additional faculty or non-tenure-track instructors to reduce the student/faculty ratio.

- The number of faculty has grown recently due to hiring two junior faculty members and the return of the former President and the former Provost to their departmental status in Biology. The Life Science Initiative, based primarily in Jupiter, has also facilitated hiring in the Biology Department and this will help reduce the overall student to teacher ratio. Our only hire with a tenure-track position since the Program Review in 2015 was Dr. Keene in Jupiter.
- New (non tenure-track) hires in the past four years include Drs. Baronas-Lowell, Jennifer Krill and Mr. Matthew Lovelace. These faculty are responsible for large sections of non-majors courses including Life Sciences (non-majors introductory biology) and Anatomy and Physiology.
- Hiring tenure-track faculty members at the rate of one to two per academic year would further sustain the department's productivity.

Goal 8: To create a formal faculty mentoring program.

- The Biology Department has a faculty mentoring program in place. Under the departmental program, a tenured faculty member is assigned to each new faculty member to give one-on-one mentoring regarding the tenure process. Two pairs of mentor/mentees recently won University mentoring awards which provide funds and support to encourage the development and submittal of federal grant proposals by junior faculty.
- There is also one Master Teacher and one Master Researcher designated in the Biology Department. The Master Teacher is responsible for giving workshops to new hires (and previous hires with low teaching evaluation scores) on teaching tips and pedagogies. The Master Researcher provides workshops on grant writing and various research concerns.

Goal 9: To consider course structures that increase the interaction of students and instructors.

- Approximately 10% of Biology undergraduate students are engaged in research and 85% of faculty members are acting as mentors. In the four semesters from Fall 2018 through and including Summer 2019 (and registration for the second half of Summer 2019 is on-going), there were 243 undergraduate students engaged in *Directed Independent Research* (DIR).
- For the past nineteen years, peer-led Lifeline sessions (24 students maximum per session) have been used to achieve more individual (peer) interactions in the introductory *Biological Principles* (BSC 1010) and *Biodiversity* (BSC 1011) courses for majors.
- . New pedagogies that have been implemented in numerous courses include:
  - With the help of Honors students, an inquiry-based activity is used in *Biological Principles* now as one of the experimental design labs, where students make observations, draw conclusions from historical data and present-day observations about the FAU Preserve, gopher tortoise habitat and invasive plant species.
  - A "Best Practices" activity was developed in which TAs and LifeLine leaders are filmed teaching in the Spring, and shortly after the Fall semester begins, we do mandatory Teaching Effectiveness training for TAs. This activity evolved after faculty members went to the Summer Institute in Madison. Our TAs love to see themselves in video, so we have their undivided attention, and they learn something, too. We do peer evaluations of each TA and LifeLine leader every semester, giving faculty members some feedback early in the semester.
  - A bioethics unit was implemented in both *Biological Principles* and BSC 1005 *Life Science* labs about stem cell use to get students thinking critically about the viewpoints of other people as stakeholders versus their opponents.
  - The Biology Department was also awarded a university technology fee grant to allow undergraduate students to obtain real field data in introductory labs for *Biodiversity* (BSC 1011). Pilot studies were launched in Fall 2016 with one BSC 1011 lab (24 students) participating in collecting data for long-term studies on gopher tortoises at the FAU preserve.
  - Our department is one of the sites for Tiny Earth (originated at Yale University) which initiates freshmen in biological research at the molecular level during teaching labs. Dr. Baronas-Lowell engages 192 non-STEM students in Tiny Earth every fall and spring semester in eight *Life Science* labs. The students have discovered and characterized hundreds of antibiotic-producing soil bacteria.
  - Dr. David Binninger has designed his *Genetics* course (PCB 3063) lectures with extensive use of TopHat questions and encouragement of peer-to-peer discussions about those questions to keep students engaged. From fall 2015 (using the traditional iClicker) to fall 2018, the percentage of students passing (with a C- or better) increased from 78% to 86%. His videos/podcasts of the lectures are the most popular study aid for the course. Fewer than 5% of his class thought they

were a waste of time and 35% said they were the single most valuable study aid and they wished they were available for other classes.

- Dr. Colin Hughes also uses TopHat as a substitute for iclicker in his *Conservation Biology* (BSC 3052) course. Dr. Hughes engages students in this course with the new Packback technology, an on-line tool based on Artificial Intelligence to increase student curiosity. He sees a significant increase in open-ended and insightful questions asked by students over the course of the semester on scientific news reports.
- Dr. Dale Gawlik has flipped his course *Principles in Ecology* (PCB 4043) with 200 students.
- Drs. Gawlik (in *Principles in Ecology*) and Sarah Milton [in *Comparative Animal Physiology* (PCB 4723), *Integrative Biology 1* (BSC 6390), *Environmental Physiology* (PCB 6749C) and *Marine Animal Physiology* (PCB 6775)] have adopted the "think-pair-share" technique in which students are allowed a few minutes to discuss a question with a neighbor prior to submitting an answer.
- Laboratory Coordinators, Ms. Sheryl van der Heiden and Ms. Cristina de la Rosa have implemented in-class iworx physiology stations measuring real-time data in our Davie *Anatomy and Physiology I and II* labs (BSC 2085L and 2086L).
- Drs. Jay Lyons and Milton have also developed new interactive lab activities using the iworx physiology stations in the *Human Morphology and Function I and II* labs (PCB 3703L and 3704L) and *Comparative Animal Physiology* (PCB 4723L) labs, respectively.
- Dr. Anderson introduced a new course titled *Topics in Behavioral Ecology* (under the Special Topics course number) in which she employs active learning strategies. The course format has students engaged in reading, writing and problem solving through group work and discussion.
- Dr. Tim Theisen implemented collaborative test-taking in his *Molecular and Cell Biology* Course (PCB 4023) and is evaluating the effect of this technique on student learning.
- Dr. Mary Jane Saunders increased the number of writing and speaking assignments in her *Plant Cell Biology* course (running under the Special Topics code) to address student weaknesses in these areas. All writing assignments and oral presentations are evaluated and used to provide students with constructive feedback. She has also incorporated support on grant writing and resume construction into her lectures.
- Dr. Jeanette Wyneken updated her *Comparative Vertebrate Morphogensis* course to include more active learning and application of the material learned and assessed her students mid-semester to obtain feedback on the class format and her effectiveness for use in further course updates and modifications.
- Dr. Milton utilizes interactive learning activities in *Comparative Animal Physiology (PCB4723 and PCB4723L)* lecture and laboratory. Students write extensively and present their data in an end-of semester "mini-symposium" to enhane communication skills.
- Instructor Lovelace made modifications to his *Anatomy and Physiology* lectures (BSC 2085 and 2086) attempting to address DFW rates in this large service course. He restructured course contents to increase the amount of time spent on foundational chemical principles early in the course, reduced the number of quizzes he administers, increased the number of homework assignments and modified his homework questions to include partial credit questions.
- Drs. Keene and Stackman currently serve as co-directors of the Neuroscience and Behavior B.S. program at FAU with over 500 undergraduate students.
- Dr. Keene has instituted curriculum that focuses on an interactive classroom, critical thinking and exposure to primary literature in his large *Comparative Animal Behavior* course (CBH 4024) which is broadcast to the satellite campuses. A teaching assistant is placed in Jupiter and Davie to facilitate interactive breakout discussions. The flexibility allowed by the multi-campus format is particularly important for students engaged in research who want to spend most of their time on the campus that houses their research laboratory.

Goal 10: To bring advisement for sophomores and upper class students back to the department.

- The chair and co-chairs agree with the reviewers that advising done by Biology faculty would be beneficial to all; however, our current student to faculty ratio precludes this as a realistic goal.
- We have secured a seasoned advisor, Mr. Glenn Malone, for specific advising in our department.
- Additionally, as described above, the advisors in the CESCOS Student Services Department are working closely with faculty and staff from our department on advising strategies for the students pursuing the different degrees in Biology, including regular briefings on course changes and new courses.

Goal 11: To engage the better students in peer-support activities by developing an undergraduate interest/service club.

- Student organizations currently exist within the major, primarily among the students interested in clinical sciences; there are nearly twenty pre-health oriented clubs for undergraduates. In addition, students may join non-clinical organizations, including 1) Strategies for Ecology Education, Diversity & Sustainability (SEEDS) and 2) Scientific Mentoring for Academic Research Training. Dr. Frazier serves as the advisor for both organizations.
- Our students volunteer in many projects to protect and improve our sensitive South Florida environment. These projects are initiated largely by field courses in marine and environmental biology taught by Drs. Wyneken, Marianne Porter and Dianne Owen and include sea turtle conservation, biomechanics of elasmobranchs, study of invasive species and strategies for conserving, restoring and monitoring the diversity of natural habitats.
- Under the direction of Dr. Gawlik, the Environmental Science Program partnering with Florida Power & Light, sponsors the fruitful Manatee Masters Program at the Manatee Lagoon in Riviera Beach since 2015. This program recruits and coaches students to become manatee experts to educate the public about manatees and the Lake Worth Lagoon.

Goal 12: To supplement the anecdotal accounts of students with data from the university to identify the roadblocks to timely graduation and how they might be cleared.

- We have made the departmental web site extremely student-friendly, for instance, by offering tips on how to graduate on time, outlining research opportunities, undergraduate and graduate academic programs, associated forms and policies, biology elective offerings according to semester and campus, student resources and, especially, student accolades and achievements.
- Each faculty member presents a slide from our departmental web site with tips on saving time and money while pursuing an FAU undergraduate degree at least once per semester during their courses. There have been positive reports from faculty that students are very receptive to this information.
- We have introduced many curriculum changes allowing more flexibility for students to customize their degree program towards a career goal.
- Two new degrees have been designed since our last Program Review. Dr. Milton sits on the steering committees for both new degrees:
    1. B.A. in Health Science, an interdisciplinary program within the CESCOS that offers fine-tuning of course curriculum to the student's career-orientation. This degree started accepting students in Fall 2017.
    2. This proposal for a B.S. in Medical Biology, to provide a program with high rigor for pre-medical students.

- The course requirements for a bachelor's degree in Biology are now offered at all three campuses, with just one course missing on the Jupiter campus (mentioned previously).

Goal 13: To strengthen research productivity by encouraging more interdisciplinary ties with other departments and colleges.

- We agree with the reviewers that it is in everyone's best interests to develop more interdisciplinary ties and we will continue to pursue these by hosting and attending interdepartmental seminars.
- Dr. Porter, a biomechanist, is forging new collaborations with FAU's Engineering Department. Dr. Porter is also working with the Department of Ocean and Mechanical Engineering (within the College of Engineering and Computer Science).
- There has been a recent increase in IB Ph.D. students working with Bioengineering faculty, allowing for co-PIs on research committees and publications in both our and the Engineering Colleges.
- Drs. Milton and Peter McCarthy (HBOI) led Boca Raton faculty members in developing a new marine biology and oceanography concentration for the IB Ph.D. Program to enhance cohesion between the marine biologists at Boca Raton and Fort Pierce.
- Our faculty members have worked with faculty members in the Charles E. Schmidt College of Medicine (CESCOM) to develop a new concentration for the IB Ph.D. Program in biomedical science.
- We are hosting a faculty member, Dr. Kate Detwiler, from the Department of Anthropology (College of Arts and Letters) in our building to enable her wet lab research.
- Dr. Dawson-Scully is collaborating with Dr. Dimitris Pados (College of Engineering) and Rhys Williams (Tech Runway).
- Drs. Dawson-Scully and Salvatore Lepore (Department of Chemistry & Biochemistry) are co-PIs on a funded NSF grant studying "Selective manipulation of hippocampal PKG activity to modulate memory processes".
- Dr. Milton has collaborations with researchers at HBOI (Drs. Annie Karjian and McCarthy), Geosciences (Dr. Tiffany Briggs), Urban Planning (Dr. Diana Mitsova) and the CESCOM (Drs. Howard Prentice and John Wu).
- Dr. Baronas-Lowell has a collaboration with Dr. Lyndon West (Department of Chemistry & Biochemistry) studying structures of novel antibiotic compounds found in bacteria isolated in the Tiny Earth Program.
- The afore-mentioned MPHP and Max Planck Academy are substantial collaborations between our department, the Psychology Department, the WHC and MPFI.

Goal 14: To strengthen research productivity by improving the graduate student support package offered to Ph.D. and M.A./M.S. students.

- This is an ongoing problem at FAU and all of the players involved are aware of the problem and are working to resolve it. FAU is at the bottom of the ranking for M.S. stipends and health care across the SUS. Only FIU pays a comparable stipend ($11,250 per nine months). Every other SUS institution surveyed pays a significantly larger stipend with UF paying double the salary for nine months. And every SUS institution surveyed pays most if not all of the student health care costs. Similar results are available for the Ph.D. students. These numbers can be directly linked to success in recruiting graduate students.
- Financial support for graduate students is a top priority of FAU's new Provost, who is working closely with the President's Office to establish more competitive graduate student support packages.
- MPFI has joined forces with the Jupiter Life Science Initiative (headed by Dr. Murphey) to increase the stipends of graduate students in the IBNS program, as well as, pay for their health insurance.

- Likewise, Dr. Randy Blakely, a neuroscientist that joined FAU's CESCOM in 2016 has arranged for graduate students in the Graduate Neuroscience Training Program (GNTP) to receive increased stipends and paid health insurance.
- We are hopeful that paying all graduate students health insurance will be implemented within the next year, and shortly thereafter, will be followed by an increase in the graduate student stipends.

VIII. Curriculum

A. Describe the specific expected student learning outcomes associated with the proposed program. If a bachelor's degree program, include a web link to the Academic Learning Compact or include the document itself as an appendix.

Florida Atlantic University has developed Academic Learning Compacts for each of its baccalaureate degree programs (https://www.fau.edu/iea/assessment/alc.php and https://www.fau.edu/iea/pdf/assessment/ALCDescription.pdf).

"The principal mission of the Department of Biological Sciences is to train students for careers in biological sciences or pursue advanced training in graduate and professional schools. Through both education and research, our department seeks an increased appreciation and respect for our environment and awareness of the impact of our decisions on local, regional and global issues concerning the economy, personal health and welfare, and the environment" (https://www.fau.edu/iea/pdf/assessment/BSBiologyALC.pdf).

Draft Expected Outcomes BS in Medical Biology

The Bachelor of Science in Medical Biology degree is designed for students interested in pursuing professional careers in health-related professions. This degree provides rigorous scientific training with a core in the human biological sciences. Special attention is made to covering the content knowledge, communication and analytical skills needed to succeed in graduate training in health professions.

CONTENT KNOWLEDGE (Declarative Knowledge): Students will demonstrate an understanding of cell structure, cell physiology and the molecular processes of cells. Students will be able to describe features that distinguish the major groups of organisms and the developmental and physiological mechanisms fundamental to all living organisms. Students will demonstrate an understanding of the principles of genetics, cell biology, physiology anatomy and health science. Students receiving the BS degree in biological sciences are required to successfully complete the following core courses listed in the curriculum description in Appendix F. Knowledge of the material will be assessed by examinations, typically using multiple-choice and short-answer questions. In upper division courses, examinations consist of advanced objective questions and high level problem solving.

CONTENT KNOWLEDGE (Technical Skills): Students will demonstrate proper laboratory practice, use of equipment, and ability to use basic and advanced techniques in several areas of biology. Students receiving a BS degree in Medical Biology are required to successfully complete core laboratory courses Students are tested on concepts by short answer and essay questions and tested on their technical skills by practical examinations. 1. Develop/enhance understanding of the US health care system and the various employment opportunities within. 2. Develop/enhance professional behavior appropriate for health care careers. 3. Develop/enhance skills, knowledge and abilities to gain employment upon completion of the Bachelor's degree or to pursue graduate level training.

COMMUNICATION (Written Communication, Oral Communication): Students will demonstrate the ability to speak and write effectively on biological topics. In selected courses, students assigned to discussion groups of eight to ten students where they discuss concepts and are evaluated for group participation. Students are tested for written communication skills by essay and short answer examinations. Develop/enhance communication skills essential for health care professionals in all

employment settings.

CRITICAL THINKING (Analytical Skills): Students will use critical thinking to evaluate data by applying basic principles of scientific methodology including (1) the nature of scientific explanations, (2) threats to the validity and reliability of observations, (3) the limitations of measurement scales, (4) using experimental and quasi-experimental designs to test hypotheses and (5) appropriate interpretation and correlation of experimental data. A focus will be on clinical studies. Develop/enhance collaborative skills to improve health outcomes through research, inquiry and problem solving.

B. Describe the admission standards and graduation requirements for the program.

The admission and graduation standards will mirror the general FAU admission and graduation criteria as listed below and outlined in the FAU catalog (http://www.fau.edu/academic/registrar/FAUcatalog/index.php).

Baccalaureate Degree Admission Requirements
(http://www.fau.edu/academic/registrar/FAUcatalog/admissions.php#ug)

Initial application review is based on the applicant's academic profile as represented by the high school grade point average, rigor of curriculum and/or performance on standardized tests (SAT or ACT). An SAT or ACT is required of all applicants for freshman admission.

1. Test scores: the following are the minimum required.

	Writing and Language	**Math**	**Reading**
rSAT	25	24	24
	English and Writing	**Math**	**Reading**
ACT	18	19	19

FAU will use the highest subscores from multiple test dates to create the ACT composite and the SAT total to satisfy admission requirements. The writing sections of the ACT or rSAT are not required.

2. High School Grade Point Average
The high school grade point average is calculated by the University using grades from academic courses. Dual Enrolled, Advanced, Honors, Gifted, Advanced Placement, International Baccalaureate and Advanced International Certificate in Education (AICE) courses are given additional weight in the University's calculation of the grade point average. A minimum high school grade point average of 2.6 is required of all applicants.

3. High School Units
Applicants are expected to have completed the following 18 (minimum) high school units:

English	4 Carnegie units (3 with substantial writing)
Mathematics	4 units (at the level of Algebra 1 or higher)
Natural Science	3 units (at least 2 with laboratory)
Social Science	3 units
Foreign Language	2 units (of the same foreign language)
Academic Electives	2 units

Appropriate academic and elective courses are listed in the *Counseling for Future Education Handbook,* published by the Florida Department of Education.

Diploma
All incoming freshmen must possess a valid high school diploma prior to enrollment. Proof of graduation must be provided in the form of a final official transcript indicating the date of graduation.

Applicants with a GED
Students with a General Equivalency Diploma (GED) from any state must submit official test scores to the Office of Undergraduate Admissions. Applicants with a GED should also submit high school transcripts from any schools attended.

Early Admission
Students who have completed their junior year of high school in Florida may be considered for Early Admission. Students must enter for the fall term. If accepted for Early Admission, students enter FAU as freshmen instead of attending high school for their senior year. Qualifications for consideration of Early Admission are:

1. A 3.8 or better GPA after six semesters of high school;

2. An rSAT score of least 1290 with an Evidence-Based Reading & Writing component score of no less than 460 and a Math component score of no less than 460; or an ACT score of 27 with no less than 18 on the English component, 19 on the Reading component and 19 on the Math component;

3. Permission from their high school to allow FAU courses to satisfy any remaining requirements toward high school graduation;

4. Written recommendations attesting to the student's maturity and readiness to meet the academic and personal challenges posed by early entry into higher education;

5. Must be a Florida resident from Broward or Palm Beach County;

6. Must submit an Early Admission supplemental application.

Non-Traditional Program of Study
Any student who completes a non-traditional program of study not measured in Carnegie Units, such as attending an institution that is not regionally accredited, must present credentials equivalent to those listed for applicants with a GED. Students completing a home education program according to Section 1002.41 of the Florida Statutes are eligible for admission. Additional documentation may be required to verify student eligibility.

Profile Assessment Admission
Students who have applied for admission and do not meet the standard requirements may be eligible for admission through a student profile assessment that considers additional factors, including but not limited to: family educational background, socioeconomic status, graduate of a low-performing high school, international baccalaureate program graduate, geographic location and special talents. These additional factors shall not include preferences in the admission process for applicants on the basis of race, national origin or sex.

Baccalaureate Degree Graduation Requirements
(http://www.fau.edu/academic/registrar/FAUcatalog/degreerequirements.php#bacc**)**

To earn a baccalaureate degree, students must:

1. Earn a minimum of 120 credits in academic courses acceptable toward the degree (some programs require more than 120 credits). Attain a minimum 2.0 grade point average in the courses required for a major program at FAU.

2. Earn a minimum of 45 of these 120 credits at the upper division as indicated by the Statewide Course Numbering System (SCNS) designations or their equivalents. In some programs, graduate-level courses may be used to satisfy undergraduate requirements; however, no undergraduate will be required to take a graduate-level course as part of a normal degree requirement.

3. Apply no more than 60 credits of non-traditional credit toward the degree earned through Credit by Exam, Correspondence Courses and Military Service Schools, **subject to credit limits for each** as stated in the Academic Policies and Regulations section of this catalog. Credits earned in this manner will be considered transfer credits.

4. Earn the last 30 upper-division credits in residence at FAU. In programs requiring more than 120 credits, at least 25 percent of the total number of credits required for the degree must be earned in residence at FAU.

5. Earn at least 75 percent of all upper-division credits required for the major from FAU. Some majors may require more than 75 percent. Consult the degree requirements section of the major for details.

6. Fulfill the Intellectual Foundations Program requirements.

7. **Summer Credit Requirement:** Earn a minimum of 9 credits by attending one or more summer terms at either FAU or another university in the Florida State University System. This requirement applies only to students admitted to FAU as freshmen or as transfer students with fewer than 60 credits (Florida Board of Governors Regulation 6.016). (For those students enrolled before fall 2011, credits earned and transferred through the Advanced International Certificate in Education (AICE) Program, Advanced Placement (AP) Program, College Level Examination Program (CLEP), Dual Enrollment (DE) Program or International Baccalaureate (IB) Program may be applied toward the 9-credit summer requirement, thereby reducing students' summer credit requirement total.)

8. Satisfy the Writing Across Curriculum (Gordon Rule) and Gordon Rule Computation Skills requirements (see explanation elsewhere in this section).

9. Fulfill the admission and graduation requirements of the department and college granting the degree as described following the Lower-Division College and Department Requirements (explanation elsewhere in this section).

10. Fulfill the foreign language graduation requirement. This requirement applies to all B.S. degree programs (unless otherwise specified) and to all B.A. degree programs. Other select degrees may require the foreign language graduation requirement (for more information, please refer to the specific degree program requirements).

11. Submit an Application for Degree form (see Application for Degree explanation elsewhere in this section).

C. Describe the curricular framework for the proposed program, including number of credit hours and composition of required core courses, restricted electives, unrestricted electives, thesis requirements, and dissertation requirements. Identify the total numbers of semester credit hours for the degree.

The degree will provide a core education in the basic sciences with an emphasis on content that is relevant to graduate and professional programs and entrance exams. A restricted elective pool will guide

students to select additional upper-division biology coursework that builds upon this core and will support them in developing increasingly deep knowledge of biological principles and systems. The program increases in rigor as students move through the core and into the restricted electives, allowing students to fine tune their study and time management skills over time as they immerse themselves in the content, preparing them to enter rigorous graduate and professional program both in terms of content acquisition and approach to content acquisition.

Credit Totals:
81 credits in the major (37 upper division credits)
24 credits Intellectual Foundations Program coursework (non-overlapping with major requirements)
8 credits foreign language requirement
9 credits of upper division free electives
1 credit general elective
120 credits minimum required to earn a baccalaureate degree at FAU

D. Provide a sequenced course of study for all majors, concentrations, or areas of emphasis within the proposed program.

120 total credits
45 credits upper-division coursework
Bolded courses fulfill Intellectual Foundations Program requirements.

	Fall		Spring		Summer	
Fr	**English Lang & Comp I**	3	**English Lang & Comp II**	3	**IFP – WAC Course**	3
	College Algebra	3	**Life Science Calc**	4		
	Biodiversity + L	4	**Bioprinciples + L**	4		
	Gen Chemistry I + L	4	Gen Chemistry II + L	4		
		14		15		3
So	Organic Chem I	3	Organic Chem II	3	Organic Chem L	2
	Introduction to Psychology	3	Statistics	3	**IFP**	3
	Foreign Language I	4	Foreign Language II	4		
	IFP – WAC Course	3	Genetics	4		
		13		14		5
Jr	Biochemistry I	3	Med Biology Elective	3	Gen Microbiology + L	4
	Cell Biology	3	Med Biology Elective	3		
	College Physics I + L	5	College Physics II + L	5		
	IFP	3	**IFP**	3		
		14		14		4
Sr	Human Morph & Func I + L OR Vert Struc Dev & Evo + L	4	Human Morph & Func II + L OR Comp Animal Phys + L	4		
	Med Biology Elective	3	Med Biology Elective	3		
	Upper Division Elective	3	Upper Division Elective	3		
	Upper Division Elective	3	General Elective	1		

		13		11		0

E. Provide a one- or two-sentence description of each required or elective course.

CORE COURSE DESCRIPTIONS

Biological Principles (BSC 1010) 3 credits
A comprehensive treatment of biological principles, including the scientific method, evolution and natural selection, cell biology, energy transformation, reproduction, development, genetics and molecular biology.

Biological Principles Lab (BSC 1010L) 1 credit
An introduction to general laboratory procedures to demonstrate the basic principle of biology.

Biodiversity (BSC 1011) 3 credits
An introduction and survey of organismal diversity, including fungi, protists, plants and animals. Phylogenetic relationships, evolutionary mechanisms, and ecological processes are emphasized. Origins of life and human evolution.

Biodiversity Lab (BSC 1011L) 1 credit
A survey of the diversity of eukaryotic organisms.

General Chemistry 1 (CHM 2045) 3 credits
An introduction to chemical principles, including atomic structure, chemical bonding, kinetics, thermodynamics and properties of the elements. A prerequisite to all other chemistry courses in science programs.

General Chemistry 1 Lab (CHM 2045L) 1 credit
An introduction to experimental techniques in chemistry designed to demonstrate basic chemical principles. This is a General Education course.

General Chemistry 2 (CHM 2046) 3 credits
An introduction to chemical principles including atomic structure, chemical bonding, kinetics, thermodynamics and properties of the elements. A prerequisite to all other chemistry courses in science programs.

General Chemistry 2 Lab (CHM 2046L) 1 credit
An introduction to experimental techniques in chemistry designed to demonstrate basic chemical principles. Qualitative analysis of selected anions and cations.

Organic Chemistry 1 (CHM 2210) 3 credits
A study of the compounds of carbon and their physical properties, structures, chemical behavior and reaction mechanisms.

Organic Chemistry 2 (CHM 2211) 3 credits
Continuation of CHM 2210.

Organic Chemistry Lab (CHM 2211L) 2 credits
Experimental study of the synthesis, purification, and identification of organic compounds using microscale techniques.

Biochemistry 1 (BCH 3033) 3 credits
The organic chemistry of biological compounds; carbohydrates; amino acids; peptides, and proteins; nucleosides and nucleotides; nucleic acids, replication, transcription and translation; saponifiable lipids; steroids and terpenes

College Physics 1 (PHY 2053) 4 credits
The algebra- and trigonometry-based course surveys fundamental laws and phenomena of mechanics, fluids, heat, wave motion, and sound. Emphasis on understanding of physical concepts through examples drawn from the physical and life sciences. No credit for physics majors.

College Physics 2 (PHY 2054) 4 credits
The algebra- and trigonometry-based course surveys fundamental laws and phenomena of electricity and magnetism, optics, special relativity, atomic and nuclear physics. Emphasis on understanding of physical concepts through examples drawn from the physical and life sciences.

General Physics 1 or General Physics for Engineers 1 (PHY 2048) 3 or 4 credits
This is the first course in a two-semester sequence on calculus-based introductory physics. Covers mechanics, linear and rotational motion, fluids, waves, and heat. There is an emphasis on mathematical analysis of physical problems. The 3-credit version of this class is exclusively for Engineering majors and may include Engineering-specific content. This is a General Education course.

General Physics 1 Laboratory (PHY 2048L) 1 credit
Experiments in mechanics, fluids, heat, wave motion and sound comprise this course. Several classes cover developing theoretical problem solving techniques. This is a General Education course.

General Physics 2 (PHY 2049) 4 credits
Intended for science majors, the course surveys fundamental laws and phenomena of electricity, magnetism, and optics. Emphasis on mathematical analysis of physical problems.

General Physics 2 Laboratory (PHY 2049L) 1 credit
Experiments in electricity and magnetism, optics, and modern physics comprise this course. Several classes cover developing theoretical problem solving techniques.

Life Science Calculus I (MAC 2241) 4 credits
Introduction to trigonometry, elementary functions, differential and integral calculus, matrices, elementary statistics, computer algebra, examples and other topics of interest to biology, psychology and premedical students.

Experimental Design and Statistical Inference (PSY 3234) 3 credits
Interpretation of data, curve-fitting and inferential techniques are considered for a variety of experimental paradigms in the life sciences including small and correlated samples.

Introduction to Biostatistics (STA 3173) 3 credits
Introduces basic statistical concepts and procedures that are necessary to conduct statistical analysis for biological researchers. The topics covered are probabilistic foundations, experimental designs and their analyses, summarizing and visualizing data, inferential statistics, including hypothesis tests and regression modeling.

Genetics (PCB 3063) 4 credits
An in-depth analysis of the mechanisms that operate in transmission genetics and an introduction to eucaryotic molecular genetics.

Cell Biology (PCB 3023) 3 credits
Genetics at the molecular level as related to gene structure, function, variation and control with a

comprehensive treatment of plant and animal cell structure and function. Basic concepts of cell physiology are treated.

General Microbiology (MCB 3020) 3 credits
A survey of microbiological concepts, microbial types and the use of microorganisms in medicine, agriculture and industry. Lecture.

General Microbiology Lab (MCB 3020L) 1 credit
The application of fundamental techniques in the isolation, cultivation and identification of microorganisms. Laboratory.

Human Morphology and Function 1 (PCB 3703) 3 credits
Normal structure and physiology of the human skeletal, muscle, and nervous systems. Lecture format. Designed for the preprofessional student planning admission into a graduate clinical program.

Human Morphology and Function 1 Laboratory (PCB 3703L) 1 credit
Laboratory exercises illustrating principles presented in PCB 3703, considering the anatomy and physiology of the human skeletal, muscle, and nervous systems. Designed for the preprofessional student planning admission into graduate clinical programs.

Human Morphology and Function 2 (PCB 3704) 3 credits
Normal structure and physiology of the human cardiovascular, renal, respiratory, gastrointestinal, endocrine, and reproductive systems. Lecture format. Designed for the preprofessional student planning admission into graduate clinical programs.

Human Morphology and Function 2 Laboratory (PCB 3704L) 1 credit
Laboratory exercises illustrating principles presented in PCB 3704, considering anatomy and physiology of the human cardiovascular, renal, respiratory, gastrointestinal, endocrine, and reproductive systems. Designed for the preprofessional student planning admission into graduate clinical programs

Vertebrate Structure Development and Evolution (ZOO 4690) 3 credits
Course covers phylogeny and diversity of vertebrate structures, along with their development through organogenesis, differentiation and growth lead to an understanding of the relationships and functioning of living organisms. Key events in vertebrate evolution are discussed.

Vertebrate Structure and Development Laboratory (ZOO 4690L) 2 credits
Laboratory emphasis is on the diversity, development, form and function of vertebrate structures. Study of vertebrates includes major developmental stages, skeletal preparations, dissection of preserved specimens and demonstrations to integrate understanding of vertebrate form.

Comparative Animal Physiology (PCB 4723) 3 credits
A comparison among vertebrates of major physiological systems; nerve, muscle, respiration, circulation, osmoregulation, excretion, temperature regulation and energy metabolism.

Comparative Animal Physiology Lab (PCB 4723L) 1 credit
Laboratory experiments designed to explore fundamental physiological processes

ELECTIVE COURSE OPTIONS:

Biochemistry 2 (BCH 3034) 3 credits
Bioreactions and the role of enzymes and coenzymes; energy aspects; generation and utilization of ATP; metabolic pathways; regulatory mechanisms; photosynthesis.

Advanced Biochemistry (BCH 4035) 3 credits
Introduction to biomolecular structure determinations by spectroscopic methods, principles of enzyme

kinetics, transport across membranes, molecular physiology, and molecular genetics.

Biochemistry Laboratory (BCH 3103L) 3 credits
An introduction to experimental techniques in physical chemistry as applied to biological systems; quantitative measurements in biochemistry.

Biological Research Writing (BSC 3481) 2 credits
This course is intended for undergraduates to experience lab research while working on their own independent project and presenting it in the form of a graded proposal and public presentation. This is NOT an honors-level course.

Molecular Genetics of Aging (BSC 4022) 3 credits
An in-depth examination of current theories of aging, molecular pathways modulating aging and major discoveries about aging in mammals and in different model organisms, including yeast, *C. elegans, Drosophila* and mouse

Laboratory Methods in Biotechnology (BSC 4403L) 3 credits
Course offers hands-on experience in some of the basic and essential lab skills required in molecular biology and biotechnology that are directly transferable to the workplace. Concepts behind designing and implementing controlled experiments involving manipulation of DNA, RNA and protein are discussed.

Biology of Cancer (BSC 4806) 3 credits
A consideration of chemical, viral and physical oncogenic agents; genetics and host factors; immunological response to neoplasia; chemotherapy.

Directed Independent Research in Biological Sciences (BSC 4910) 0-3 credits
The student works closely with a research mentor to conduct research and inquiry in biological sciences. The requirements for the course and the criteria for evaluation are agreed upon by the research mentor and the student. *Grading: S/U*

Special Topics (BSC 4930) 1-3 credits
Special topics of interest to biological sciences students.

Honors Research (BSC 4917) 3 credits
Supervised independent research for students in the Biology Honors program. Must earn an "A" to receive Biology Honors Distinction.

Honors Thesis (BSC 4918) 3 credits
A continuation of research initiated in BSC 4917. Requires preparation of a written paper and presentation of results at a departmental seminar. Must earn an "A" to receive Biology Honors Distinction.

Comparative Animal Behavior (CBH 4024) 3 credits
An introduction to the evolution and adaptive significance of animal behavior. Topics include traditional and modern ethological concepts; sensory function; orientation, migration and communication; territoriality and animal social behavior

Evolution (PCB 3674) 3 credits
An in-depth examination of the mechanisms that operate in the evolutionary process.

Principles of Ecology (PCB 4043) 3 credits
A functional approach to the basic principles and concepts of modern ecology. Lecture and field trips.

Medical Bacteriology (MCB 4203) 3 credits

The classification and epidemiology of bacteria infecting humans. The role of host defenses in prevention and/or limitation of infection by these organisms and careful examination of the progression of the infections to the disease state. Lecture.

Genetics Lab (PCB 4067L) 3 credits
This laboratory course is open to advanced undergraduates and graduate students. Students gain significant experience in classical and molecular genetics using two powerful model systems, the roundworm *Caenorhabditis elegans* and fruit fly *Drosophila melanogaster.* Experiments are performed to identify morphological and behavioral mutant phenotypes, investigate gene linkage and crossing over, establish dominant versus recessive and sex-linked versus autosomal inheritance, and generate genetic maps.

Immunology (PCB 4233) 3 credits
The tissues, cells and biochemical components of the immune system, and the role of immune responses in the diagnosis and prevention of disease. Lecture

Molecular Genetics (PCB 4522) 3 credits

The genetic control and molecular basis of gene expression

Genes and Development (PCB 4594) 3 credits
Introduction to cellular and molecular mechanisms that underlie organismal development including differential gene regulation, pattern formation, animal stem cells and cloning, sex determination and developmental disorders

Cellular Neuroscience and Disease (PCB 4842) 3 credits
The course focuses on the cellular aspects of human neurological diseases and disorders.
Lectures provide the basic knowledge about common cellular and molecular mechanisms, principles and pathways relevant to neuronal processes and neurological diseases.

Practical Cell Neuroscience (PCB 4843C) 3 credits
This course focuses on understanding neurophysiological signaling at the cellular level. It looks at signaling from the perspective of single ion channels to cellular synaptic transmission. Students learn through both theory and practical laboratory experiments and apply these principles in an experimental proposal that they present and execute, resulting in a final report.

Principles of Human Neuroanatomy (ZOO 4742) 3 credits
This course focuses on the basic structural components and interconnections of the human brain, spinal cord and peripheral nervous system at the level of functional circuits. A discussion of diseases and injuries that disrupt the morphological integrity of the human nervous system is included.

Introduction to Drug Design (CHM 4273) 3 credits
This course will provide an in-depth overview of the approaches utilized by medicinal chemists to design novel, pharmacologically active molecules to treat human diseases.

Structural Biochemistry (CHM 4350) 3 credits
Course emphasizes a computer-based approach to teaching structural biochemistry. It uses hands-on experience to develop essential skills for understanding relationships between structure and function of biomolecules. Classes are held in computer labs. State-of-the-art software for visualization, manipulation and simulation of various biomolecules is used throughout.

Directed Independent Study (in Chemistry) (CHM 4915) 1 – 4 credits
Independent research.

Special Topics (in Chemistry) (CHM 4933) 1 – 4 credits

Directed Independent Study (in Biomedicine) (PCB 4905) 1 – 3 credits
Independent research.

Directed Independent Research (in Biomedicine) (PCB 4915) 1 – 3 credits
Independent research.

Directed Independent Research (in Biomedicine) (PCB 4915) 0 – 3 credits
Independent research.

Special Topics (PCB 4930) 1 – 8 credits
Special topics of interest to biomedical students

Honors Advanced Cell Imaging for Neuroscientists (PCB 4933C) 1 credit
This is an intensive, four-day minimester in light microscopy for students participating in the FAU Max Planck Honors Program (MPHP). The course provides an introduction to practical imaging applications in cellular neuroscience that employ fluorescence and laser scanning.

Honors Advanced Genetics (PCB 4935) 1 credit
Detailed study of molecular control of genetic processes including gene expression, development and optogenetics, and a review of historical and current genetic research methods.

Honors Advanced Physiology (PCB 4937C) 1 credit
This course is designed for the preprofessional student planning admission into graduate clinical programs. The course consists of laboratory investigations illustrating the structure and physiology of the human body, including cardiovascular, renal, respiratory, gastrointestinal, endocrine and reproductive systems.

Honors Advanced Scientific Grant Writing (PCB 4956) 1 credit
Students are introduced to content, techniques and software important in the preparation and submission of neuroscience grant proposals to the National Science Foundation and the National Institutes for Health

Honors Introduction to Neuroscience Research (PSB 4003) 1 credit
This course is designed to introduce incoming FAU Max Planck Honors Program (MPHP) participants to the Program. Students are introduced to neuroscience faculty and build an intellectual community with peer MPHP participants. Specific programmatic responsibilities that undergraduates typically do not encounter are emphasized as are analysis, synthesis and evaluation of information-components fundamental to eventual successful fulfillment of the research requirements associated with MPHP completion

Honors Advanced Techniques in Neuroscience (PSB 4112C) 1 credit
Students receive hands-on training in the application of current neuroscience research techniques using specialized instrumentation. Students learn to both generate and analyze data. *Grading: S/U*

Honors Directed Independent Research (PSB 4916) 0-3 credits
The student works closely with a research mentor to conduct research and inquiry in neuroscience. The requirements for the course and the criteria for evaluation are agreed upon by the research mentor and the student in alignment with the requirements of the FAU Max Planck Honors Program. *Grading: S/U*

Honors Symposium Presentation (PSB 4922) 1 credit
This is a guided independent study course individualized for each student. Students receive supervised study of research opportunities in neuroscience and attend the Max Planck Florida Institute for Neuroscience's Symposium Research Conference. *Grading: S/U*

Honors Special Topics in Neuroscience (PSB 4931) 1 credit
Special topics in neuroscience of interest to FAU Max Planck Honors program participants.

Max Planck Honors Seminar (PSB 4932) 1 credit
The FAU Max Planck Honors Program (MPHP) seminar is a seminar series with distinguished speakers from outside and inside the Max Planck Florida Institute (MPFI) for Neuroscience. *Grading: S/U*

Honors Journal Club in Neuroscience (PSB 4951) 1 credit
Students learn to read, select, present and discuss recently published articles on relevant topics in neuroscience in a journal club format. *Grading: S/U*

Biology Honors Research Thesis Program

Participants in the BS Medical Biology who meet program requirements described below will be eligible to participate in one of three upper-division honors programs. Coursework specific to these options are described within the above program elective list. Students participating in these programs are permitted to use the program-specific required coursework toward fulfillment of the restricted elective requirement within the B.S. in Medical Biology curriculum.

The Department of Biological Sciences offers an Honors Thesis Program that recognizes research accomplishments of talented undergraduates. Eligible students must have a minimum of 20 credits in biology and an overall GPA of 3.2. Students usually begin the program in their sophomore or junior year and conduct independent supervised research during their junior and senior years. A written paper and a seminar describing the results of their research are required in the senior year. Students who meet the eligibility criteria must apply and be accepted to the program in order to enroll in the below Honors Program courses which **can** be used as biology elective courses. Interested students should contact the faculty member whose research interests are closest to those the student wishes to pursue and see biology.fau.edu/academics/undergraduate/research.php for more information.

	Course Title	*Lect Grade*	*Lab Grade*	*FAU*	*Credits*
	Introduction to Biological Research			BSC 3453	1
	Biological Research			BSC 3481	2
	Honors Research			BSC 4917	3
	Honors Thesis			BSC 4918	3

Biology Honors Research Program

The Department of Biological Sciences offers an Honors Thesis Program that recognizes research accomplishments of talented undergraduates. Eligible students must have a minimum of 20 credits in biology and an overall GPA of 3.2. Students usually begin the program in their sophomore or junior year and conduct independent supervised research during their junior and senior years. A written paper and a seminar describing the results of their research are required in the senior year. Students who meet the eligibility criteria must apply and be accepted to the program in order to enroll in the below Honors Program courses which **can** be used as biology elective courses. Interested students should contact the faculty member whose research interests are closest to those the student wishes to pursue and see biology.fau.edu/academics/undergraduate/research.php for more information.

	Course Title	*Lect Grade*	*Lab Grade*	*FAU*	*Credits*
	***Directed Independent Research			BSC 4910	***
	***Directed Independent Research			BSC 4910	***

FAU Max Planck Honors Program Required Coursework

Core Course (required for all participants)					
	Course Title	***Lect Grade***	***Lab Grade***	***FAU***	***Credits***
	Honors Introduction to Neuroscience Research			PSB 4003	1
Enrichment Course Electives (at a minimum, two different courses are required)					
	Honors Scientific Communication			BSC 4934	1
	Honors Advanced Cell Imaging for Neuroscientists			PCB 4933C	1
	Honors Advanced Genetics			PCB 4935	1
	Honors Advanced Physiology			PCB 4937C	1
	Honors Advanced Scientific Grant Writing			PCB 4956	1
	Honors Advanced Techniques in Neuroscience			PSB 4112C	1
	***Honors Directed Independent Research			PSB 4916	0 - 3
	Honors Symposium Presentation			PSB 4922	1
	Honors Special Topics in Neuroscience			PSB 4931	1
	Max Planck Honors Seminar			PSB 4932	1
	Honors Journal Club in Neuroscience			PSB 4951	1
Capstone Options (at least 3 credits in one of the following courses is required)					
	FAU Max Planck Honors Capstone			PSB 4902	
	Honors Mentored Research			PSB 4910	
	FAU Max Planck Honors Thesis			PSB 4970	

F. For degree programs in the science and technology disciplines, discuss how industry-driven competencies were identified and incorporated into the curriculum and indicate whether any industry advisory council exists to provide input for curriculum development and student assessment.

No appropriate industry advisory council exists to provide input for curriculum development or student assessment. The curriculum was established by a departmental (Biology) subcommittee comprised of faculty members with appropriate background and expertise (e.g. Dr. H. Jay Lyons previously served as Associate Professor and Chairman of the Department of Physiology and Pharmacology at Southeastern College of Osteopathic Medicine, Dr. Kailiang Jia's credentials include an MS in Medical Genetics, an MD in Clinical Medicine and a PhD in Genetics and Molecular Biology, etc.). The committee considered existing baccalaureate level programs under the proposed CIP, MCAT exam content, and didactic medical school curricula in assembling the proposed curriculum. All courses were developed by Ph.D. level faculty with expertise in their fields and membership in National Professional Associations that provide guidance and exposure to appropriate content, current research and industry needs.

G. For all programs, list the specialized accreditation agencies and learned societies that would be concerned with the proposed program. Will the university seek accreditation for the program if it is available? If not, why? Provide a brief timeline for seeking accreditation, if appropriate.

There are no specialized accreditation agencies at the bachelor's level that would be concerned with this program.

H. For doctoral programs, list the accreditation agencies and learned societies that would be concerned with corresponding bachelor's or master's programs associated with the proposed program. Are the programs accredited? If not, why?

This will not be a doctoral program.

I. Briefly describe the anticipated delivery system for the proposed program (e.g., traditional delivery on main campus; traditional delivery at branch campuses or centers; or nontraditional delivery such as distance or distributed learning, self-paced instruction, or external degree programs). If the proposed delivery system will require specialized services or greater than normal financial support, include projected costs in Table 2 in Appendix A. Provide a narrative describing the feasibility of delivering the proposed program through collaboration with other universities, both public and private. Cite specific queries made of other institutions with respect to shared courses, distance/distributed learning technologies, and joint-use facilities for research or internships.

The delivery mode for this program will be mostly face-to-face. The complete curriculum is delivered traditionally (face-to-face) on the main Boca Raton campus. Students may also access junior and senior level program electives on our Davie and Jupiter campuses in a traditional, face-to-face format. One elective, Comparative Animal Behavior (CBH 4024) is currently available at all three campus locations via videobroadcast (live section in Boca with connections to Davie and Jupiter campus locations).

Although not a part of the degree program, there are existing opportunities for internships and practicum experiences for students interested in pursuing professional programs. Internships are available through FAU's College of Science Student Services, Pre-Health, and Career Development offices. There are currently over 200 providers affiliated with FAU's Medical Internship course.
For students interested in pursuing graduate programs in the life sciences upon completion of the BS Medical Biology, there are opportunities to participate in intensive honors research programs with or without the completion of a formal thesis. These program options are described in section VIII. E.

IX. Faculty Participation

A. Use Table 4 in Appendix A to identify existing and anticipated full-time (not visiting or adjunct) faculty who will participate in the proposed program through Year 5. Include (a) faculty code associated with the source of funding for the position; (b) name; (c) highest degree held; (d) academic discipline or specialization; (e) contract status (tenure, tenure-earning, or multi-year annual [MYA]); (f) contract length in months; and (g) percent of annual effort that will be directed toward the proposed program (instruction, advising, supervising internships and practica, and supervising thesis or dissertation hours).

As requested, details are provided in Table 4 in Appendix A. We are proposing to redistribute faculty efforts. We are not requesting funding for additional hires or adjuncts to support this program.

B. Use Table 2 in Appendix A to display the costs and associated funding resources for existing and anticipated full-time faculty (as identified in Table 4 in Appendix A). Costs for visiting and adjunct faculty should be included in the category of Other Personnel Services (OPS). Provide a narrative summarizing projected costs and funding sources.

As requested, details are provided in Table 2 in Appendix A. All core and elective courses in the curriculum are already offered at FAU. We are proposing to redistribute faculty efforts. We are not requesting funding for additional hires or adjuncts to support this program.

The total cost (in redistributed effort) is projected to be $253,088 in Year One and $1,058,664 in Year Five and was determined as described in section III. A.

C. Provide in the appendices the abbreviated curriculum vitae (CV) for each existing faculty member (do not include information for visiting or adjunct faculty).

As requested, CVs for existing faculty who will participate in delivering this program are included in Appendix G.

D. Provide evidence that the academic unit(s) associated with this new degree have been productive in teaching, research, and service. Such evidence may include trends over time for average course load, FTE productivity, student HC in major or service courses, degrees granted, external funding attracted, as well as qualitative indicators of excellence.

All of the participating faculty current meet SACS standards. Our Biology programs consistently meet the productivity metrics established by the Board of Governors.

According to FAU's Office of Institutional Effectiveness and Analysis (IEA), the Department of Biological Sciences has awarded an average of 450 total degrees per year with the majority of these degrees being awarded at the Bachelors level and has demonstrate strong FTE productivity.

	Year Degree Granted					All
	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	
Degree Level						
Bachelors	397.5	394	379	386	430	5,104.00
Masters	47	39	51	42	36	550
Doctorate	5	10	12	11	11	114
All	449.5	443	442	439	477	5,768.00

	State Fundable SCH					
	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	Total
Course Level						
Lower Div	20,839	21,058	20,285	20,625	22,527	**105,334**
Upper Div	14,172	14,166	14,669	16,026	15,747	**74,780**
Grad	1,352	1,505	1,410	1,441	1,358	**7,066**
T&D	585	653	490	629	605	**2,962**
Total	**36,948**	**37,382**	**36,854**	**38,721**	**40,237**	**190,142**

	Annualized State Fundable FTE					
	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	Total
Course Level						
Lower Div	694.6	701.9	676.2	687.5	750.9	**3,511.10**
Upper Div	472.4	472.2	489	534.2	524.9	**2,492.70**
Grad	56.3	62.7	58.7	60	56.6	**294.4**
T&D	24.4	27.2	20.4	26.2	25.2	**123.4**
Total	**1,247.70**	**1,264.10**	**1,244.30**	**1,308.00**	**1,357.60**	**6,421.60**

The department maintains a healthy undergraduate major population as demonstrated by headcount

enrollments also accessed through IEA.

	Biology Major Headcount Enrollments by Academic Year					
	2014-2015	**2015-2016**	**2016-2017**	**2017-2018**	**2018-2019**	**5-YR AVG**
Total	2982	2769	2855	2781	2922	2862

Departmental faculty participate in a variety of service activities both internal and external to FAU and maintain active research programs as demonstrated within their CVs (Appendix G).

Further details of our department's activities are outlined in our most recent program review (Appendix H) and mid-program review (Appendix I).

X. Non-Faculty Resources

A. Describe library resources currently available to implement and/or sustain the proposed program through Year 5. Provide the total number of volumes and serials available in this discipline and related fields. List major journals that are available to the university's students. Include a signed statement from the Library Director that this subsection and subsection B have been reviewed and approved.

Existing library resources are sufficient to meet the needs of the degree. This proposal has been reviewed and approved by the FAU Dean of Libraries (Appendix B).

The FAU Libraries https://library.fau.edu/ have extensive resources to support the BS in Medical Biology primarily because of the FAU Medical School located on the Boca Raton campus. There is a **Medical and Health Sciences Collections and User Services Department (**https://library.fau.edu/medical) staffed by two medical librarians. The collection is more than adequate to serve the needs of the undergraduate population enrolled in Medical Biology and faculty teaching the courses.

FAU Libraries Mission Excerpt

"The FAU Libraries….are student-focused, with proactive engagement across the University and the broader community. While access to scholarly content and effective use of it remains foundational, the Libraries are also focusing on new and enhanced services, with the expectation that some services will be delivered without the need for users to enter one of our physical spaces. The Libraries are moving to a just-in-time rather than a just-in-case service model to enable the library faculty and staff to undertake new initiatives without compromising essential legacy services."

Medical and Health Sciences Collections and User Services Department

"The predominant aim of the **Medical and Health Sciences Collections and User Services Department (**https://library.fau.edu/policy/medical-and-health-sciences-collections-user-services) is to support the curricular, instructional, and research needs of the students, faculty, residents, and staff of the FAU Charles E. Schmidt College of Medicine. The department is currently staffed by two medical librarians. The collection development component of the department incorporates both clinical and basic sciences as well as medical education requirements.

The MHSC&US department cooperates in the purchase or leasing of library materials such as electronic databases, journals, and monographs or books, etc., with Florida Virtual Campus and other library cooperative arrangements when possible. The MHSC&US participates in national, regional, and statewide resource sharing programs. As an integrated department within the FAU Libraries the

MHSC&US shares the benefits of being a member of Docline, Consortium of Southern Biomedical Libraries (CONBLS), Florida Collaboration of Acadmic Libraries of Medicine (FCALM), OCLC, Lyrasis, the Southeast Florida Library Information Network (SEFLIN), and the Florida Library Information Network (FLIN). The Libraries share their resources free of charge with other member libraries through interlibrary loan and reciprocal borrowing agreements. The Libraries maintain an associate membership in the Center for Research Libraries. The Center provides access to a large collection of rarely held research materials which can be obtained through interlibrary loan and document delivery

The below table lists the Medical Department's **most frequently used library resources for user's Research and Point of Care needs.** A detailed guide to help users navigate through all the FAU medical resources is available through the Database Quick Reference Resource.

Access Medicine All Medical Databases ClinicalKey Database Quick Reference Resource Cochrane Library E-Journals Embase via Elsevier Library Catalog Facts & Comparisons OneSearch Natural Medicines Refworks Pubmed Scholarly Publishing Guide

Curriculum and Study materials.

UWise ACOG USMLE Resources Thieme E-Book Library Anatomy and Physiology Online VitalSource Bookshelf Aquifer (formerly MedU) AMA Manual of Style Online Symptom Media Web of Science

Resource for tutorials and guides intended to help users navigate FAU resources.

Clinical Affiliate Faculty Guide Evidence-Based Medicine Resident Guide Off-Campus Access Tutorial Citing your Sources Pharmacology Tools Tutorial Finding Images RefWorks Tutorial Database Quick Reference Resource VitalSource Help Mobile Apps The EBM Medical Literature Search"

B. Describe additional library resources that are needed to implement and/or sustain the program through Year 5. Include projected costs of additional library resources in Table 2 in Appendix A. Please include the signature of the Library Director in Appendix B.

Existing library resources are sufficient to meet the needs of the degree. This proposal has been reviewed and approved by the FAU Dean of Libraries (Appendix B).

C. Describe classroom, teaching laboratory, research laboratory, office, and other types of space that are necessary and currently available to implement the proposed program through Year 5.

Existing departmental space is sufficient to meet the needs of the degree. The department controls 112,664 total square feet of space (combined classroom, research, office and other types of space (e.g. lab and research service spaces) across the three campus locations on which the program will be delivered (years 1 through 4 accessible on the Boca Raton campus and years 3 and four accessible on the Davie and Jupiter satellite campuses). This total includes:

Teaching Spaces

Our department controls 18,109 total combined square feet of classroom and associated service spaces.

- 10 teaching laboratories and associated laboratory service spaces in Boca (total combined square footage of 9,898)
- 6 teaching laboratories and associated laboratory service spaces in Davie (total combined square footage of 8,211)

Our department has access to and additional 14 teaching laboratories and associated laboratory service

spaces in Jupiter (total combined square footage of 11,296)

Research Spaces
Talented program participants can access opportunities to conduct cutting edge research in the life sciences (total combined department-controlled square footage of 29,172).

- 21,617 square feet research laboratory and laboratory service space in Boca
- 13,497 square feet research laboratory space and laboratory service in Davie
- 18973 square feet research laboratory and laboratory service space in Jupiter

Other Spaces
Our department has sufficient office, study, storage and other types of spaces to support this program.

- 9,603 square feet "other" space in Boca
- 3,799 square feet "other" space in Davie
- 15,770 square feet square feet "other" space in Jupiter

D. Describe additional classroom, teaching laboratory, research laboratory, office, and other space needed to implement and/or maintain the proposed program through Year 5. Include any projected Instruction and Research (I&R) costs of additional space in Table 2 in Appendix A. Do not include costs for new construction because that information should be provided in response to X (E) below.

We do not anticipate the need for additional space.

Existing departmental space is sufficient to meet the needs of the degree. The department controls 112,664 total square feet of space (combined classroom, research, office and other types of space (e.g. lab and research service spaces) across the three campus locations on which the program will be delivered (years 1 through 4 accessible on the Boca Raton campus and years 3 and four accessible on the Davie and Jupiter satellite campuses). This total includes:

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- 9,603 square feet "other" space in Boca
- 3,799 square feet "other" space in Davie
- 15,770 square feet square feet "other" space in Jupiter

E. If a new capital expenditure for instructional or research space is required, indicate where this item appears on the university's fixed capital outlay priority list. Table 2 in Appendix A includes only Instruction and Research (I&R) costs. If non-I&R costs, such as indirect costs affecting libraries and student services, are expected to increase as a result of the program, describe and estimate those expenses in narrative form below. It is expected that high enrollment programs in particular would necessitate increased costs in non-I&R activities.

New capital expenditure is not necessary for this degree program.

F. Describe specialized equipment that is currently available to implement the proposed program through Year 5. Focus primarily on instructional and research requirements.

Existing equipment will suffice to serve the needs of this program.

G. Describe additional specialized equipment that will be needed to implement and/or sustain the proposed program through Year 5. Include projected costs of additional equipment in Table 2 in Appendix A.

We do not anticipate the need for any additional specialized equipment for this degree program.

H. Describe any additional special categories of resources needed to implement the program through Year 5 (access to proprietary research facilities, specialized services, extended travel, etc.). Include projected costs of special resources in Table 2 in Appendix A.

We do not anticipate the need for additional special categories of resources to implement the program through Year 5

I. Describe fellowships, scholarships, and graduate assistantships to be allocated to the proposed program through Year 5. Include the projected costs in Table 2 in Appendix A.

As faculty efforts will be redistributed, so will graduate teaching assistantships. Please refer to Table 2 in Appendix A.

J. Describe currently available sites for internship and practicum experiences, if appropriate to the program. Describe plans to seek additional sites in Years 1 through 5.

Although not a part of the degree program, there are existing opportunities for internships and practicum experiences for students interested in pursuing professional programs. Internships are available through FAU's College of Science Student Services, Pre-Health, and Career Development offices. There are currently over 200 providers affiliated with FAU's Medical Internship course. For students interested in pursuing graduate programs in the life sciences upon completion of the BS Medical Biology, there are opportunities to participate in intensive honors research programs with or

without the completion of a formal thesis. These program options are described below.

Biology Honors Research Thesis Program

Participants in the BS Medical Biology who meet program requirements described below will be eligible to participate in one of three upper-division honors programs. Coursework specific to these options are described within the above program elective list. Students participating in these programs are permitted to use the program-specific required coursework toward fulfillment of the restricted elective requirement within the B.S. in Medical Biology curriculum.

The Department of Biological Sciences offers an Honors Thesis Program that recognizes research accomplishments of talented undergraduates. Eligible students must have a minimum of 20 credits in biology and an overall GPA of 3.2. Students usually begin the program in their sophomore or junior year and conduct independent supervised research during their junior and senior years. A written paper and a seminar describing the results of their research are required in the senior year. Students who meet the eligibility criteria must apply and be accepted to the program in order to enroll in the below Honors Program courses which **can** be used as biology elective courses. Interested students should contact the faculty member whose research interests are closest to those the student wishes to pursue and see biology.fau.edu/academics/undergraduate/research.php for more information.

	Course Title	*Lect Grade*	*Lab Grade*	*FAU*	*Credits*
	Introduction to Biological Research			BSC 3453	1
	Biological Research			BSC 3481	2
	Honors Research			BSC 4917	3
	Honors Thesis			BSC 4918	3

Biology Honors Research Program

The Department of Biological Sciences offers an Honors Thesis Program that recognizes research accomplishments of talented undergraduates. Eligible students must have a minimum of 20 credits in biology and an overall GPA of 3.2. Students usually begin the program in their sophomore or junior year and conduct independent supervised research during their junior and senior years. A written paper and a seminar describing the results of their research are required in the senior year. Students who meet the eligibility criteria must apply and be accepted to the program in order to enroll in the below Honors Program courses which **can** be used as biology elective courses. Interested students should contact the faculty member whose research interests are closest to those the student wishes to pursue and see biology.fau.edu/academics/undergraduate/research.php for more information.

	Course Title	*Lect Grade*	*Lab Grade*	*FAU*	*Credits*
	***Directed Independent Research			BSC 4910	***
	***Directed Independent Research			BSC 4910	***

FAU Max Planck Honors Program Required Coursework

Core Course (required for all participants)					
	Course Title	*Lect Grade*	*Lab Grade*	*FAU*	*Credits*
	Honors Introduction to Neuroscience Research			PSB 4003	1

Enrichment Course Electives (at a minimum, two different courses are required)					
	Honors Scientific Communication			BSC 4934	1
	Honors Advanced Cell Imaging for Neuroscientists			PCB 4933C	1
	Honors Advanced Genetics			PCB 4935	1
	Honors Advanced Physiology			PCB 4937C	1
	Honors Advanced Scientific Grant Writing			PCB 4956	1
	Honors Advanced Techniques in Neuroscience			PSB 4112C	1
	***Honors Directed Independent Research			PSB 4916	0 - 3
	Honors Symposium Presentation			PSB 4922	1
	Honors Special Topics in Neuroscience			PSB 4931	1
	Max Planck Honors Seminar			PSB 4932	1
	Honors Journal Club in Neuroscience			PSB 4951	1
Capstone Options (at least 3 credits in one of the following courses is required)					
	FAU Max Planck Honors Capstone			PSB 4902	
	Honors Mentored Research			PSB 4910	
	FAU Max Planck Honors Thesis			PSB 4970	

APPENDICES

Appendix A. Headcount, Budget, and Faculty Tables

Appendix B. Equal Opportunity Office and Library Signatures

Appendix C. Labor Assessment and Portfolio Review (Hanover Report)

Appendix D. Medical Biology BS Degree Program Pre-proposal

Appendix E. Letters of Support/No Conflict from Potentially Impacted FAU Entities

Appendix F. BS Medical Biology Degree Sheet (Program Checklist for Students)

Appendix G. Participating Faculty CVs

Appendix H. 2014-15 Biology Program Review

Appendix I. Biology Mid-Program Review

Appendix A. Headcount, Budget, and Faculty Tables

APPENDIX A

TABLE 1-A
PROJECTED HEADCOUNT FROM POTENTIAL SOURCES
(Baccalaureate Degree Program)

Source of Students (Non-duplicated headcount in any given year)*	Year 1		Year 2		Year 3		Year 4		Year 5	
	HC	FTE	HC	FTE	HC	FTE	HC	FTE	HC	FTE
Upper-level students who are transferring from other majors within the university**	30	24	15	12	7	5.6	0	0	0	0
Students who initially entered the university as FTIC students and who are progressing from the lower to the upper level***	160	128	180	144	219	175.2	261	208.8	287	229.6
Florida College System transfers to the upper level***	180	144	351	280.8	513	410.4	675	540	815	652
Transfers to the upper level from other Florida colleges and universities***	40	32	76	60.8	76	60.8	76	60.8	76	60.8
Transfers from out of state colleges and universities***	10	8	19	15.2	19	15.2	19	15.2	19	15.2
Other (New Incoming FTIC Students)***	150	120	302	241.6	410	328	518	414.4	583	466.4
Totals	**570**	**456**	**943**	**754.4**	**1244**	**995.2**	**1549**	**1239.2**	**1780**	**1424**

* List projected annual headcount of students enrolled in the degree program. List projected yearly cumulative ENROLLMENTS instead of admissions.
** If numbers appear in this category, they should go DOWN in later years.
*** Do not include individuals counted in any PRIOR CATEGORY in a given COLUMN.

APPENDIX A

TABLE 1-B

PROJECTED HEADCOUNT FROM POTENTIAL SOURCES

(Graduate Degree Program)

Source of Students (Non-duplicated headcount in any given year)*	Year 1		Year 2		Year 3		Year 4		Year 5	
	HC	FTE	HC	FTE	HC	FTE	HC	FTE	HC	FTE
Individuals drawn from agencies/industries in your service area (e.g., older returning students)	0	0	0	0	0	0	0	0	0	0
Students who transfer from other graduate programs within the university**	0	0	0	0	0	0	0	0	0	0
Individuals who have recently graduated from preceding degree programs at this university	0	0	0	0	0	0	0	0	0	0
Individuals who graduated from preceding degree programs at other Florida public universities	0	0	0	0	0	0	0	0	0	0
Individuals who graduated from preceding degree programs at non-public Florida institutions	0	0	0	0	0	0	0	0	0	0
Additional in-state residents***	0	0	0	0	0	0	0	0	0	0
Additional out-of-state residents***	0	0	0	0	0	0	0	0	0	0
Additional foreign residents***	0	0	0	0	0	0	0	0	0	0
Other (Explain)***	0	0	0	0	0	0	0	0	0	0
Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

* List projected annual headcount of students enrolled in the degree program. List projected yearly cumulative ENROLLMENTS instead of admissions.

** If numbers appear in this category, they should go DOWN in later years.

*** Do not include individuals counted in any PRIOR category in a given COLUMN.

This program is not a graduate level program.

APPENDIX A

TABLE 2
PROJECTED COSTS AND FUNDING SOURCES

Instruction & Research Costs (non-cumulative)	Year 1								Year 5						
	Funding Source								Funding Source						
	Reallocated Base* (E&G)	Enrollment Growth (E&G)	New Recurring (E&G)	New Non-Recurring (E&G)	Contracts & Grants (C&G)	Philanthropy Endowments	Enterprise Auxiliary Funds	**Subtotal coulumns 1+…+7**	Continuing Base** (E&G)	New Enrollment Growth (E&G)	Other*** (E&G)	Contracts & Grants (C&G)	Philanthropy Endowments	Enterprise Auxiliary Funds	**Subtotal coulumns 9+…+ 14**
Columns	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Faculty Salaries and Benefits	150,241	0	0	0	0	0	0	**$150,241**	583,226	0	0	0	0	0	**$583,226**
A & P Salaries and Benefits	16,953	0	0	0	0	0	0	**$16,953**	46,603	0	0	0	0	0	**$46,603**
USPS Salaries and Benefits	7,915	0	0	0	0	0	0	**$7,915**	21,757	0	0	0	0	0	**$21,757**
Other Personal Services	1,665	0	0	0	0	0	0	**$1,665**	4,577	0	0	0	0	0	**$4,577**
Assistantships & Fellowships	76,315	0	0	0	0	0	0	**$76,315**	402,501	0	0	0	0	0	**$402,501**
Library	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Expenses	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Operating Capital Outlay	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Special Categories	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Total Costs	**$253,088**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$253,088**	**$1,058,664**	**$0**	**$0**	**$0**	**$0**	**$0**	**$1,058,664**

*Identify reallocation sources in Table 3.

**Includes recurring E&G funded costs ("reallocated base," "enrollment growth," and "new recurring") from Years 1-4 that continue into Year 5.

***Identify if non-recurring.

Faculty and Staff Summary

Total Positions	Year 1	Year 5
Faculty (person-years)	0.93	4.39
A & P (FTE)	0.63	1.74
USPS (FTE)	0.17	0.47

Calculated Cost per Student FTE

	Year 1	Year 5
Total E&G Funding	$253,088	$1,058,664
Annual Student FTE	456	1780
E&G Cost per FTE	$555	$595

Table 2 Column Explanations		
Reallocated Base* (E&G)	1	E&G funds that are already available in the university's budget and will be reallocated to support the new program. Please include these funds in the Table 3 – Anticipated reallocation of E&G funds and indicate their source.

Enrollment Growth (E&G)	2	Additional E&G funds allocated from the tuition and fees trust fund contingent on enrollment increases.
New Recurring (E&G)	3	Recurring funds appropriated by the Legislature to support implementation of the program.
New Non-Recurring (E&G)	4	Non-recurring funds appropriated by the Legislature to support implementation of the program. Please provide an explanation of the source of these funds in the budget section (section III. A.) of the proposal. These funds can include initial investments, such as infrastructure.
Contracts & Grants (C&G)	5	Contracts and grants funding available for the program.
Philanthropy Endowments	6	Funds provided through the foundation or other Direct Support Organizations (DSO) to support of the program.
Enterprise Auxiliary Funds	7	Use this column for continuing education or market rate programs and provide a rationale in section III.B. in support of the selected tuition model.
Subtotal coulumns 1+…+7	8	Subtotal of values included in columns 1 through 7.
Continuing Base** (E&G)	9	Includes the sum of columns 1, 2, and 3 over time.
New Enrollment Growth (E&G)	10	See explanation provided for column 2.
Other*** (E&G)	11	These are specific funds provided by the Legislature to support implementation of the program.
Contracts & Grants (C&G)	12	See explanation provided for column 5.
Philanthropy Endowments	13	See explanation provided for column 6.
Enterprise Auxiliary Funds	14	Use this column for continuing education or market rate programs and provide a rationale in section III.B. in support of the selected tuition model.
Subtotal coulumns 9+…+ 14	15	Subtotal of values included in columns 9 through 14.

APPENDIX A

TABLE 3
ANTICIPATED REALLOCATION OF EDUCATION & GENERAL FUNDS*

Program and/or E&G account from which current funds will be reallocated during Year 1	Base before reallocation	Amount to be reallocated	Base after reallocation
0.93 FTE Department of Biological Sciences faculty from Table 4 (Medical Biology participation in courses already taught by Biology faculty)	2,495,088	150,241	**$2,344,847**
0.63 FTE admin support (A&P, Biology)	293,633	16,953	**$276,680**
0.17 FTE admin support (USPS, Biology)	106,309	7,915	**$98,394**
Assistantships and Fellowships	805,002	76,315	**$728,687**
Other Personal Services	13,500	1,665	**$11,835**
	0	0	**$0**
	0	0	**$0**
	0	0	**$0**
	0	0	**$0**
	0	0	**$0**
	0	0	**$0**
	0	0	**$0**
	0	0	**$0**
	0	0	**$0**
	0	0	**$0**
Totals	$3,713,532	$253,089	**$3,460,443**

*** If not reallocating funds, please submit a zeroed Table 3**

APPENDIX A

TABLE 4
ANTICIPATED FACULTY PARTICIPATION

Faculty Code	Faculty Name or "New Hire" Highest Degree Held Academic Discipline or Speciality	Rank	Contract Status	Initial Date for Participation in Program	Mos. Contract Year 1	FTE Year 1	% Effort for Prg. Year 1	PY Year 1	Mos. Contract Year 5	FTE Year 5	% Effort for Prg. Year 5	PY Year 5
A	Rindy Anderson, Ph.D. Biology	Assistant Professor	Tenure Track	Spring 2019	9	0.75	0.03	0.02	9	0.75	0.10	0.08
A	John "Jay" Baldwin, Ph.D. Cell and Developmental Biol	Professor	Tenure	Spring 2019	9	0.75	0.03	0.02	9	0.75	0.13	0.09
A	Brian Benscoter, Ph.D. Plant Biology	Associate Professor	Tenure	Spring 2019	9	0.75	0.03	0.02	12	1.00	0.10	0.10
A	David Binninger, Ph.D. Genetics	Associate Professor	Tenure	Spring 2019	12	1.00	0.10	0.10	12	1.00	0.33	0.33
A	W. Randy Brooks, Ph.D. Biological Sciences	Professor	Tenure	Spring 2019	9	0.75	0.03	0.02	9	0.75	0.26	0.20
A	Brenda Claiborne, Ph.D. Biology	Professor	Tenure	Spring 2019	9	0.50	0.05	0.03	9	0.50	0.20	0.10
A	Ken Dawson-Scully, Ph.D. Physiology	Associate Professor	Tenure	Spring 2019	12	1.00	0.02	0.02	12	1.00	0.06	0.06
A	Nathan Dorn, Ph.D. Zoology	Associate Professor	Tenure	Spring 2019	9	0.75	0.03	0.02	9	0.75	0.10	0.08
A	Nwadiuto Esiobu, Ph.D. Microbiology	Professor	Tenure	Spring 2019	9	0.75	0.05	0.04	9	0.75	0.20	0.15
A	Evelyn, Frazier, Ph.D. Zoology	Senior Instructor	Non-Tenure	Spring 2019	9	0.75	0.05	0.04	9	0.75	0.40	0.30
A	Dale Gawlik, Ph.D. Wildlife Science	Professor	Tenure	Spring 2019	12	1.00	0.02	0.02	12	1.00	0.75	0.75
A	Tanja Godenschwege, Ph.D. Biology	Professor	Tenure	Spring 2019	9	0.75	0.03	0.02	9	0.75	0.10	0.08
A	Carl Hansen, Ph.D. Physiology	Professor	Tenure	Spring 2019	9	0.75	0.05	0.04	9	0.75	0.20	0.15
A	James Hartmann, Ph.D. Biological Sciences	Professor	Tenure	Spring 2019	9	0.75	0.05	0.04	9	0.75	0.20	0.15
A	Colin Hughes, Ph.D. Biology	Associate Professor	Tenure	Spring 2019	9	0.75	0.04	0.03	9	0.75	0.15	0.11
A	Kailiang Jia, Ph.D. Genetics	Associate Professor	Tenure	Spring 2019	9	0.75	0.03	0.02	9	0.75	0.10	0.08
A	Stephen Kajiura, Ph.D. Zoology	Professor	Tenure	Spring 2019	9	0.75	0.03	0.02	9	0.75	0.10	0.08
A	Alex Keene, Ph.D. Biomedical Sciences	Associate Professor	Tenure	Spring 2019	9	0.75	0.03	0.02	9	0.75	0.10	0.08
A	Marguerite Koch-Rose, Ph.D. Biological Science: Marine	Professor	Tenure	Spring 2019	9	0.75	0.03	0.02	9	0.75	0.10	0.08
A	James Kumi-Diaka, Ph.D., D.V.M. Biological Sciences, Vet Sciences	Associate Professor	Tenure	Spring 2019	9	0.75	0.06	0.05	9	0.75	0.25	0.19
A	H. Jay Lyons, Ph.D. Medical Science	Associate Professor	Tenure	Spring 2019	12	1.00	0.11	0.11	12	1.00	0.38	0.38
A	Sarah Milton, Ph.D. Marine Biology and Fisheries	Associate Professor	Tenure	Spring 2019	9	0.75	0.03	0.02	9	0.75	0.10	0.08
A	Rod Murphey, Ph.D. Zoology	Professor	Tenure	Spring 2019	12	1.00	0.14	0.14	12	1.00	0.38	0.38
A	Timothy Theisen, Ph.D. Integrative Biology	Senior Instructor	Non-Tenure	Spring 2019	9	0.75	0.10	0.08	9	0.75	0.40	0.30
A	Jeanette Wyneken, Ph.D. Biology	Professor	Tenure	Spring 2019	9	0.75	0.03	0.02	9	0.75	0.10	0.08
A	Xing-Hai Zhang, Ph.D. Plant Molecular Biology	Professor	Tenure	Spring 2019	9	0.75	0.03	0.02	9	0.75	0.10	0.08
	Total Person-Years (PY)							**0.96**				**4.49**

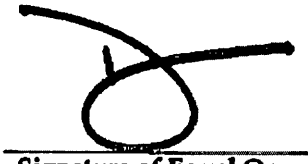
Faculty Code		Source of Funding	PY Workload by Budget Classsification Year 1		Year 5

A	Existing faculty on a regular line	Current Education & General Revenue	0.93			4.39
B	New faculty to be hired on a vacant line	Current Education & General Revenue	0.00			0.00
C	New faculty to be hired on a new line	New Education & General Revenue	0.00			0.00
D	Existing faculty hired on contracts/grants	Contracts/Grants	0.00			0.00
E	New faculty to be hired on contracts/grants	Contracts/Grants	0.00			0.00
		Overall Totals for	**Year 1**	**0.93**	**Year 5**	**4.39**

Appendix B. Equal Opportunity Officer and the Library Director Signatures

APPENDIX B

Please include the signature of the Equal Opportunity Officer and the Library Director.



Signature of Equal Opportunity Officer — **Date:** September 26, 2019

Signature of Library Director — **Date:** 10/3/19

This appendix was created to facilitate the collection of signatures in support of the proposal. Signatures in this section illustrate that the Equal Opportunity Officer has reviewed section II.E of the proposal and the Library Director has reviewed sections X.A and X.B.

FIU | Office of the Provost
FLORIDA INTERNATIONAL UNIVERSITY

February 10, 2020

Bret Danilowicz, Ph.D.
Provost and Vice President for Academic Affairs
Florida Atlantic University
777 Glades Road
Boca Raton, FL 33431

Dear Provost Danilowicz:

Thank you for the opportunity to review the proposed BS in Medical Biology (26.0102). As stated at the CAVP Academic Review Group on September 28, 2018, Florida International University has no objections to FAU creating a new degree program in this field.

Sincerely,

Kenneth G. Furton
Provost and Executive Vice President

Kenneth G. Furton
Provost and Executive Vice President
Modesto A. Maidique Campus, PC 526, 11200 SW 8 Street, Miami, FL 33199
Tel 305-348-2151 · Fax 305-348-2994 · provost.fiu.edu

Florida Agricultural and Mechanical University
TALLAHASSEE, FLORIDA 32307-3100

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OFFICE OF THE PROVOST AND
VICE PRESIDENT OF ACADEMIC AFFAIRS

TELEPHONE: (850) 599-82766
FAX: (850) 561-2551

February 27, 2020

Dr. Bret Danilowicz
Provost and Vice President of Academic Affairs
Florida Atlantic University
777 Glades Road
Boca Raton, FL 33431

Dear Provost Danilowicz:

Thank you for the opportunity to review the proposed B.S. Medical Biology (CIP Code 26.0102) at Florida Atlantic University (FAU). Florida Agricultural and Mechanical University (FAMU) currently offers an undergraduate degree in biology under CIP code 26.0101, similar to FAU. The B.S. in Biology prepares our graduates with the necessary prerequisites to enter professional medical programs through our specialized concentration in pre-medicine and as a result has similar courses offered in the lower-division program as the proposed degree. However, due to the sustained and growing demand of the workforce for graduates prepared to enter medical professions, FAMU offers full support for the proposed degree. We have no concerns regarding negative impact on the enrollment and degree productivity of FAMU's academic programs.

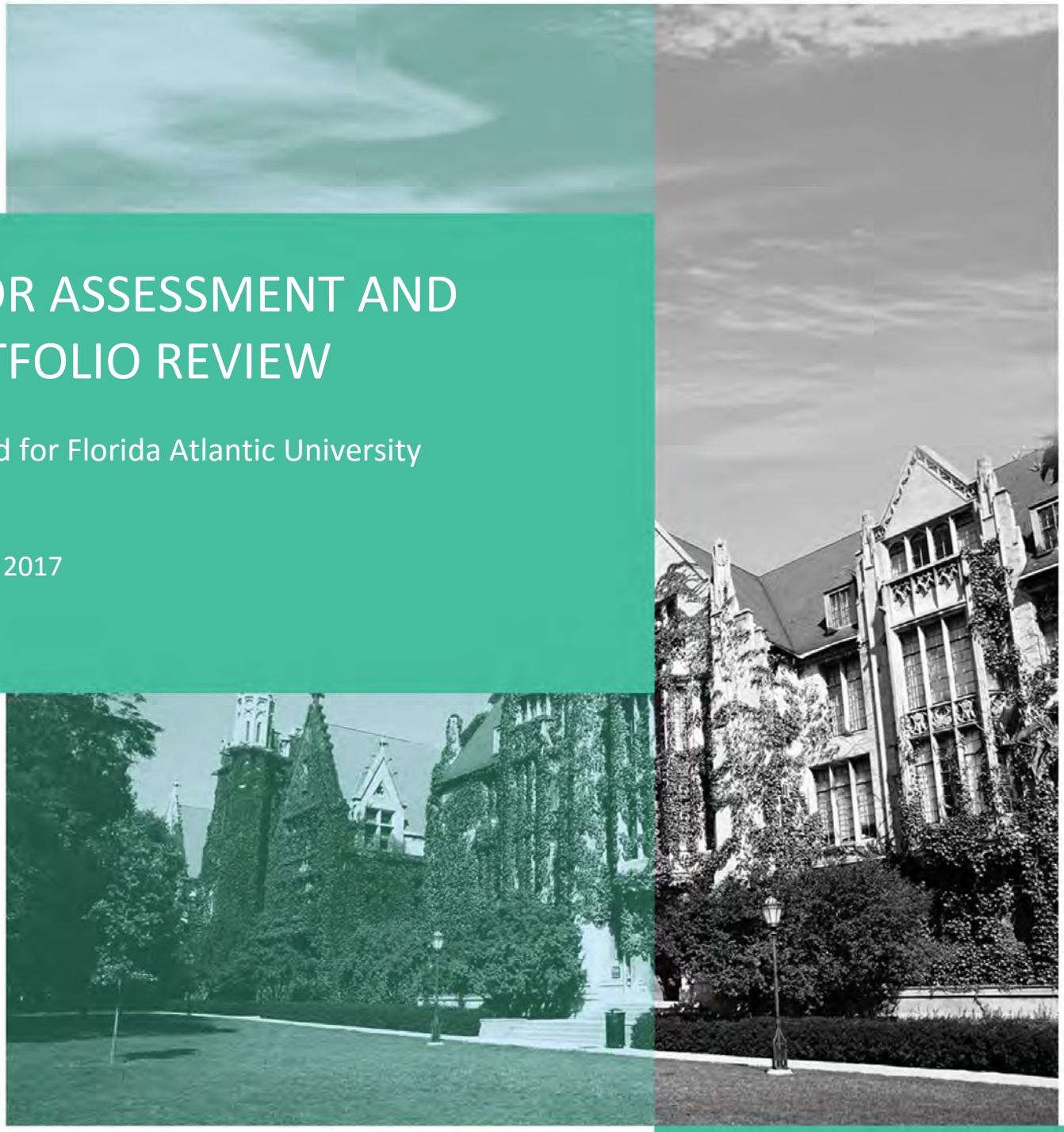
We believe this program will be a benefit to the State University System and workforce of Florida. Best wishes to your team as they move forward in developing the program.

Sincerely,

Maurice D. Edington, Ph.D.
Provost and Vice President for Academic Affairs

c: Dr. Russ Ivy, Senior Associate Provost, Florida Atlantic University
Dr. Richard Alo, Dean, College of Science and Technology
Dr. Sundra Kincey, Assistant Vice President of Program Quality

Appendix C. Labor Assessment and Portfolio Review (Hanover Report)



LABOR ASSESSMENT AND PORTFOLIO REVIEW

Prepared for Florida Atlantic University

February 2017

In the following report, Hanover Research compares fastest growing occupations in surrounding counties with academic offerings at Florida Atlantic University. In addition, Hanover identifies potential areas for program expansion and reduction based on institutional degree completions trends.

HANOVER RESEARCH

www.hanoverresearch.com

TABLE OF CONTENTS

EXECUTIVE SUMMARY AND KEY FINDINGS

INTRODUCTION

In this report, Hanover compares fastest and slowest growing occupations in surrounding counties to programs at Florida Atlantic University (FAU). This analysis accompanies the companion spreadsheet to this report, which contains full labor projections and FAU completions data and facilitates more granular manipulation of these data. This report contains the following sections:

- **Section I – Labor Market Analysis:** identifies fastest and slowest growing occupations in the counties surrounding Florida Atlantic University using Florida labor projections data and links these occupations with academic programs offered at FAU.
- **Section II – Portfolio Review:** uses institutional completions trends to identify fields with increasing, decreasing, and stable student demand and then matches academic fields to fast and slow growing occupations.

KEY FINDINGS

In general, FAU's current programs match growing occupations including offerings with stable or declining completions. The following bullet points outline potential areas for program reduction or expansion based on the findings contained in this report.

- **There are four programs at FAU with growing or stable completions growth with negative employment prospects, which could signal potential areas for reduction.** These fields are: criminal justice, public safety administration, early care and education, hospitality and tourism management. If FAU continues to offer these programs, it may want to revamp curricula to increase the competitiveness of graduates.
- **Healthcare and engineering represent the most promising potential program areas for expansion, due to high projected growth for multiple occupations in these fields.** Healthcare professionals with advanced degrees will experience the most job growth, revealing a sustained need for pre-professional programs. In terms of engineering occupations, mechanical, civil, biomedical, and environmental engineers all have high projected growth. Education professions largely have positive employment prospects, as well, but FAU already has a wide array of programs associated with growing occupations in this field.
- **Occupational projections also reveal that there are specific opportunities that are closely related to existing programs at FAU and/or have cross-disciplinary applications.** For example, operations research has cross-applications in business and STEM fields, offering multiple avenues for additional program options. Healthcare and mental health social work are other opportunities, given FAU's existing offerings in mental health counseling, healthcare, and social work. Informatics represents another potential area; while this academic field is not linked with any discrete

occupation/s, it has applications in healthcare, business, computer science, and biological sciences- all areas with growing occupations. which could enhance the employability of graduates.

- **Additional program opportunities exist specifically in Palm Beach and Broward counties, especially for certain engineering fields and statistics.** FAU could leverage its existing sciences and engineering programs to create biomedical, materials, and/or environmental engineering offerings. Furthermore, expanding statistics options may benefit majors in a variety of fields, particularly business, given high demand for analysts in marketing, management, and operations research.

SECTION I: LABOR MARKET

In this section, Hanover uses Florida labor projections data to identify growing occupations in the counties surrounding Florida Atlantic University. In particular, Hanover focuses on Broward, Palm Beach, Martin, St. Lucie, Indian River, Okeechobee, Highlands, Glades, Hendry, and Collier counties. Note that Florida publishes eight-year projections for 2016 through 2024 and that county level data are only available for large counties such as Broward and Palm Beach. Smaller counties are combined into workforce regions (WFR). Therefore, Hanover uses the following WFRs: 1) Collier, Charlotte, Glades, Hendry, and Lee 2) De Soto, Hardee, and Highlands 3) Indian River, Martin, Okeechobee, and St. Lucie in its analysis, along with Broward and Palm counties. As a result, additional counties are included in projections data that are beyond FAU's local area of interest.

LABOR PROJECTIONS METHODOLOGY

To assess trends in occupations, Hanover uses data compiled by the Florida Department of Economic Opportunity,[1] which uses the taxonomic Standard Occupational Classification (SOC) code system developed by the U.S. Bureau of Labor Statistics (BLS). Hanover then links fast and slow growing SOC codes with academic programs at FAU to determine whether FAU already has program offerings that prepare students for these occupations. Programs associated with slow growing occupations may represent areas for reduction, while a lack of offerings in fast growing occupations could indicate fields for expansion.

In this report, Hanover analyzes SOC codes at two levels of analysis, using 2-digit SOC codes to highlight trends in broad groups of occupations and 6-digit SOC codes to identify occupation-specific trends. 2-digit SOC codes start with two digits other than zero and have four zeros at the end. 6-digit SOC codes are more specific and typically have a combination of non-zero and zero numbers for all six digits. The first 2-digits of 6-digit SOC codes denote the broad occupational group in which the 6-digit SOC occupation belongs.

OVERALL TRENDS

In general, FAU possesses programs in growing 2-digit SOC categories (Figure 1.1). Some of these categories may or may not also be large in size based on total projected openings. Promising areas in which FAU does not offer programs are 310000 Healthcare Support Occupations, 470000 Construction and Extraction Occupations, and 350000 Food Preparation and Serving Related Occupations. Although educational attainment levels are not published for 2-digit CIP categories, it is notable that the vast majority of 6-digit occupations in these three categories require postsecondary vocational education or below. As a result, these broad occupational categories may not represent viable areas for additional programming options.

[1] Unless otherwise noted, all labor data come from "Employment Projections." Florida Department of Economic Opportunity. http://www.floridajobs.org/labor-market-information/data-center/statistical-programs/employment-projections . All FAU data are provided by the institution.

Figure 1.1: Summary of Trends by 2-Digit SOC Code
(Percent Growth for All Occupations: Local Area = 12.2%; Palm Beach = 12.8%; Broward = 10.5%)
(Median Openings: Local Area = 26,279; Palm Beach = 7,733; Broward=8,488)

2-Digit SOC Code	Local Area			Palm Beach			Broward			Aligned with Programs at FAU	Linked Programs
	Largest and/ or Fastest Growing Occupation	% Growth	Openings	Largest and/or Fastest Growing Occupation	% Growth	Openings	Largest and/or Fastest Growing Occupation	% Growth	Openings		
310000 Healthcare Support Occupations	Fastest and Small	18.6%	22,917	Fastest and Median	19.8%	7,100	Fastest and Small	13.7%	6,372	X	None
150000 Computer and Mathematical Occupations	Fastest and Small	17.0%	11,550	Fastest and Small	16.6%	3,902	Fastest and Small	17.2%	5,517	✓	▪ All Computer and IT ▪ All Mathematics and Statistics
290000 Healthcare Practitioners and Technical Occupations	Fastest and Largest	16.1%	44,974	Fastest and Largest	17.6%	13,210	Fast and Largest	12.7%	14,501	✓	▪ All Nursing ▪ Pre-med ▪ Exercise Science
470000 Construction and Extraction Occupations	Fastest and Large	15.8%	33,846	Fast and Large	15.8%	8,365	Fast and Large	11.6%	9,142	X	None
130000 Business and Financial Operations Occupations	Fastest and Large	15.2%	34,266	Fastest and Largest	16.2%	11,544	Fastest and Large	13.4%	13,622	✓	▪ All Finance and Accounting ▪ All Economics ▪ All Business ▪ All Marketing ▪ All Management
230000 Legal Occupations	Fastest and Smallest	15.1%	7,869	Fastest and Small	16.8%	3,144	Fastest and Small	14.7%	3,303	Partial	▪ Criminal Justice

2-digit SOC Code	Local Area			Palm Beach			Broward			Aligned with Programs at FAU	Linked Programs
	Largest and/or Fastest Growing Occupation	% Growth	Openings	Largest and/or Fastest Growing Occupation	% Growth	Openings	Largest and/or Fastest Growing Occupation	% Growth	Openings		
190000 Life, Physical, and Social Science Occupations	Fastest and Smallest	15.1%	3,596	Fastest and Smallest	16.2%	1,119	Fastest and Smallest	13.8%	1,187	✓	▪ All Physical and Life Science, incl. Environment ▪ All Social Science
210000 Community and Social Services Occupations	Fast and Smallest	14.3%	8,684	Fast and Small	15.9%	2,956	Fast and Smallest	11.6%	2,876	✓	▪ All Social Work ▪ All Counseling and Psychology
250000 Education, Training, and Library Occupations	Fast and Large	14.0%	31,199	Fast and Large	14.5%	8,495	Fastest and Large	13.4%	12,035	✓	▪ All Education ▪ All Curriculum and Instruction ▪ All Humanities ▪ All Science and Mathematics
350000 Food Preparation and Serving Related Occupations	Fast and Largest	13.5%	107,664	Fast and Largest	13.0%	29,707	Fastest and Largest	13.4%	35,791	X	None
390000 Personal Care and Service Occupations	Fast and Median	13.2%	24,036	Fast and Small	13.3%	6,119	Average and Median	10.1%	8,243	X	None
170000 Architecture and Engineering Occupations	Fast and Smallest	13.2%	7,006	Fast and Smallest	15.3%	2,706	Average and Smallest	9.8%	2,360	✓	▪ All Engineering ▪ All Architecture and Urban Planning
370000 Building & Grounds Cleaning & Maintenance Occupations	Average and Large	12.6%	30,861	Fast and Large	12.9%	8,795	Average and Large	10.5%	8,733	X	None

2-digit SOC Code	Local Area			Palm Beach			Broward			Aligned with Programs at FAU	Linked Programs
	Largest and/or Fastest Growing Occupation	% Growth	Openings	Largest and/or Fastest Growing Occupation	% Growth	Openings	Largest and/or Fastest Growing Occupation	% Growth	Openings		
490000 Installation, Maintenance, and Repair Occupations	Average and Large	11.8%	30,588	Average and Large	12.5%	8,834	Average and Large	9.6%	10,525	X	None
530000 Transportation and Material-Moving Occupations	Slow and Largest	11.5%	40,181	Average and Large	12.3%	10,041	Average and Largest	10.9%	17,822	X	None
410000 Sales and Related Occupations	Slow and Largest	10.8%	108,644	Slow and Largest	10.3%	38,943	Slow and Largest	9.1%	40,619	Partial	▪ All Marketing
110000 Management Occupations	Slow and Large	10.3%	28,521	Average and Large	11.8%	8,996	Average and Large	9.8%	9,779	✓	▪ All Business ▪ All Management
270000 Arts, Entertainment, Sports, and Media Occupations	Slow and Small	10.3%	10,199	Average and Small	11.8%	3,388	Slow and Small	8.4%	3,621	✓	▪ All Theater and Music ▪ All Arts ▪ All Media Studies ▪ All Humanities
430000 Office and Administrative Support Occupations	Slow and Largest	9.2%	95,696	Slow and Largest	10.1%	27,518	Slow and Largest	7.6%	37,239	✓	▪ All Majors
330000 Protective Service Occupations	Slow and Small	8.9%	16,639	Slow and Small	10.3%	5,161	Slow and Small	7.6%	6,499	Partial	▪ Criminal Justice ▪ Public Safety
510000 Production Occupations	Slow and Small	7.9%	18,061	Slowest and Small	9.4%	4,883	Slowest and Small	5.6%	6,610	X	None
450000 Farming, Fishing, and Forestry Occupations	Slowest and Smallest	0.4%	4,349	Slowest and Smallest	0.3%	996	Slowest and Smallest	0.4%	150	Partial	▪ All Environment

Note: Largest fields are determined based on the top 10 largest CIP codes, while large are CIP categories with volumes well above the geographic median.

To identify fast growing six-digit occupations, Hanover gathered projections data and sorted occupations by percent growth. Occupations with growth rates that exceeded the growth rate for all occupations by 0.5 percent or more for that geographic level were designated as fast growing. Hanover then matched these occupations with degree offerings at FAU. In addition, Hanover cross-referenced occupations at each level of geographic analysis to determine which occupations were increasing or decreasing at all five or most (four out of five) geographic levels. Hanover provides growth rates for each occupation at each geographic level, as such information could help FAU direct regional marketing efforts for each program. In general, geographic areas with higher growth rates may represent more attractive markets, while those with lower growth rates may be less promising. Full data for all fast and slow growing occupations is located in the companion excel spreadsheet.

Note that Hanover omits occupations that require high school diplomas or lower educational attainment levels, as it remains unlikely that FAU graduates would enter such occupations. Educational attainment levels are assigned to occupations based on the plurality credential held by workers age 25 or above. Postsecondary vocational and associate's levels are included in the dataset as the entry level requirement for some occupations may be rising. For example, the educational attainment level for nurses is currently an associate's degree according to Florida projections data; yet bachelor's degrees are becoming the entry level standard. Additionally, individuals with higher educational attainment levels could have a competitive advantage in securing employment in occupations where the plurality of workers hold lower credentials.

In general, FAU's programs align with fast growing occupations (Figure 1.2)**.** These growing occupations tend to fall into several categories: health, counseling and psychology, business, STEM, and education. Furthermore, the FAU's programs appear to be offered at the appropriate educational attainment level, as offered awards match or exceed the educational attainment levels required for entry into analyzed occupations.

In health, demand is high for individuals with advanced professional credentials. Nurse practitioners have the highest demand, followed by physician assistants. Given that FAU does not possess advanced medical degree programs outside of nursing, it may want to consider expanding its degree offerings. Due to high demand for professional degrees, pre-professional programs like FAU's biological sciences program, which prepares graduates for further medical study, may continue to be in demand. Growing employment demand for health-related postsecondary teachers further indicates high student demand for nursing and health educational programs. Demand is also growing in mental health counseling and psychology professions in which FAU already has degree programs; however, FAU could expand its social work offerings to include mental health and healthcare-specific programs.

Employer demand is increasing for individuals with business backgrounds, particularly related to analysis. Operations research, marketing, and management analyst occupations are all expected to grow. Accountants and auditors also have a positive outlook, along with human resources managers. FAU does not possess a human resources management-focused program and may want to consider developing such an option. Furthermore, FAU may want

to increase the competitiveness of its business programs by preparing graduates for analyst positions through coursework or dual offerings in statistics.

Among STEM occupations, engineering appears to be the most promising job growth area. Mechanical, environmental, and civil engineers have particularly promising outlooks, and FAU already has programs in these areas. Among English-related occupations, demand is growing for technical writers; as a result, technical writing may represent a potential new degree area. In terms of education occupations, demand is growing for teachers at all instructional levels and for instructional coordinators. However, demand is only growing for special education teachers at the middle school level and for educational administrators at the elementary and secondary school level, suggesting potential areas for reduction.

Figure 1.2: Fast Growing Occupations, Across All Geographic Areas

6-digit SOC Code	Growth Rate						Linked Programs
	Local Area	Palm Beach	Broward	Collier WFR	De Soto WFR	Indian River WFR	
Health							
291171 Nurse Practitioners	34.0%	38.2%	29.5%	36.6%	20.8%	34.8%	Nursing Practice, Family Nurse Practitioner, Adult/Gero Nurse Practitioner
291071 Physician Assistants	31.8%	31.8%	38.2%	27.3%	29.3%	35.1%	Premed, Biological Sciences
291031 Dietitians and Nutritionists	14.2%	15.5%	12.6%	--	17.8%	16.7%	Premed, Biological Sciences, Exercise Science and Wellness
291123 Physical Therapists	21.9%	27.7%	14.0%	25.2%	19.4%	23.9%	Premed, Biological Sciences
291122 Occupational Therapists	18.1%	20.7%	12.7%	25.6%	19.0%	19.1%	Premed, Biological Sciences
291127 Speech-Language Pathologists	17.3%	19.6%	12.3%	20.7%	20.0%	18.6%	Speech and Audiology
291021 Dentists, General	17.6%	18.1%	15.0%	21.6%	14.0%	18.6%	Premed, Biological Sciences
291069 Physicians and Surgeons, All Other	19.7%	22.0%	16.2%	20.3%	--	24.0%	Premed, Biological Sciences
291199 Health Diagnosing and Treating Practitioners, All Other	17.3%	19.6%	11.2%	21.7%	--	16.7%	Premed, Biological Sciences, Nursing Practice, Family Nurse Practitioner, Adult/Geor Nurse Practitioners
119111 Medical and Health Services Managers	16.5%	18.9%	23.0%	17.6%	--	15.4%	Health Administration, Business: Health Administration

6-digit SOC Code	Growth Rate						Linked Programs
	Local Area	Palm Beach	Broward	Collier WFR	De Soto WFR	Indian River WFR	
291141 Registered Nurses	15.1%	15.3%	12.1%	19.6%	14.7%	15.2%	All Nursing
251071 Health Specialties Teachers, Postsecondary	25.3%	23.3%	25.2%	32.8%	21.4%	18.7%	Nursing: Education
251072 Nursing Instructors and Teachers, Postsecondary	23.2%	22.7%	21.8%	32.8%	--	20.0%	Nursing: Education
Counseling and Psychology							
193031 Clinical, Counseling, and School Psychologists	24.5%	29.7%	18.1%	25.0%	14.3%	18.9%	Counselor Education: School Counselor, Foundations: Educational Psychology
211011 Substance Abuse and Behavioral Disorder Counselors	17.2%	17.3%	15.8%	20.7%	--	18.8%	Social Work, Counselor Education: Mental Health
211022 Healthcare Social Workers	20.2%	27.0%	12.2%	24.9%	19.1%	19.8%	Social Work
211023 Mental Health and Substance Abuse Social Workers	20.5%	22.5%	17.3%	28.5%	--	16.4%	Social Work, Counselor Education: Mental Health
211014 Mental Health Counselors	18.2%	18.7%	13.9%	26.2%	--	25.9%	Social Work, Counselor Education: Mental Health, Counselor Education: Mental Health and Rehabilitation
251066 Psychology Teachers, Postsecondary	23.0%	20.2%	22.6%	31.5%	--	16.7%	All Psychology and Brain Science
291129 Therapists, All Other	25.6%	25.9%	22.0%	27.7%	--	27.8%	Psychology, All Counselor Education
Business							
152031 Operations Research Analysts	27.0%	29.5%	25.6%	27.2%	--	22.0%	Business: Operations Management
132052 Personal Financial Advisors	22.5%	23.5%	22.6%	21.4%	--	19.4%	All Finance
131161 Market Research Analysts and Marketing Specialists	23.0%	23.2%	21.5%	29.5%	31.0%	17.9%	All Marketing
131111 Management Analysts	20.9%	20.3%	19.8%	26.1%	18.5%	19.6%	All Management

6-digit SOC Code	Growth Rate						Linked Programs
	Local Area	Palm Beach	Broward	Collier WFR	De Soto WFR	Indian River WFR	
113121 Human Resources Managers	16.4%	19.7%	13.9%	17.8%	--	13.6%	All Management, All Business
132011 Accountants and Auditors	15.9%	16.3%	14.8%	17.0%	18.0%	17.3%	Accounting
112021 Marketing Managers	18.3%	18.9%	16.3%	23.9%	--	14.3%	All Marketing
STEM							
172141 Mechanical Engineers	22.7%	27.4%	13.4%	25.9%	--	18.9%	Mechanical Engineering
251022 Mathematical Science Teachers, Postsecondary	22.3%	21.0%	21.3%	29.6%	--	18.4%	Mathematics, Applied Mathematics and Statistics
172051 Civil Engineers	17.0%	19.1%	12.5%	23.2%	--	17.0%	Civil Engineering
172081 Environmental Engineers	19.9%	21.3%	19.2%	22.3%	--	19.6%	Environmental Science, Biological Sciences: Environment
119041 Architectural and Engineering Managers	17.5%	19.7%	13.6%	22.0%	--	15.7%	All Architecture and Urban Planning, All Engineering
251052 Chemistry Teachers, Postsecondary	23.9%	21.3%	23.3%	30.4%	--	16.7%	Chemistry, Chemistry: Biochemistry
151132 Software Developers, Applications	20.5%	17.7%	22.3%	23.2%	18.5%	24.2%	All Computer/IT
English and Communications							
273042 Technical Writers	20.1%	22.1%	18.3%	18.8%	--	15.0%	English
251123 English Language & Literature Teachers, Postsecondary	17.1%	15.5%	16.1%	26.0%	18.2%	12.9%	English, English: Creative Writing
251122 Communications Teachers, Postsecondary	17.3%	16.5%	17.2%	23.8%	--	13.0%	All Communication
Education							
252031 Secondary School Teachers, Exc. Special and Voc. Ed.	13.6%	14.1%	13.6%	11.7%	--	14.3%	All Education, All Subject Teaching, All Curriculum and Instruction
252022 Middle School Teachers, Exc. Special & Voc. Education	13.4%	14.1%	13.3%	--	11.5%	14.4%	All Education, All Subject Teaching, All Curriculum and Instruction

6-DIGIT SOC CODE	GROWTH RATE						LINKED PROGRAMS
	LOCAL AREA	PALM BEACH	BROWARD	COLLIER WFR	DE SOTO WFR	INDIAN RIVER WFR	
252021 Elementary School Teachers, Except Special Education	13.4%	14.0%	13.2%	--	11.7%	14.1%	Elementary Education, All Subject Teaching
259031 Instructional Coordinators	13.3%	13.8%	12.4%	15.3%	10.0%	--	All Curriculum and Instruction, All Education, All Subject Teaching
252053 Special Education Teachers, Middle School	13.3%	13.6%	13.0%	--	12.5%	13.7%	Exceptional Student Education, ESOL
211012 Educational, Guidance, School, and Vocational Counselors	13.2%	13.4%	12.3%	15.8%	10.9%	14.3%	Counselor Education: School Counselor, Foundations: Educational Psychology
119032 Education Administrators, Elementary and Secondary	13.1%	13.9%	12.8%	--	11.1%	13.8%	Educational Leadership: K-12
252012 Kindergarten Teachers, Except Special Education	13.0%	14.1%	12.2%	--	11.0%	13.6%	Curriculum and Instruction-PreK/Primary Ed, Early Childhood Education

Dashes denote that data are not available.

To identify slow growing six-digit occupations, Hanover gathered projections data and sorted occupations by percent growth. Occupations with growth rates that underperformed the growth rate for all occupations by more than 0.5 percent per geographic level were designated as slow growing. Hanover then matched these occupations with degree offerings at FAU. **Some contracting occupations align with FAU's offerings; however, many occupations have no match** (Figure 1.3).

Slow growing occupations generally fall into business, arts and multimedia, criminal justice and public safety, and hospitality and tourism management fields (Figure 1.3). Slow growth appears particularly widespread in arts and criminal justice/public safety administration occupations. As a result, graduates of associated programs may have lackluster employment prospects in the area surrounding FAU. Most slow growth business occupations are in finance and accounting, but typically only require an associate's degree and are entry level. Similarly, most negative STEM outlook occupations are at the associate's level, suggesting better employment prospects for more educated professionals. Preschool education was the only education field to have slow growth.

Figure 1.3: Slow Growing Occupations, Across All Geographic Areas

6-digit SOC Code	Growth Rate						Linked Programs
	Local Area	Palm Beach	Broward	Collier WFR	De Soto WFR	Indian River WFR	
Business							
111011 Chief Executives	6.5%	6.3%	5.0%	10.5%	4.0%	7.2%	Executive Education Programs, All Business and Management
131041 Compliance Officers	10.3%	11.8%	6.8%	--	5.0%	10.5%	All Business, All Finance
132041 Credit Analysts	5.6%	5.9%	5.5%	7.0%	--	0.0%	All Accounting, All Finance
132081 Tax Examiners and Collectors, and Revenue Agents	-3.0%	-0.5%	-4.7%	-2.4%	-5.3%	-1.2%	All Accounting, All Finance
433031 Bookkeeping, Accounting, and Auditing Clerks	0.6%	1.0%	-2.3%	1.9%	-1.2%	-0.6%	All Accounting, All Finance
131075 Labor Relations Specialists	0.8%	0.0%	-7.6%	9.1%	--	0.0%	All Management
434161 Human Resources Assistants, Exc. Payroll	5.1%	6.1%	3.9%	5.9%	1.9%	7.3%	All Management
413011 Advertising Sales Agents	5.3%	6.4%	6.6%	2.8%	--	0.7%	All Marketing
413031 Securities and Financial Services Sales Agents	5.4%	5.6%	5.5%	5.0%	--	2.2%	All Finance
113051 Industrial Production Managers	4.7%	7.0%	4.1%	5.8%	--	1.9%	All Business, All Management
131023 Purchasing Agents, Except Farm Products & Trade	8.4%	10.1%	6.5%	11.5%	5.0%	8.3%	All Business
Arts and Multimedia							
271024 Graphic Designers	9.9%	11.2%	8.0%	13.0%	0.0%	7.8%	Art Graphic Design, Art: Graphic Design, Art: Computer Arts
273041 Editors	-5.8%	-9.1%	-2.0%	-4.3%	--	-12.1%	All English
273011 Radio and Television Announcers	-5.2%	-5.8%	-2.5%	-8.2%	--	-5.6%	Multimedia Studies: Multimedia Journalism
273022 Reporters and Correspondents	-4.1%	-2.3%	-6.7%	-1.7%	--	-15.4%	Multimedia Studies: Multimedia Journalism

6-digit SOC Code	Growth Rate						Linked Programs
	Local Area	Palm Beach	Broward	Collier WFR	De Soto WFR	Indian River WFR	
STEM							
151131 Computer Programmers	-2.8%	-2.4%	-3.7%	-0.8%	--	0.0%	All Computer, All Information Technology/Management
439011 Computer Operators	-11.0%	-9.6%	-11.8%	-8.8%	-15.8%	--	All Computer, All Information Technology/Management
172072 Electronics Engineers, Except Computer	4.0%	6.7%	2.1%	3.4%	--	2.6%	Electrical Engineering
173013 Mechanical Drafters	4.0%	5.5%	1.2%	5.1%	--	3.8%	Mechanical Engineering
518031 Water and Wastewater Treatment Plant & System Operators	10.2%	10.3%	7.9%	12.3%	--	11.2%	Ocean Engineering, Biological Sciences: Marine and Environmental, Environmental Science
173031 Surveying and Mapping Technicians	5.2%	5.2%	0.3%	9.9%	--	3.0%	Geography, Geography: GIS, All Urban Planning
Criminal Justice and Public Safety							
231023 Judges, Magistrate Judges, and Magistrates	-5.0%	-5.7%	-3.8%	-6.6%	--	-4.7%	Criminal Justice
331012 First-Line Supervisors of Police and Detectives	7.1%	7.9%	5.8%	8.2%	6.1%	9.6%	Criminal Justice, Public Safety
331021 First-Line Superv. of Fire Fighting and Prevention Workers	9.7%	10.5%	7.7%	12.3%	--	10.6%	Public Safety
333011 Bailiffs	8.8%	12.1%	7.9%	--	7.1%	7.7%	Criminal Justice, Public Safety
333012 Correctional Officers and Jailers	5.0%	2.3%	7.2%	8.6%	1.5%	-0.2%	Criminal Justice, Public Safety
333021 Detectives and Criminal Investigators	5.0%	7.7%	2.7%	6.9%	4.8%	6.6%	Criminal Justice, Public Safety
333051 Police and Sheriff's Patrol Officers	9.3%	10.0%	7.8%	11.5%	7.8%	9.6%	Criminal Justice, Public Safety
339032 Security Guards	10.5%	12.2%	8.7%	10.6%	--	10.2%	Criminal Justice, Public Safety
435031 Police, Fire, and Ambulance Dispatchers	1.2%	1.3%	-0.6%	3.3%	-1.2%	2.2%	Criminal Justice, Public Safety

6-digit SOC Code	Growth Rate						Linked Programs
	Local Area	Palm Beach	Broward	Collier WFR	De Soto WFR	Indian River WFR	
Education							
252011 Preschool Teachers, Except Special Education	8.6%	9.8%	6.8%	10.0%	--	9.1%	Early Childhood Education, Early Care and Education, Curriculum and Instruction: PreK/Primary Ed
399011 Childcare Workers	10.5%	11.1%	9.1%	13.4%	8.7%	11.2%	Early Childhood Education, Early Care and Education, Curriculum and Instruction: PreK/Primary Ed
Hospitality Management							
413041 Travel Agents	-8.7%	-2.5%	-11.7%	-11.7%	--	-3.2%	Hospitality and Tourism Management
119081 Lodging Managers	9.5%	11.1%	6.1%	12.6%	--	10.3%	Hospitality and Tourism Management
Health							
291051 Pharmacists	7.7%	7.5%	5.8%	11.9%	7.9%	8.2%	Premed

Dashes denote that data not available.

PALM BEACH AND BROWARD TRENDS

Figures 1.4 displays fastest growing occupations in Palm Beach and Broward counties that are not listed at all or nearly all geographic levels. Note that the omission of these occupations are typically due to lack of projections data, rather than divergent trends. Note that higher or lower growth rates indicate greater or fewer market opportunities for related programs.

There are only three cases in which there are fast growing occupations in either Palm Beach or Broward (but not both) that would constitute potential areas for new program offerings at FAU. These occupations are materials scientists, materials engineering, and lawyers. As a result, FAU may want to consider offering a materials science/engineering program, with demand for science in Broward and engineering in Palm Beach. Given rising jobs for lawyers, FAU may want to consider a pre-law program in the Palm Beach area. Notably, demand is growing for hydrologists area-wide and in Palm Beach, but contracting demand in Broward county, creating a mixed outlook for such professionals in the area around FAU.

Figure 1.4: Additional Growing Occupations in Palm Beach and Broward

6-DIGIT SOC CODE	GROWTH RATES			
	Overall	Palm Beach	Broward	FAU Degree Programs
291181 Audiologists	27.1%	32.4%	18.2%	Speech and Audiology
292041 Emergency Medical Technicians and Paramedics	15.3%	15.2%	17.0%	Premed, Biological Sciences, Public Safety Administration
211091 Health Educators	14.9%	19.8%	12.8%	Nursing Education
STEM and Architecture				
152041 Statisticians	47.7%	45.5%	48.5%	Applied Mathematics and Statistics
192031 Chemists	13.9%	13.4%	13.6%	Chemistry, Chemistry: Biochemistry
172031 Biomedical Engineers	26.5%	19.4%	28.8%	Bioengineering, Biomedical Science, Business: Biotechnology, Medical Physics, Neuroscience and Behavior, Complex Systems and Brain Science
172131 Materials Engineers	17.7%	17.7%	--	None
192032 Materials Scientists	15.8%	--	14.8%	None
192043 Hydrologists	22.6%	20.9%	8.3%*	Environmental Science, Biological Science: Environmental, Ocean Engineering
119121 Natural Sciences Managers	14.3%	13.8%	13.3%	Environmental Science, Biological Science: Environmental, Biological Science, Biological Science: Marine, Geology, Geosciences,
113021 Computer and Information Systems Managers	18.9%	20.8%	17.0%	All Computer/IT
172061 Computer Hardware Engineers	18.6%	21.2%	17.6%	Computer Engineering
251021 Computer Science Teachers, Postsecondary	16.7%	15.4%	15.9%	All Computer/IT
151133 Software Developers, Systems Software	16.2%	16.5%	14.8%	All Computer/IT
151141 Database Administrators	15.0%	16.5%	14.5%	All Computer/IT
151142 Network and Computer Systems Administrators	13.6%	13.7%	14.2%	All Computer/IT
Social Sciences and Humanities				
231011 Lawyers	16.1%	17.7%	--	None
251067 Sociology Teachers, Postsecondary	25.0%	22.7%	21.1%	Sociology
251125 History Teachers, Postsecondary	16.7%	16.7%	16.7%	History
251065 Political Science Teachers, Postsecondary	21.2%	20.6%	21.9%	Political Science
274032 Film and Video Editors	17.5%	19.9%	14.0%	Multimedia Studies: Film & Video
272012 Producers and Directors	12.8%	16.9%	11.2%	Multimedia Studies: Film & Video
Psychology and Counseling				
193039 Psychologists, All Other	22.3%	23.1%	21.8%	All Psychology and Brain Science

6-DIGIT SOC CODE	GROWTH RATES			FAU Degree Programs
	Overall	Palm Beach	Broward	
211013 Marriage and Family Therapists	20.1%	29.0%	14.9%	Counselor Education, All Psychology and Brain Science
Education				
251081 Education Teachers, Postsecondary	19.0%	16.2%	17.1%	All Education, All Subject Teaching, All Curriculum and Instruction
119033 Education Administrators, Postsecondary	16.0%	15.0%	15.6%	Educational Leadership: Higher Education, Educational Leadership: Adult
252051 Special Education Teachers, Preschool	13.9%	14.9%	13.0%	Early Care and Education, Early Childhood Education, Exceptional Student Education
252023 Vocational Education Teachers, Middle School	12.9%	13.8%	12.5%	None
Business				
131081 Logisticians	18.5%	16.7%	12.5%	Business Administration: Operations Management
113061 Purchasing Managers	13.7%	15.4%	12.5%	Management: General
112011 Advertising and Promotions Managers	18.1%	19.4%	16.7%	All Marketing
251011 Business Teachers, Postsecondary	18.0%	16.1%	16.9%	All Business, All Management, All Marketing
112011 Advertising and Promotions Managers	18.1%	19.4%	16.7%	All Marketing
113131 Training and Development Managers	16.9%	16.3%	18.6%	Management: All, Business Administration: Operations Management, Business Administration and Management
131151 Training and Development Specialists	15.3%	14.9%	15.0%	Management: General
273031 Public Relations Specialists	14.4%	15.8%	12.4%	All Communication

Data reveal a contracting labor market for many occupations in Palm Beach and Broward that did not exhibit overall slow growth at all broader geographic levels (Figures 1.5 and 1.6, respectively). In fact, none of the listed slow growth occupations in Palm Beach and/or Broward exhibited slow growth at the aggregated local level, except for environmental scientists and specialists (Palm Beach and Local Area) and financial managers (Palm Beach, Broward, and Local Area).

Despite differences in slow growth occupations, there are some similarities between the two counties, such as declining demand for art and real estate professionals. As a result, graduates of FAU's art and real estate programs may have low employment prospects in the local area. Broward has a more negative outlook for some architecture, urban planning, and civil engineering occupations; suggesting, FAU may want to market these programs more heavily in Palm Beach. In contrast, Palm Beach has a more negative outlook for environmental science professionals across a number of occupations, so environmental science programs may attract more students outside of Palm Beach. Financial managers are expected to have slow growth in both counties and in the aggregated local area, potentially signaling future declining demand for finance degrees.

Figure 1.5: Additional Slow Growth Occupations in Palm Beach

6-DIGIT SOC CODE	GROWTH RATE	FAU DEGREE PROGRAMS
Art		
254012 Curators	8.8%	All Art
271011 Art Directors	7.8%	All Art
271014 Multimedia Artists and Animators	10.7%	Art: Computer Arts, Multimedia Studies: Film and Video
274021 Photographers	7.6%	Art Studio, Arts and Humanities
STEM and Architecture		
173011 Architectural and Civil Drafters	11.7%	All Architecture
194021 Biological Technicians	11.3%	All Biological Sciences
194031 Chemical Technicians	11.8%	Chemistry, Chemistry: Biochemistry
192041 Environmental Scientists & Specialists, Including Health	11.1%	Biological Science: Environmental, Environmental Science
194091 Environmental Science Technicians, Including Health	1.2%	Biological Science: Environmental, Environmental Science
191013 Soil and Plant Scientists	4.2%	Biological Science, Biological Science: Environmental, Environmental Science
191022 Microbiologists	5.0%	Biological Science, Biomedical Science
191023 Zoologists and Wildlife Biologists	-1.8%	Biological Science, Integrative Biology, Environmental Sciences, Biological Science: Environmental Science
Education		
259041 Teacher Assistants	12.0%	All Education, All Subject Teaching
253011 Literacy, Remedial and GED Teachers and Instructors	0.0%	Exceptional Student Education: ESOL Endorsement, Exceptional Student Education
Business		
132021 Appraisers and Assessors of Real Estate	11.5%	Real Estate
113031 Financial Managers	11.2%	All Finance
131031 Claims Adjusters, Examiners, and Investigators	10.8%	All Finance, All Accounting
132053 Insurance Underwriters	0.0%	All Finance, All Accounting
414011 Sales Representatives, Wholesale & Mfg, Tech. & Sci. Prod.	8.0%	All Marketing
Health		
291131 Veterinarians	10.6%	Premed, Biological Sciences
319096 Veterinary Assistants and Laboratory Animal Caretakers	9.6%	Premed, Biological Sciences
519081 Dental Laboratory Technicians	4.7%	Premed, Biological Sciences
292071 Medical Records and Health Information Technicians	12.1%	Premed, Health Administration, Business: Health Administration

Figure 1.6: Additional Declining Occupations in Broward

6-DIGIT SOC CODE	GROWTH RATE	FAU DEGREE PROGRAMS
Art		
271011 Art Directors	9.1%	All Art
271024 Graphic Designers	8.0%	Art Graphic Design, Art: Graphic Design, Art: Computer Arts
274021 Photographers	5.4%	Art Studio, Arts and Humanities
472121 Glaziers	3.3%	Art: Ceramics
STEM and Architecture		
173011 Architectural and Civil Drafters	3.1%	All Architecture and Urban Planning, Civil Engineering
193051 Urban and Regional Planners	9.6%	All Urban Planning
173022 Civil Engineering Technicians	9.5%	Civil Engineering
192043 Hydrologists	8.3%	Ocean Engineering, Environmental Science, Biological Science: Environmental, Biological Science: Marine, Ocean Engineering
191042 Medical Scientists, Except Epidemiologists	9.1%	Biomedical Science, Medical Physics
191031 Conservation Scientists	6.7%	Biological Science: Environmental, Environmental Science
Business, Finance, Accounting, and Real Estate		
131141 Compensation, Benefits, and Job Analysis Specialists	9.7%	All Management
113031 Financial Managers	9.5%	All Finance
132031 Budget Analysts	8.3%	All Finance, All Accounting
413021 Insurance Sales Agents	8.1%	All Marketing
132082 Tax Preparers	7.8%	All Finance, All Accounting
132053 Insurance Underwriters	0.0%	All Finance, All Accounting
132081 Tax Examiners and Collectors, and Revenue Agents	0.0%	All Finance, All Accounting
414011 Sales Representatives, Wholesale & Mfg, Tech. & Sci. Prod.	5.5%	All Marketing
119141 Property, Real Estate & Community Association Managers	7.7%	Real Estate
132021 Appraisers and Assessors of Real Estate	5.3%	Real Estate
419022 Real Estate Sales Agents	4.6%	Real Estate
419021 Real Estate Brokers	4.5%	Real Estate
Health		
291063 Internists, General	9.5%	Premed, Biological Sciences
291065 Pediatricians, General	8.3%	Premed, Biological Sciences
291011 Chiropractors	7.8%	Premed, Biological Sciences
291081 Podiatrists	2.4%	Premed, Biological Sciences

SECTION II: PORTFOLIO REVIEW

This section scans current program offerings at FAU to identify potential programs for expansion or reduction based on completions growth and whether degree fields are linked with fast or slow growing occupations. Hanover analyzes four-year completions data from FAU for 2013 through 2016 to determine whether each degree program has growing or declining student demand. To do so, Hanover primarily uses **average annual change** (AAC) as its main growth metric. AAC accounts for overall growth, year-to-year variation, and size of program, allowing for a more comprehensive view of the yearly average change in completions, as each year plays a role in determining the metric. If AAC for a particular field at a particular level increases over time, it can be inferred that student demand for that type of degree is rising.

Note that Hanover only calculates AAC for programs with a full-four years of data. To avoid distortions in completions trends, Hanover initially aggregates completions across all award levels and then identifies specific degree levels for each field that diverge from aggregated trends across all awards. Occupations with a "mixed" outlook include both fast and slow growing occupations. "Unclear" occupations have an unclear outlook, normally because these fields do not directly match with fast or slow growing occupations. Fields that match only with postsecondary teaching occupations are also given this designation.

In general, degree fields exhibiting completions growth are associated with growing occupations, indicating that FAU's degree offerings coincide with labor market trends (Figure 2.1)**.** Furthermore, even declining degree fields are typically associated with at least growing occupations, potentially indicating that decreasing student demand for select degrees at FAU is not linked solely to negative employment prospects. Yet, it is notable that fields with declining demand are more likely to have a "mixed" or "unclear" labor outlook, particularly for social sciences and humanities degrees (Figure 2.2). Note that the outlook for such degrees is often difficult to ascertain, as social sciences and humanities fields typically have only indirect matches to occupations.

Four degree fields show increasing or stable completions growth, but have negative employment prospects which could portend future completions declines. These programs are: criminal justice, public safety administration, early care and education, and hospitality and tourism management. In terms of stable and declining degree fields, there are no clear candidates for reduction. Only programs with slight completions declines, such as English: Creative Writing and Art: Graphic Design are directly associated with occupations with negative outlooks. However, FAU may want to consider providing an Environmental Engineering option, given low projected growth for environmental science occupations, particularly in Palm Beach and Broward counties, but more promising growth for environmental engineers.

Figure 2.1: FAU Programs with Growing Student Demand

(Based on AAC, Numbers for All Award Levels)

Degree Program	AAC	Positive Occupational Outlook?	Examples of Occupations * Denotes Declining Occupations	Offered Awards
Nursing	49	✓	Registered Nurses* Nurse Practitioners Health Educators Nursing Instructors and Teachers (Postsecondary)	Bachelor's, Doctorate
Communication Studies	43	✓	Public Relations Specialists Public Relations and Fundraising Managers Communications Teachers (Postsecondary)	Bachelor's
Biological Science	37	✓	Doctors and Surgeons Dentists and Dental Assistants Physical and Occupational Therapists and Assistants Veterinarians	Bachelor's, Master's
Bus Adm: Prof Alt MBA	22	Mixed	General and Operations Managers Business Operations Specialists, All Other Operations Research Analysts Business Teachers (Postsecondary) Chief Executives* Purchasing Agents, Except Farm and Trade*	Master's
Exercise Science and Wellness	21	✓	Dietitians and Nutritionists Recreational Therapists Athletic Trainers Exercise Physiologists Recreation and Fitness Studies Teachers (Postsecondary) Recreation Workers	Bachelor's, Master's
Business Administration-External Masters	18	Mixed	General and Operations Managers Business Operations Specialists, All Other Operations Research Analysts Business Teachers (Postsecondary) Chief Executives* Purchasing Agents, Except Farm and Trade*	Master's
Criminal Justice	16	X	Criminal Justice and Law Enforcement Teachers (Postsecondary) Lawyers Detectives and Criminal Investigators* First-Line Supervisors of Police and Detectives* Judges, Magistrate Judges, and Magistrates* Correctional Officers and Jailers* Probation Officers and Correctional Treatment Specialists*	Bachelor's, Master's
Psychology	16	✓	Clinical, Counseling, and School Psychologists Psychiatrists Marriage and Family Therapists Psychology Teachers (Postsecondary)	Bachelor's
Health Administration	15	✓	Medical and Health Services Managers Medical Records and Health Information Technicians	Bachelor's
Economics	14	Unclear	Economics Teachers (Postsecondary)	Bachelor's
Neuroscience and Behavior	14	✓	Biomedical Engineers Medical Scientists (except Epidemiologists)	Bachelor's
Social Work	11	✓	Healthcare Social Workers Community Health Workers Mental Health and Substance Abuse Social Workers Child, Family, and School Social Workers, Social Work Teachers (Postsecondary)	Bachelor's, Master's

Degree Program	AAC	Positive Occupational Outlook?	Examples of Occupations * Denotes Declining Occupations	Offered Awards
Management Information Systems	10	✓	Computer and Information Systems Managers Network and Computer Systems Administrators Computer Network Architects, Computer Systems Analysts	Bachelor's
Public Safety Administration	10	X	Criminal Justice and Law Enforcement Teachers (Postsecondary) First-Line Supervisors of Fire Fighting and Prevention Workers* Fire Inspectors and Investigators* Fire Fighters* Emergency Management Directors*	Bachelor's
Computer Science	9	✓	Software Developers (Applications) Web Developers Computer Systems Analysis Computer Network Architects, Database Administrators Computer and Information Systems Managers Computer Science Teachers (Postsecondary)	Bachelor's
Counselor Education	9	✓	Educational, Guidance, School, and Vocational Counselors Mental Health and Substance Abuse Social Worker Healthcare Social Workers Community Health Social Workers	Master's
Architecture	7	✓	Architects Landscape Architects Architectural and Engineering Managers	Bachelor's
Multimedia Studies: Film & Video	7	Mixed	Film and Video Editors Multimedia Artists and Animators	Bachelor's
Electrical Engineering	6	✓	Electrical Engineers	Bachelor's, Master's
Mechanical Engineering	6	✓	Mechanical Engineers	Bachelor's
Public Administration	6	Unclear	Management Analysts	Master's, Doctorate
Early Care and Education	5	X	Early Care and Education*	Bachelor's
Except. Student Educ.: ESOL Endorsement	5	Unclear	Special Education Teachers, Middle School	Bachelor's
Geology	5	Mixed	Geoscientists, Except Hydrologists and Geographers	Bachelor's
Language & Linguistics: Linguistics	5	✓	Interpreters and Translators, Foreign Language and Literature Teachers (Postsecondary)	Bachelor's, Master's
Liberal Arts & Science - Honors College	5	Unclear	None	Bachelor's
Chemistry	4	✓	Chemists Chemical Technicians Chemistry Teachers (Postsecondary)	Bachelor's
Marketing: General	4	✓	Marketing Managers Market Research Analysts and Marketing Specialists Advertising and Promotions Managers	Bachelor's
Business Administration: Accounting	3	Mixed	Accountants and Auditors Tax Examiners and Collectors, and Revenue Agents*	Master's
Family Nurse Practitioner	3	✓	Nurse Practitioners	Doctorate
Physics	3	Unclear	Biochemists and Biophysicists	Bachelor's
Public Management	3	Unclear	Management Analyst	Bachelor's
Curriculum and Instruction	2	✓	Instructional Coordinators Teachers (All Levels)	Master's, Doctorate
Experimental Psychology	2	✓	Clinical, Counseling, and School Psychologists	Doctorate

Degree Program	AAC	Positive Occupational Outlook?	Examples of Occupations * Denotes Declining Occupations	Offered Awards
Info Tech and Management	2	✓	Computer Systems Analysts Computer and Information Systems Managers Network and Computer Systems Administrators Computer Network Architects	Master's
Nursing Practice	2	✓	Nurse Practitioners Registered Nurses	Doctorate
Speech & Audiology	2	✓	Speech-Language Pathologists	Master's
Taxation-Executive Masters	2	Unclear	Tax Examiners and Collectors, and Revenue Agents*	Master's
Additional Fields (Based on Level-Specific AAC)				Increasing Award
Business Administration	4	✓	Operations Research Analysts Marketing Researchers and Analysts Management Analysts Business Teachers (Postsecondary) Chief Executives* Purchasing Agents, Except Farm and Trade*	Master's, Doctorate
Computer Engineering	3	✓	Computer Hardware Engineers Computer Systems Analysts Software Developers (Applications) Computer and Information Systems Managers Network and Computer Systems Administrators Computer Network Architects	Bachelor's
Finance	3	Mixed	Personal Financial Advisors Financial Analysts Financial Examiners Credit Analysts* Financial Managers* Budget Analysts*	Bachelor's
Music	2	Unclear	Art, Drama, and Music Teachers (Postsecondary)	Bachelor's
Anthropology	2	Unclear	Social Sciences Teachers (Postsecondary)	Master's

Figure 2.2: Stable and Declining Degree Programs, All Award Levels

(Based on AAC, Numbers for All Award Levels)

Degree Program	AAC	Positive Occupational Outlook?	Examples of Occupations * Denotes Increasing Occupations	Offered Awards
Accounting	-56	Mixed	Bookkeeping, Accounting, and Auditing Clerks Budget Analysts Accountants and Auditors*	Bachelor's, Master's
Elementary Education	-48	✓	Elementary School Teachers* Special Education Teachers (Kindergarten and Elementary)* Education Administrators (Elementary and Secondary)*	Bachelor's, Master's
Communications: Public Communication	-22	✓	Public Relations Specialists* Public Relations and Fundraising Managers* Media and Communication Workers All Other* Communications Teachers (Postsecondary)*	Bachelor's
Interdisciplinary Studies: Arts and Humanities	-17	Unclear	Photographers	Bachelor's
Economics: Business	-8	Unclear	None	Bachelor's
Political Science	-8	Unclear	Social Scientists and Related Workers, All Other	Bachelor's, Master's
International Business & Trade	-7	Unclear	Purchasing Agents Transportation, Storage, and Distribution Managers	Bachelor's
Management: General	-7	✓	Management Analysts* Human Resources Specialists* General and Operations Managers* Operations Research Analysts*	Bachelor's
Sociology	-7	Mixed	Social Sciences Teachers (Postsecondary)* Social Scientists and Related Workers, All Other Sociologists	Bachelor's, Master's
Exceptional Student Education	-6	✓	Special Education Teachers (All Levels)* Literacy, Remedial and GED Teachers and Instructors	Bachelor's, Master's, Doctorate
Communication: Media Studies	-5	Unclear	None	Bachelor's
Mathematics	-5	✓	Statisticians*	Bachelor's, Doctorate
Nursing: Registered Nurse	-4	✓	Registered Nurse* Nurse Practitioners*	Bachelor's
Ocean Engineering	-4	Mixed	Water and Wastewater Treatment Plant & System Operators Hydrologists*	Bachelor's, Master's, Doctorate
Biomedical Science	-3	✓	Biomedical Engineers* Medical Scientists (Except Epidemiologists)* Medical and Clinical Laboratory Technicians*	Master's
Communication	-3	✓	Public Relations Specialists* Public Relations and Fundraising Managers* Media and Communication Workers All Other* Communications Teachers (Postsecondary)*	Bachelor's, Master's
Interdisciplinary Studies: Social Science	-3	Unclear	Social Scientists and Related Workers, All Other	Bachelor's
Psychobiology	-3	✓	Medical Scientists, Except Epidemiologists* Clinical, Counseling, and School Psychologists* Psychiatrists*	Bachelor's
Spanish	-3	✓	Interpreters and Translators* Foreign Language and Literature Teachers (Postsecondary)*	Bachelor's, Master's

Degree Program	AAC	Positive Occupational Outlook?	Examples of Occupations * Denotes Increasing Occupations	Offered Awards
English	-2	Mixed	Technical Writers* English Language and Literature Teachers (Postsecondary)* Editors	Bachelor's, Master's
English: Creative Writing	-2	X	Writers and Authors	Master's
Geography	-2	Mixed	Cartographers and Photogrammetrists* Geography Teachers (Postsecondary)* Surveying and Mapping Technicians Surveyors	Bachelor's, Master's
Integrative Biology	-2	✓	Biomedical Engineers* Medical Scientists (Except Epidemiologists)*	Doctorate
Multimedia Studies: Multimedia Journalism	-2	X	Reporters and Correspondents Radio and Television Announcers	Bachelor's
Music: Performance	-2	Unclear	Music Directors and Composers Art, Drama, and Music Teachers, Postsecondary*	Bachelor's
Philosophy	-2	Unclear	None	Bachelor's
Art Education Teachers	-1	Unclear	Kindergarten and Elementary Teachers* Special Education Teachers (All Levels)* Art, Drama, and Music Teachers (Postsecondary)*	Bachelor's
Art: Studio	-1	Unclear	Curators* Art, Drama, and Music Teachers (Postsecondary)*	Bachelor's
Bioengineering	-1	✓	Biochemists and Biophysicists* Biomedical Engineers*	Bachelor's
Chemistry: Biochemistry	-1	✓	Biochemists and Biophysicists* Biomedical Engineers*	Bachelor's
Comparative Studies	-1	Unclear	Sociologists Sociology Sciences Teachers (Postsecondary)*	Doctorate
Environmental Science	-1	Mixed	Environmental Scientists and Specialists (including Health), Zoologists and Wildlife Biologists, Agricultural Inspectors, Environmental Science Technicians Conservation Scientists Hydrologists* Environmental Science Teachers (Postsecondary)* Environmental Engineering*	Bachelor's
History	-1	Unclear	History Teachers (Postsecondary)*	Bachelor's
Management: Not-For-Profit	-1	Unclear	No Match	Bachelor's
Mathematics Education	-1	Unclear	Teachers (All, Except Preschool)* Special Education Teachers (All Levels)*	Bachelor's
Music Education	-1	Unclear	Teachers (All, Except Preschool)* Special Education Teachers (All Levels)* Art, Drama, and Music Teachers, Postsecondary*	Bachelor's
Music: Business	-1	Unclear	No Match	Bachelor's
Reading Education	-1	Unclear	Teachers (All, Except Preschool)* Special Education Teachers (All Levels)* Literacy, Remedial and GED Teachers and Instructors	Bachelor's, Master's
Theatre	-1	Unclear	Art, Drama, and Music Teachers, Postsecondary*	Bachelor's Master's
Women's Studies	-1	Unclear	None	Bachelor's Master's
Art: Fine Art	0	Unclear	Curators* Art Directors	Bachelor's
Business Biotechnology	0	Unclear	Biomedical Engineers*	Master's
Civil Engineering	0	✓	Civil Engineers	Bachelor's, Master's

Degree Program	AAC	Positive Occupational Outlook?	Examples of Occupations * Denotes Increasing Occupations	Offered Awards
Taxation	0	Unclear	Tax Examiners and Collectors, and Revenue Agents	Master's
Hospitality and Tourism Management	1	X	Travel Agents* Lodging Managers*	Bachelor's
Commercial Music: Creative	1	X	Music Composers and Directors* Art, Drama, and Music Teachers, Postsecondary*	Bachelor's
English Education	1	✓	Teachers (All, Except Preschool)* Special Education Teachers (All Levels)*	Bachelor's
French	1	✓	Interpreters and Translators* Foreign Language & Literature Teachers, Postsecondary*	Bachelor's, Master's
Complex Systems and Brain Science	1	✓	Biomedical Engineers* Medical Scientists, Except Epidemiologists*	Doctorate
Geomatics Engineering	1	✓	Geoscientists, Except Hydrologists and Geographers*	Bachelor's
Declining Fields Based on Level-Specific AAC				Declining Award
Counselor Education: Rehabilitation and Mental Health	-5	✓	Educational, Guidance, School, and Vocational Counselors* Mental Health and Substance Abuse Social Worker* Healthcare Social Workers* Community Health Social Workers* Rehabilitation Therapists	Master's
Art: History	-3	Mixed	Curators* Art Directors	Bachelor's
Bus Adm: International Business Executive	-3	Unclear	Chief Executives	Master's
Health Administration	-3	✓	Medical and Health Services Managers* Medical Records and Health Information Technicians* Health Support Workers, All Other* Medical Secretaries*	Master's
Urban and Regional Planning	-3	Mixed	Urban and Regional Planners* Surveyors Surveying and Mapping Technicians	Master's
Art: Graphic Design	-2	X	Graphic Designers	Bachelor's
Urban Design	-1	Mixed	Urban and Regional Planners* Surveyors Surveying and Mapping Technicians	Bachelor's
Economics	-1	Unclear	Economics Teachers (Postsecondary)	Master's
Counselor Education	-1	✓	Educational, Guidance, School, and Vocational Counselors* Mental Health and Substance Abuse Social Worker* Healthcare Social Workers* Community Health Social Workers*	Doctorate

PROJECT EVALUATION FORM

Hanover Research is committed to providing a work product that meets or exceeds client expectations. In keeping with that goal, we would like to hear your opinions regarding our reports. Feedback is critically important and serves as the strongest mechanism by which we tailor our research to your organization. When you have had a chance to evaluate this report, please take a moment to fill out the following questionnaire.

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Appendix D. BS Medical Biology Degree Program Pre-Proposal

New Academic Degree Program Authorization Pre-Proposal Form

New Academic Program Pre-Proposal Process

New academic program pre-proposals are initiated and developed by the faculty members. Approval of the pre- proposal must be obtained from department chairs and college deans or equivalent administrators before submission for Academic Affairs level review and consideration for inclusion in the University's Annual Work Plan.

Directions: Please provide a succinct, yet thorough response to each section. Obtain the Provost's signature, and submit the proposal to Carol DeLoach, cdeloach@fsu.edu, for review by the Council of Academic Vice President's Academic Coordination Project Workgroup.

Institution	Florida Atlantic University
Degree Program Title (e.g. M.A. in Biology)	B.S. in Pre-Health Professions
CIP Code	26.0102 Biomedical Sciences, General
Proposed Delivery Mode (% online, if applicable)	In-person
Enrollment Projections (Headcount): Year 1 and Year 5	Year 1 = 400; Year 5 = 2,000
Proposed Implementation Date (e.g. Fall 2017)	Fall 2019
Emphasis: (STEM, Health, Global, other)	STEM
Other Programs in the SUS (Including Enrollment and Degrees):	**Bachelors Programs in Biomedical Sciences (CIP 26.0102) are currently at** 1) Univ Central Florida (2,525 enrolled in 2015; 327 degrees awarded in 2016-17), 2) Univ Southern Florida (150 enrolled in 2018; 0 degrees awarded as of 2018) and 3) Univ Western Florida (350 enrolled in 2017; 0 degrees awarded as of 2017). Taken from https://prod.flbog.net:4445/pls/apex/f?p=136:45:7036291418400::NO::: (24 May 2018): Legend: B-Bachelors; M-Masters; A-Advanced Master; E-Engineering; S-Specialist; P-Professional Doctorate; R-Research Doctorate

CIP	CIP Title	FAMU	FAU	FGCU	FIU	FPU	FSU	NCF	UCF	UF	UNF	USF T	USF SM	USF SP	UWF	ExcelCIP	Area
26.0102	Biomedical Sciences, General		M		R	-	MR		BMR			B			B	'26.0102	STEM

Program Summary: (*Briefly describe the proposed program*)

1. Briefly summarize the overall rationale for the new academic program and consider the following in your narrative:
    - Nature of the proposed curriculum, including areas of emphasis
    - Ways in which the proposed program is distinct from others already offered in the SUS (use the 4-digit CIP as a guide).
    - How this program supports specific university and SUS missions.
    - Collaborative opportunities with other SUS institutions as appropriate. (maximum length 250 words)

The B.S. in Biomedical Sciences (CIP 26.0102), will offer students pursuing professional/graduate schools (including Medical, Veterinary, Dental, Pharmacy and Physician Assistant) the rigor expected for admittance. The curriculum will fulfill prerequisites of medically-focused schools by demanding additional advanced relevant courses and considering pre-professional entrance exams.

FAU currently offers a B.S. in Biology (CIP 26.0101), a flexible and holistic degree designed to train biologists, *not* medical professionals. In this degree, students select specializations, such as ecology, marine science, behavior or microbiology. FAU offers a B.A. in Health Science (CIP 51.000) designed for students that will *not* advance on to medical professional schools.

Currently, there's a market not being served by FAU's programs. There are over 2,800 declared biology majors at FAU. According to the Associate Dean of Undergraduate Studies, over 500 incoming first-time-in-college freshmen identify as pre-health every fall.

The proposed degree will capture and support these students and leave large student numbers in the Biology B.S. (>1,000 students) or the Health Science B.A. (> 300 students). Currently FAU undergraduate students are not required to access academic advising services or self-identify as pre-health majors. Enrollment by otherwise unidentified pre-health students in a designated major specific to their educational objectives will facilitate us in identifying and disseminating to them information pertinent to the achievement of their goals.

This program supports SUS's goal of increasing STEM/Health degrees and FAU's pillars of Healthy Aging and Neuroscience and will supply talented students for M.S., Ph.D., M.D. and M.D./Ph.D. programs in the SUS.

Student Demand: *(Describe the demand in the SUS for the proposed program)*

2. Briefly describe the student demand for the proposed program and consider the following in your narrative:
   - Explain why a student would be interested in this program.
   - Recognizing that programs at different levels may require different degrees of justification (e.g., greater duplication may be warranted at undergraduate and master's degree levels), indicate why duplicative programs should be warranted.
   - Numbers of graduates and students enrolled in similar programs currently offered online or face-to-face. For assistance, see the Board of Governors interactive data source, http://www.flbog.edu/resources/iud/.
   - As applicable: place-bound learners, underserved populations in the field/profession, and professional credentials requirements. (maximum length 250 words)

Students wishing to pursue graduate education at professional schools (including Medical, Veterinary, Dental, Pharmacy and Physician Assistant) will be extremely interested in the B.S. in Biomedical Sciences. This degree will thoroughly prepare students with the prerequisites to apply and be accepted into competitive graduate professional schools. According to the SUS[1] the B.S. in Biomedical Sciences (CIP 26.0102) is offered only at University of Central Florida (2,525 students enrolled in 2015[2] and 327 degrees awarded in 2016-17[3]), University of Southern Florida (160 students enrolled in 2018[4] and no degrees awarded as of 2018[5]) and University of Western Florida (350 students enrolled in 2017[6] and no degrees awarded as of 2017[7]). There are currently over 2,800 declared biology majors at FAU. FAU serves primarily commuter students (place-bound learners); moreover, as a Hispanic-serving university, FAU could prepare large numbers of underrepresented applicants for professional schools.

This major would also be compatible with research intensive enrichment programs (Honors in the Major: Biology, FAU-Max Planck Honors in the Major with an emphasis in neuroscience), FAU's Med Direct BS/MD Program, 5-year BS/MS fast-track options, and interdisciplinary Masters and PhD program options within the FAU's College of Science and College of Medicine.

1. https://prod.flbog.net:4445/pls/apex/f?p=136:45:7036291418400::NO, accessed 7/17/18.
2. https://ikm.ucf.edu/files/2017/02/01.03-Enrollment-by-College-and-Major-2015-16.pdf, accessed 7/17/18.
3. https://ikm.ucf.edu/files/2017/08/Degrees-Awarded-by-College-Dept-Major-2016-17.pdf, accessed 7/17/18.
4. http://usfweb.usf.edu/DSS/INFOCENTER/?silverheader=4&report_category=STU&report_type=SAAEH&reportid=424830, accessed 7/17/18.
5. http://usfweb.usf.edu/DSS/INFOCENTER/?silverheader=23&report_category=STU&report_type=GDEGT&reportid=424832, accessed 7/17/18.
6. https://tableau.uwf.edu/views/IR-FB-Enrollment/CustomizedReport?%3Aembed=y&%3AshowShareOptions=true&%3Adisplay_count=no&%3AshowVizHome=no, accessed 7/17/18.
7. https://tableau.uwf.edu/views/IR-FB-DegreeAwarded_0/CustomizeReport?%3Aembed=y&%3AshowShareOptions=true&%3Adisplay_count=no&%3AshowVizHome=no, accessed 7/17/18.

Workforce and Economic Development Needs: *(Describe how the proposed program meets workforce and economic development needs)*

3. Briefly describe how the proposed program meets workforce and economic development needs and consider the following in your narrative:
    - Impact of this program (local, state, national, and international).
    - Impact of research funding.
    - Changing of professional credential requirements. (maximum length 250 words)

The Department of Labor projects that healthcare practitioners and related occupations will increase 15.3% to 23.6% as the fastest growing occupations in the US from 2016-2026 (https://www.bls.gov/emp/tables/emp-by-major-occupational-group.htm). Further, Hanover Research found that pre-med degrees are associated with the fastest and largest growing occupations in FAU's surrounding areas (Labor Assessment and Portfolio Review, Prepared for FAU, 2017). The B.S. in Biomedical Sciences is a degree in the STEM/Health field that will be coveted by FAU's pre-med students and will supply workforce and economic needs. Students with this degree that want to continue onto graduate professional or research degrees will supply talent to the M.S., Ph.D., M.D. and M.D./Ph.D. programs in the SUS and elsewhere. Students that decide to not pursue graduate education will supply research institutes, including our neighbors, The Scripps Research Institute and the Max Planck Florida Institute with talented employees. Students that pursue graduate education will supplement the local, state, national and international communities with physicians, veterinarians, dentists, pharmacists and physician assistants. FAU's efforts to satisfy local needs that revolve around Healthy Aging (wellness, geriatrics, drug discovery and health policy) and Neuroscience (dementia, aging disorders involving the nervous system, cognitive and mental needs) will be energized by all students graduating with this degree. Research funding at FAU will be boosted by students graduating with the B.S. in Biomedical Sciences that get involved with the Charles E. Schmidt Colleges of Science and/or Biomedicine as skilled workers at the Bachelor's level or that pursue graduate education as Ph.D. or M.D. scientists.

☒ **I support the exploration of this degree proposal.**

Bret Danilowicz

Print Provost's Name

Bret Danilowicz

Provost's Signature

8/2/18

Date

Appendix E. Letters of Support/No Conflict from Potentially Impacted FAU Entities

From: Rainer Steinwandt
To: Sarah Milton
Cc: Michelle Cavallo
Subject: Re: Your feedback requested
Date: Friday, September 27, 2019 10:11:42 AM

Dear Sarah,

This looks like a great program. We look forward to support this effort.

Best,
Rainer

From: Michelle Cavallo <MCAVALLO@fau.edu> on behalf of Sarah Milton <smilton@fau.edu>
Sent: Wednesday, September 25, 2019 2:36 PM
To: Rainer Steinwandt <RSTEINWA@fau.edu>
Cc: Michelle Cavallo <MCAVALLO@fau.edu>
Subject: Your feedback requested

Dear Rainer,

Thank you and your Department again for working with us toward the establishment of the new BS in Medical Biology. Please find attached the new program proposal and most of the appendices. Those appendices that are still incomplete at this time are listed below and you will not find them attached to this email.

Appendix B. Equal Opportunity Office and Library Signatures
Appendix D. MAC 2241 Life Science Calculus I Course Proposal
Appendix E. Statistics and Chemistry Course Syllabi
Appendix K. Letters of Support/No Conflict from Potentially Impacted FAU Entities

We have been advised to "consult and list departments that might be affected by the change and attach comments" and so we asking that Math review our proposal.

Kindly send a letter of support or an email with your comments.

If you could also share with us a copy of the syllabus for your department's undergraduate level Introduction to Biostatistics course for inclusion in the proposal, we would appreciate it. As you know, we are requesting permission for students in this new major to continue to enroll in either Psychology's or Math's statistics courses as our current majors do rather than enroll in a second semester of calculus as the state currently prescribes for biomedical-oriented undergraduate degree programs.

Thank you again very much for your time and attention.

Best,
Sarah

Dr. Sarah L. Milton
Professor and Interim Chair
Department of Biological Sciences
FAU

Michelle Cavallo

From: Rainer Steinwandt
Sent: Tuesday, January 7, 2020 1:03 PM
To: Michelle Cavallo
Subject: Re: Your feedback requested

Hi, Michelle

If the combined enrollment of MAC 2241 and MAC 2233 from students in your department does not exceed the current enrollment in MAC 2233 of students in your department, we can teach the new MAC 2241 with existing teaching resources. From what I can see, the two courses are very comparable in terms of resource needs on our side, so having students move between these two courses is perfectly fine. I look forward to having the new course in place; I think this is a very nice addition.

Best,
Rainer

From: Michelle Cavallo <MCAVALLO@fau.edu>
Sent: Tuesday, January 7, 2020 12:45 PM
To: Rainer Steinwandt <RSTEINWA@fau.edu>; Sarah Milton <smilton@fau.edu>
Subject: RE: Your feedback requested

Dear Rainer,

Thank you for your response. Can you also confirm via email that the Math department can accommodate the implementation of the new major via an internal redistribution of faculty efforts (i.e. adjusting offerings of the Methods of Calculus (2233) course currently taken by existing B.A. and B.S. Biology majors down and adding sections of MAC 2241 accordingly as enrollments shift between the existing degree programs and the new Medical Biology degree program). Given the scale at which your department stands to be impacted, it has been suggested to us that we obtain an explicit statement related specifically to the impact that the program will have on your department beyond the statement of support that you have already provided.

All the best,

Michelle

From: Rainer Steinwandt
Sent: Friday, September 27, 2019 10:12 AM
To: Sarah Milton <smilton@fau.edu>
Cc: Michelle Cavallo <MCAVALLO@fau.edu>
Subject: Re: Your feedback requested

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Cc: Michelle Cavallo <MCAVALLO@fau.edu>
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Thank you again very much for your time and attention.

Best,
Sarah

Dr. Sarah L. Milton
Professor and Interim Chair
Department of Biological Sciences
FAU

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Rainer

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Michelle

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Cc: Michelle Cavallo <MCAVALLO@fau.edu>
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Rainer

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Sent: Wednesday, September 25, 2019 2:36 PM
To: Rainer Steinwandt <RSTEINWA@fau.edu>
Cc: Michelle Cavallo <MCAVALLO@fau.edu>
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Thank you again very much for your time and attention.

Best,
Sarah

Dr. Sarah L. Milton
Professor and Interim Chair
Department of Biological Sciences
FAU

FAU
FLORIDA ATLANTIC UNIVERSITY

CHARLES E. SCHMIDT COLLEGE OF SCIENCE
Department of Chemistry and Biochemistry
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tel: 561.297.3390
fax: 561.297.2759
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Dr. Sarah L. Milton
Professor and Interim Chair
Department of Biological Sciences
Florida Atlantic University

November 18, 2019

Dear Dr. Milton,

I write this letter on behalf of the Department of Chemistry and Biochemistry in support of the new Medical Biology BS degree program offered by your Department. We acknowledge that enrollments in the chemistry and biochemistry courses listed in the program may increase. I confirm that the Department of Chemistry and Biochemistry can accommodate this increase and that we are fully committed to fulfilling our obligations within the program.

The Department of Chemistry and Biochemistry is currently working on the revision of our BS track in Biochemistry. We believe that our revised Biochemistry track will complement your new Medical Biology program and additionally support our students on their path to professional and graduate programs in the health and biomedical sciences.

We look forward to working with your Department to better support our students.

Sincerely,

Predrag Cudic

Predrag Cudic, Ph.D.
Professor and Chair
Department of Chemistry and Biochemistry
Charles E. Schmidt College of Science
Florida Atlantic University
5353 Parkside Drive, Building MC17, Room 208
Jupiter, FL 33458
Phone: 561-799-8375

From: Luc Wille
To: Michelle Cavallo
Cc: Sarah Milton
Subject: Proposed BS degree in Medical Biology
Date: Thursday, January 9, 2020 12:40:02 PM

Dear Michelle:

With this email I am confirming that the physics department has no objections to the proposed BS degree in Medical Biology.

With my very best wishes, --Luc

Luc T. Wille
Professor and Chair
Department of Physics
Florida Atlantic University

FAU
FLORIDA ATLANTIC UNIVERSITY

Charles E. Schmidt College of Medicine
Graduate Program Office
777 Glades Road, BC71-206A
Boca Raton, FL 33431
(561) 297-2910

Dr. Sarah Milton
Interim Chair and Professor
Biology & College of Science Dean's Office
Boca Ration
Sanson Life Sciences (SC-1)
Room 136
(561) 297-3331
smilton@fau.edu

January 14, 2020

Dear Dr. Milton,

This memo is to confirm support of the Charles E. Schmidt College of Medicine (COM) for the new Medical Biology BS program. The COM acknowledges the potential enrollment of Medical Biology BS program students in COM courses PCB 4905, PCB 4915, and PCB 4930 which will be listed in the restricted elective pool. These courses are scheduled based on the programmatic needs of the COM and total student enrollments in these courses may be restricted by space limitations and/or required instructor approvals. The COM acknowledges that enrollment of Medical Biology BS students in these courses could impact their total enrollments and that the COM will work towards accommodating potential enrollment increases.

Please don't hesitate to contact our office if you have questions or we can further in any way.

All the best,

Marc Kantorow

Marc Kantorow PhD FARVO
Professor of Biomedical Science
Assistant Dean for Graduate Programs
Charles E. Schmidt College of Medicine
Florida Atlantic University
Boca Raton, FL USA 33431
mkantoro@health.fau.edu
561-297-2910

From: Teresa Wilcox
To: Sarah Milton
Cc: Michelle Cavallo
Subject: Re: Requesting your feedback
Date: Tuesday, October 1, 2019 2:03:15 PM

Sarah,

Thank you for reaching out to us about your new BS degree program in Medical Biology. We support your proposal.

If you need anything else from me, please let me know.

Best,

Teresa

Teresa Wilcox, Ph.D.
Chair and Professor
Department of Psychology
College of Science
Florida Atlantic University
BS 12, Room 101
777 Glades Road
Boca Raton, FL 33431-0991
wilcoxt@fau.edu

From: Michelle Cavallo on behalf of Sarah Milton
Date: Wednesday, September 25, 2019 at 2:34 PM
To: Teresa Wilcox
Cc: Michelle Cavallo
Subject: Requesting your feedback

Dear Teresa,

As we've discussed, our department is submitting a proposal to pursue a new BS degree program which we are calling Medical Biology. Please find attached the new program proposal and most of the appendices. Those appendices that are still incomplete at this time are listed below and you will not find them attached to this email.

Appendix B. Equal Opportunity Office and Library Signatures
Appendix D. MAC 2241 Life Science Calculus I Course Proposal
Appendix E. Statistics and Chemistry Course Syllabi
Appendix K. Letters of Support/No Conflict from Potentially Impacted FAU Entities

We have been advised to "consult and list departments that might be affected by the change and attach comments" and so we asking that Psychology review our proposal.

Kindly send a letter of support or an email with your comments.

If you could also share with us a copy of the syllabus for Psychology's undergraduate level Experimental Design and Statistical Inference course for inclusion in the proposal, we would appreciate it. As part of the proposal, we are requesting permission for students in this new major to continue to enroll in either Psychology's or Math's statistics courses as our current majors do rather than enroll in a second semester of calculus as the state currently prescribes for biomedical-oriented undergraduate degree programs.

Thank you very much for your time and attention.

Best,
Sarah

Dr. Sarah L. Milton
Professor and Interim Chair
Department of Biological Sciences
FAU

From: Sarah Milton
To: Michelle Cavallo
Subject: Fw: Your feedback requested
Date: Thursday, October 3, 2019 3:45:48 PM

Dr. Sarah L. Milton
Professor and Interim Chair
Department of Biological Sciences
FAU

From: Michael Whitehurst <whitehur@fau.edu>
Sent: Thursday, October 3, 2019 2:12 PM
To: Sarah Milton <smilton@fau.edu>
Subject: Re: Your feedback requested

Sarah,
The Department of Exercise Science & Health Promotion has no objections to the proposed BS in Medical Biology degree program.
Mike

Michael Whitehurst, EdD, FACSM
Professor and Chair, Dept. Exercise Science & Health Promotion
Florida Atlantic University
777 Glades Road
Fieldhouse 11A, Rm. 124
Boca Raton, Florida 33431
561.297.2317
561.302.2674 (cell)

From: Sarah Milton <smilton@fau.edu>
Sent: Wednesday, October 2, 2019 11:20 AM
To: Michael Whitehurst <whitehur@fau.edu>
Cc: Michelle Cavallo <MCAVALLO@fau.edu>
Subject: Re: Your feedback requested

Hi Mike - We had a representative at the DoR showcase, but somehow never get invited otherwise.... So I missed you. But I am happy to chat anytime - let's arrange a time.

As for the Med Bio proposal, I am hoping to get a note from you supporting it in the next week or so - we are trying to make the October UP meeting.

Cheers,
Sarah

Dr. Sarah L. Milton
Professor and Interim Chair
Department of Biological Sciences
FAU

From: Michael Whitehurst <whitehur@fau.edu>
Sent: Wednesday, September 25, 2019 3:58:59 PM
To: Sarah Milton <smilton@fau.edu>
Cc: Michelle Cavallo <MCAVALLO@fau.edu>
Subject: Re: Your feedback requested

Hi Sarah,
I have perused the proposal and don't see conflicts with ESHP. However, I will run it by the faculty and get back to in a couple of days. Also, my department is in the midst of lots of changes including a name change, taking over the BA in HS and hiring a couple of key faculty. That said, I'd really like to have a follow up meeting so I could share some ideas, etc. Are you going to the DoR Research Showcase? Perhaps we can chat there.
Mike

From: Michelle Cavallo <MCAVALLO@fau.edu> on behalf of Sarah Milton <smilton@fau.edu>
Sent: Wednesday, September 25, 2019 2:38 PM
To: Michael Whitehurst <whitehur@fau.edu>
Cc: Michelle Cavallo <MCAVALLO@fau.edu>
Subject: Your feedback requested

Dear Michael,

Our department is submitting a proposal to pursue a new BS degree program which we are calling Medical Biology. Please find attached the new program proposal and most of the appendices. Those appendices that are still incomplete at this time are listed below and you will not find them attached to this email.

Appendix B. Equal Opportunity Office and Library Signatures
Appendix D. MAC 2241 Life Science Calculus I Course Proposal
Appendix E. Statistics and Chemistry Course Syllabi
Appendix K. Letters of Support/No Conflict from Potentially Impacted FAU Entities

We have been advised to "consult and list departments that might be affected by the change and attach comments". We are asking that the Department of Exercise Science and Health Promotion review our proposal.

Kindly send a letter of support or an email with your comments.

Thank you very much for your time and attention.

Best,
Sarah

Dr. Sarah L. Milton
Professor and Interim Chair
Department of Biological Sciences
FAU

From: Zhixiao Xie
To: Sarah Milton
Cc: Michelle Cavallo
Subject: RE: Your feedback requested
Date: Wednesday, October 2, 2019 3:44:53 PM

Good Afternoon Sarah,
Sorry for late reply. There is no objection from Geosciences on the BS degree (Medical Biology).

Best,
Zhixiao

Dr. Zhixiao Xie
Professor and Chair
Geosciences Department
Florida Atlantic University
Tel: 561-297-2852

From: Michelle Cavallo **On Behalf Of** Sarah Milton
Sent: Wednesday, September 25, 2019 2:38 PM
To: Zhixiao Xie <xie@fau.edu>
Cc: Michelle Cavallo <MCAVALLO@fau.edu>
Subject: Your feedback requested

Dear Zhixiao,

Our department is submitting a proposal to pursue a new BS degree program which we are calling Medical Biology. Please find attached the new program proposal and most of the appendices. Those appendices that are still incomplete at this time are listed below and you will not find them attached to this email.

Appendix B. Equal Opportunity Office and Library Signatures
Appendix D. MAC 2241 Life Science Calculus I Course Proposal
Appendix E. Statistics and Chemistry Course Syllabi
Appendix K. Letters of Support/No Conflict from Potentially Impacted FAU Entities

We have been advised to "consult and list departments that might be affected by the change and attach comments". We are asking that all of the Departments of the College of Science review our proposal.

Kindly send a letter of support or an email with your comments.

Thank you very much for your time and attention.

Best,

Appendix F. BS Medical Biology Degree Sheet (Program Checklist for Students)

Appendix F. BS Medical Biology Degree Sheet (Program Checklist for Students)

MEDICAL BIOLOGY (BS)

This major consists of 75-76 total credits (core + elective), 37-38 of which are Upper Division

REQUIRED COURSES (MEDICAL BIOLOGY CORE) (63-64 credits, 25-26 upper division credits)

	Course Title	*Lect Grade*	*Lab Grade*	*FAU*	*Credits*
	Biological Principles & Lab **(IFP)**			BSC 1010 & L	4
	Biodiversity & Lab (IFP) **(IFP)**			BSC 1011 & L	4
	*General Chemistry I & Lab **(IFP)**			CHM 2045 & L	4
	*General Chemistry II & Lab **(IFP)**			CHM 2046 & L	4
	*Organic Chemistry I			CHM 2210	3
	*Organic Chemistry II			CHM 2211	3
	*Organic Chemistry Lab			CHM 2211L	2
	*Biochemistry 1			BCH 3033	3
	College Physics I and Lab **OR** General Physics I & General Physics I Lab **(IFP)**			PHY 2053 **OR** PHY 2048 **&** 2048L	5
	College Physics II and Lab **OR** General Physics II & General Physics II Lab			PHY 2054 **OR** PHY 2049 **&** 2049 L	5
	Life Science Calculus **OR** Calc with Analytic Geom 1 **(IFP)**			MAC 2241 **OR** MAC 2311	4
	Exp. Design and Statistical Inference **OR Bio Statistics			PSY 3234 **OR** STA 3173	3
	Genetics			PCB 3063	4
	Cell Biology			PCB 3023	3
	General Microbiology and Lab			MCB 3020, 3020L	4
	Human Morphology & Function 1 and Lab **OR** Vertebrate Structure, Develoment and Evolution and Lab			PCB 3703, 3703L **OR** ZOO 4690, ZOO 4690L	4 **OR** 5
	Human Morphology & Function 2 and Lab **OR** Comparative Animal Physiology and Lab			PCB 3704, 3704L **OR** PCB 4723, PCB 4723L	4

MEDICAL BIOLOGY ELECTIVES (SELECT 12 UPPER DIVISION CREDITS FROM THIS LIST)

	Course Title	*Lect Grade*	*Lab Grade*	*FAU*	*Credits*
	Biochemistry 2 **OR** Advanced Biochemistry			BCH 3034 **OR** BCH 4035	3
	Biochemistry Lab			BCH 3103L	3
	Molecular Genetics of Aging			BSC 4022	3
	Biotechnology Laboratory 1			BSC 4403L	2
	Biotechnology Laboratory 2			BSC 4448L	2
	Biology of Cancer			BSC 4806	3
	Introduction to Drug Design			CHM 4273	3
	Structural Biochemistry			CHM 4350	3
	Directed Independent Study			CHM 4905, PCB 4905	
	***Directed Independent Research			BSC 4910, PCB 4915, PCB 4916	***
	Comparative Animal Behavior			CBH 4024	3
	Evolution			PCB 3674	3
	Principles of Ecology			PCB 4043	3
	Medical Bacteriology			MCB 4203	3
	Genetics Lab			PCB 4067L	3
	Immunology			PCB 4233	3
	Molecular Genetics			PCB 4522	4
	Genes and Development			PCB 4594	3
	Cellular Neuroscience and Disease			PCB 4842	3
	Practical Cell Neuroscience			PCB 4843C	3
	Principles of Human Neuroanatomy			ZOO 4742	3
	Special Topics as approved by the Biology Department			BSC 4930, CHM 4930, PCB 4930	1 - 3
	Upper Division Honors Program Course Components	***See next page***			

Important:

***Need a C- or better (*FAU Chemistry sequence requires a C or better to take the next course in the sequence)**

****General Psychology (PSY 1012), an IFP Society course, is a prerequisite for Experimental Design & Statistical Inference.**

*****Maximum of 5 credits ungraded (S/U) coursework; maximum of 3 credits DIR within a given semester**

- **Credits over 10 years old will not apply**
- **75% of Upper Division must come from major department @ FAU (26 cr. min UD Bio @FAU)**
- **45 credits of upper division coursework is required (min. 120 cr. total)**

Honors in the Major: Upper Division Honors Program Options in Biology

Biology Honors Research Thesis Program

	Course Title	*Lect Grade*	*Lab Grade*	*FAU*	*Credits*
	Introduction to Biological Research			BSC 3453	1
	Biological Research			BSC 3481	2
	Honors Research			BSC 4917	3
	Honors Thesis			BSC 4918	3

Note: This is not an Institutional Honors designation (e.g. Magna, Suma, cum Laude).

Note: The Biology Honors Research Thesis Program credits can be used toward fulfillment of the 12 upper division medical biology elective credit requirement.

Biology Honors Research Program

	Course Title	*Lect Grade*	*Lab Grade*	*FAU*	*Credits*
	***Directed Independent Research			BSC 4910	***
	***Directed Independent Research			BSC 4910	***

Note: This is not an Institutional Honors designation (e.g. Magna, Suma, cum Laude).

Note: The Biology Honors Research Thesis Program credits can be used toward fulfillment of the 12 upper division medical biology elective credit requirement.

FAU Max Planck Honors Program Required Coursework

Core Course (required for all participants)					
	Course Title	*Lect Grade*	*Lab Grade*	*FAU*	*Credits*
	Honors Introduction to Neuroscience Research			PSB 4003	1
Enrichment Course Electives (at a minimum, two different courses are required)					
	Honors Scientific Communication			BSC 4934	1
	Honors Advanced Cell Imaging for Neuroscientists			PCB 4933C	1
	Honors Advanced Genetics			PCB 4935	1
	Honors Advanced Physiology			PCB 4937C	1
	Honors Advanced Scientific Grant Writing			PCB 4956	1
	Honors Advanced Techniques in Neuroscience			PSB 4112C	1
	***Honors Directed Independent Research			PSB 4916	0 - 3
	Honors Symposium Presentation			PSB 4922	1
	Honors Special Topics in Neuroscience			PSB 4931	1
	Max Planck Honors Seminar			PSB 4932	1
	Honors Journal Club in Neuroscience			PSB 4951	1
Capstone Options (at least 3 credits in one of the following courses is required)					
	FAU Max Planck Honors Capstone			PSB 4902	
	Honors Mentored Research			PSB 4910	
	FAU Max Planck Honors Thesis			PSB 4970	

Note: This is not an Institutional Honors designation (e.g. Magna, Suma, cum Laude).

Note: The FAU Max Planck Honors Program credits can be used toward fulfillment of the 12 upper division medical biology elective credit requirement.

The Medical Biology major consists of 75-76 total credits (core + elective), 37-38 of which are Upper Division. All FAU students must complete a minimum of 120 total credits, 45 of which must be upper division credits. All FAU students must also fulfill Intellectual Foundations Program (IFP) requirements. In completing the Medical Biology curriculum, students will complete 3 math and 6 science IFP credits. Beyond these 9 credits, Medical Biology majors must complete an additional 27 IFP credits (3 additional Math, 6 Writing, 6 Society, 6 Global and 6 Humanities) and 18-19 general elective credits, 7 - 8 of which must be upper division. We strongly recommend that students pursuing this degree option select graded courses to fulfill their Medical Biology elective requirement (12 credits) and use any Directed Independent Research credits they might wish to complete toward fulfillment of the general (remaining 7 - 8) upper division elective requirement.

This degree program is meant to serve students interested in pursuing a variety of professional programs (medical, dental, PA, pharmacy, vet, etc.). It is recommended that students pursuing professional programs upon completion of this degree consider selecting Introduction to Psychology (PSY 1012) and Sociological Perspectives (SYG 1000) to fulfill the Foundations of Society and Human Behavior IFP category. It is each student's responsibility to verify the courses required as prerequisites for specific programs or examinations they wish to pursue beyond this degree program.

Appendix G. Participating Faculty CVs

Faculty are listed below and in Appendix A, Table 4.

Anderson, Rindy

Baldwin, John

Benscoter, Brian

Binninger, David

Brooks, W. Randy

Claiborne, Brenda

Dawson-Scully, Ken

Dorn, Nathan

Esiobu, Nwadiuto

Frazier, Evelyn

Gawlik, Dale

Godenschwege, Tanja

Hansen, Carl

Hartmann, James

Hughes, Colin

Jia, Kailiang

Kajiura, Stephen

Keene, Alex

Koch-Rose, Marguerite

Kumi-Diaka, James

Lyons, H. Jay

Milton, Sarah

Murphey, Rod

Theisen, Timothy

Wyneken, Jeanette

Zhang, Xing-Hai

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Rindy Anderson

eRA COMMONS USER NAME (credential, e.g., agency login): N/A

POSITION TITLE: Assistant Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Arizona State University, Tempe, AZ	B.S.	08/1994	Zoology
University of San Diego, San Diego, CA	M.S.	12/2000	Marine Sciences
University of Miami, Coral Gables, FL	Ph.D.	12/2006	Biology
Duke University		08/2014	Postdoctoral research

A. Personal Statement

I study the function and evolution of behavior with a focus on animal social behavior, communication, and cognition. By studying the function of animal communication signals, and by testing hypotheses about the cognitive processes involved in communication and mate choice, I aim to understand how behavior contributes to survival and reproductive success. My approach is interdisciplinary and collaborative, combining operant conditioning and methods for testing cognitive function, laboratory studies of behavioral development, field observation and experimentation, digital signal analysis and synthesis, and hormone and other physiological manipulations and measurements.

B. Positions and Honors

2014 – present Assistant Professor of Biological Sciences, Florida Atlantic University
2012 – 2014 Research Scientist, Duke University
2007 – 2012 Postdoctoral Research Associate, Duke University
1999 – 2001 Research Biologist, Hubbs-Sea World Research Institute

C. Contributions to Science

1. A core area of my research program is testing hypotheses about the adaptive value, perception, and reliability of aggressive communication signals. Whether animal communication systems are honest is an unresolved question in evolutionary biology. Because signalers and their intended receivers often have divergent evolutionary interests one might expect animal signals to be generally deceptive, but empirical work shows that most signals are reliable, or "honest," on average. What enforces this honesty? The most widely accepted hypothesis is that signals will be reliable if there is some cost to their production and if signalers differ in their ability to withstand this cost. My work has tested this theory in the context of aggressive signaling between male songbirds, a system that is enigmatic because signal costs have been difficult to identify.

a. Sabah Ali, Rindy C. Anderson (2018) Song and aggressive signaling in the Bachman's sparrow. *The Auk: Ornithological Advances* 135: 521–533.

b. Joseph N. Niederhauser, Adrienne L. Dubois, William A. Searcy, Stephen Nowicki, Rindy C. Anderson (2018) A test of the eavesdropping avoidance hypothesis as an explanation for the structure of low amplitude aggressive signals in the song sparrow. *Behavioral Ecology and Sociobiology* 72: 47.

c. Rindy C. Anderson, William A. Searcy, Susan Peters, Melissa Hughes, Adrienne L. Dubois, Stephen Nowicki (2017) Song learning and cognitive ability are not consistently related in a songbird. *Animal Cognition* 20(2) 309–320.

d. Dustin G. Reichard, Rindy C. Anderson (2015) Why signal softly? The structure, function and evolutionary significance of low-amplitude signals. *Animal Behaviour* 105: 253-265.

e. Molly K. Grace, Rindy C. Anderson (2015) No frequency shift in the "D" notes of Carolina chickadee calls in response to traffic noise. *Behavioral Ecology and Sociobiology* 69(2): 253–263.

2. A second focus of my research is to test the influences of learning on perception as a means to understand behavioral plasticity. My work in this area integrates perspectives from behavioral ecology and animal cognition, using behavior as a window into how an animal acquires, stores, and processes information. Songbirds are an excellent system to address this question because we know that early song exposure strongly influences the development of mate preferences in female birds. We know very little, however, about the processes by which females learn to recognize and discriminate male song qualities. To fill this gap in knowledge, I developed an operant conditioning technique to study the development of female songbirds' preferences for male song characteristics and showed that laboratory-reared females not only learn the specific tutor songs heard when young, but also generalize learned information about song when assessing novel songs. In another study, my co-authors and I found support for the hypothesis that female swamp sparrows assess how well males have learned their songs by evaluating the degree to which songs are typical of population norms. We have proposed a learning mechanism through which females categorize songs into types, and use the most typical representatives, or 'prototypes' of these categories, as the models for assessment.

a. Robert F. Lachlan, Rindy C. Anderson, Susan Peters, William A. Searcy, Stephen Nowicki. (2014) Typical versions of learned swamp sparrow songs are more effective signals than are less typical versions. *Proceedings of the Royal Society of London B* 281: 20140252

b. Rindy C. Anderson, Susan Peters, Nowicki, S (2014) Effects of early auditory experience on the development of local song preference in female swamp sparrows. *Behavioral Ecology and Sociobiology* 68(3): 437-447

c. Rindy C. Anderson (2009) Operant conditioning and copulation solicitation display assays reveal a stable preference for local song by female swamp sparrows. Behavioral Ecology & Sociobiology 64: 215-223

d. Jonathan F. Prather, Stephen Nowicki, Rindy C. Anderson, Susan Peters, Richard Mooney (2009) Neural correlates of categorical perception in learned vocal communication. Nature Neuroscience 12: 221-228

3. A third contribution of my research has been to identify the signal characteristics that influence female mate choice, the information conveyed to females by these signal characteristics, and the evolutionary mechanisms that enforce reliability in the signaling system. Cognitive abilities may be subject to sexual selection if superior cognition improves success in male-male competition, or if females prefer to mate with males possessing superior cognitive abilities. In songbirds, song learning is a cognitive task in which young birds acquire and store information about adult song to shape their own song production (males) and song preferences (females). In several studies in both the lab and the field we tested the hypothesis that performance in song learning could reliably signal performance on other kinds of cognitive tasks, such as association learning, spatial learning, and learning a new foraging task. We showed that variation in male song complexity predicts performance on an inhibitory control task, but that song learning quality does not reliably predict general cognitive performance on a task battery.

a. Kendra B. Sewall, Rindy C. Anderson, Jill A. Soha, Susan Peters, Stephen Nowicki (2018) Early life conditions that impact song learning in male zebra finches also impact neural and behavioral responses to song in females. Developmental Neurobiology, published online April 20 ahead of print, 14 pgs. https://doi.org/10.1002/dneu.22600

b. Rindy C. Anderson, William A. Searcy, Susan Peters, Melissa Hughes, Adrienne L. Dubois, Stephen Nowicki (2017) Song learning and cognitive ability are not consistently related in a songbird. Animal Cognition 20(2) 309–320

c. Neeltje Boogert, Rindy C. Anderson, Susan Peters, William A. Searcy & Nowicki, S (2011) Song repertoire size

correlates with inhibitory control, but not other measures of cognitive ability, in male song sparrows. Animal Behaviour 81: 1209-1216

Complete list of my peer-reviewed published works (34) can be found at Google Scholar:
https://scholar.google.com/citations?hl=en&user=DF_aKa0AAAAJ&view_op=list_works&sortby=pubdate

D. Research Support

External to Florida Atlantic University

1) 2017 Wildlife Acoustics, Inc. Product Grant 06/2017 - 06/2018
Title: Studying female song in Bachman's Sparrow
Agency: Wildlife Acoustics, Inc.
Role: Principal Investigator

2) 2016 Pymatuning Laboratory of Ecology Early Career Fellowship 02 – 10/2016
Title: Are brood parasitic nestlings insensitive to their environment? A preliminary study of stress responsiveness in the brown-headed cowbird, *Molothrus ater*.
Agency: University of Pittsburgh, Pymatuning Laboratory of Ecology
Role: Principal Investigator, Co-PI: Sara Bebus, FAU postdoctoral research associate

Internal to Florida Atlantic University

1) FAU Summer Undergraduate Research Fellowship: Smarts and symbiosis: linking cognitive performance and the gut microbiome in a songbird 05-08/2019
Role: Principal Investigator, student awardee Wilner Fresin

2) 2018 FAU College of Science Seed Grant: Testing models of social behavior and population dynamics in a territorial bird 03/2018 – 04/2019
Role: Principal Investigator, Co-PI: Erik Noonburg, FAU Biological Sciences

3) 2017 FAU Technology Fee Grant: FAU Bioacoustics Hub: Equipment to Enhance Technology-driven Education and Research Training in the Biological Sciences 09/2017 – 09/2018
Role: Principal Investigator

4) 2017 FAU Brain Institute Pilot Grant: Glucocorticoid mechanisms linking cognition and mate choice 03/2017 – 03/2018
Role: Principal Investigator

5) 2016 FAU Summer Undergraduate Research Fellowship: Song and aggressive signaling in Bachman's sparrow 05 – 08/2016
Role: Principal Investigator, student awardee Sabah Ali

6) 2015 Broward Undergraduate Research Award: Song and aggressive signaling in Bachman's sparrow 11/2015 – 04/2016
Role: Principal Investigator, student awardee Sabah Ali

7) 2015-2016 Faculty Research Mentoring Award 03/2015 – 03/2016
Role: Principal Investigator, mentor: Professor Dale Gawlik

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: John D. Baldwin

eRA COMMONS USER NAME (credential, e.g., agency login):

POSITION TITLE: Professor, Department of Biological Sciences, Florida Atlantic University

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
University of Maryland, College Park, MD	BS	12/1988	Zoology
University of California, Davis/Bodega Bay, CA	PhD	12/1997	Cell-Developmental Biol
University of Florida, Gainesville, FL	Postdoctoral	08/1998	Genetics/Fisheries

A. Personal Statement

I am a broadly trained biologist with expertise in population genetics, reproduction and development, and conservation. My research program is both laboratory and field-based, and typically uses both quantitative and experimental approaches to address hypotheses in the areas of molecular ecology, evolution, fisheries and wildlife management, aquaculture, and environmental science.

B. Positions and Honors

Positions and Employment

2014 – Associate Director, Florida Center for Environmental Studies, Florida Atlantic University
2014 – Professor, Department of Biological Sciences, Florida Atlantic University
2011 – 2012 Interim-Director, Environmental Sciences Graduate Program, Florida Atlantic University
2009 – 2010 Research Fellow, South Florida Natural Resource Center, NPS, DOI, Homestead, FL
2004 – 2014 Associate Professor, Department of Biological Sciences, Florida Atlantic University
1998 – 2004 Assistant Professor, Department of Biological Sciences, Florida Atlantic University
1997 – 1998 Post-Doc Researcher: Dept. Fisheries and Aquatic Sciences, University of Florida
1994 - 1997 Biological Research Scientist: Dept. Fisheries and Aquatic Sciences, University of Florida
1989 - 1994 Post-Grad. Researcher: Marine Toxicology, Bodega Marine Laboratory, Univ. of California

Professional Experience and Memberships

2017 – Integrative Biology Graduate Program Executive Committee, FAU
2016 – Marine Science Graduate Program Committee, FAU
2015 American Fisheries Society-Hutton Junior Fisheries Biology Program Mentor
2014 – Board of Directors, Environmental Science Magnet Program, South Plantation H.S.
2014 – College of Science Promotion/Tenure Committee, FAU (Chair, 2016 – pres.)
2010 – South Florida-Caribbean Cooperative Ecosystem Studies Unit – Tech. Sci. Rep. FAU
2007 – South Florida Ecosystem Restoration Federal Task Force - Science Coordination Group
2007 – Environmental Science Graduate Program Committee, FAU (Interim Director, 2011-12)
2000 – Courtesy Professor: Dept. Fisheries and Aquatic Sciences, University of Florida
2003 – 2009 University Research Committee, Div. of Sponsored Research, FAU (Chair, 2007-08)
2003 – 2009 Department of Biological Sciences Graduate Studies Committee, FAU (Chair, 2004-06)

C. Contributions to Science

Selected Peer-Reviewed Publications

1. Denton, M. J., A.WJ Demopoulos, J.D. Baldwin, B. J. Smith, and K. M. Hart. 2018. "Stable Isotope Analysis Enhances Our Understanding of Diamondback Terrapin (*Malaclemys terrapin*) Foraging Ecology." Estuaries and Coasts: 1-16. https://doi.org/10.1007/s12237-018-0476-6
2. Hanson, M.R. and J.D. Baldwin. 2017. Adjusted Diets of Bald Eagles, *Haliaeetus leucocephalus*, Breeding in an Altered Estuary. *Journal of Raptor Research*. 51(1):1-14.
3. Denton, M.J., K.M. Hart, A.W.J. Demopoulos, A. Oelinik, and J.D. Baldwin. 2016. Diet of Diamondback Terrapins (*Malaclemys terrapin*) in subtropical mangrove habitats of South Florida. *Chelonian Conservation Biology*. 15(1): 54-61.
4. Hanson, M.R. and J.D. Baldwin. 2016. Provisioning rates suggest food-limitation for breeding bald eagles in their southernmost range. *Southeastern Naturalist*. 15(2): 365-381.
5. Green. M.L., D.L. Herzing, and J.D. Baldwin. 2015. Molecular assessment of mating strategies in a population of Atlantic spotted dolphins. *PloS one*, 10(2): e0118227, 10.1371/journal.pone.0118227
6. Denton, M.J., Hart, K.M., Oleinik , A., Wood, R., and Baldwin, J.D. 2015. *Malaclemys terrapin rhizophorarum* (Mangrove Diamondback terrapin). Herpetological Review. 46(3): 426-427
7. Ogden, J.C., J.D. Baldwin, O. Bass, J. Browder, M. Cook, S. Davis, P. Fletcher, P. Fredrick, P.E. Frezza, R. Galvez, A. Hodgson, K. Meyer, L. Oberhofer, A. Paul, and J. Lorenz. 2014. Waterbirds as Indicators of Ecosystem Health in the Coastal Marine Habitats of Southern Florida: 1. Selection and Justification for a Suite of Indicator Species. *Ecological Indicators* 44, 128-147.
8. Ogden, J.C., J.D. Baldwin, O. Bass, J. Browder, M. Cook, S. Davis, P. Fletcher, P. Fredrick, P.E. Frezza, R. Galvez, A. Hodgson, K. Meyer, L. Oberhofer, A. Paul, and J. Lorenz. 2014. Waterbirds as Indicators of Ecosystem Health in the Coastal Marine Habitats of Southern Florida: 2. Conceptual Ecological Models. *Ecological Indicators* 44, 148-163.
9. Mealey, B.K., J.D. Baldwin, G.B.Parks-Mealey, G.D. Bossart, and M.R.J. Forstner. 2014. Characteristics Of Mangrove Diamondback Terrapins (*Malaclemys Terrapin Rhizophorarum*) Inhabiting Altered And Natural Mangrove Islands. *The Journal of North American Herpetology* 2014(1) 76-80.
10. Theisen, T. and J.D. Baldwin. 2012. Movements and depth/temperature distribution of the ectothermic Scombrid *Acanthocybium solandri* (wahoo) in the western North Atlantic. *Marine Biology* 159 (10) 2249-2258.
11. Baldwin, J.D., J.W. Bosley, L. Oberhofer, and O.L. Bass. 2012. Long-Term Changes, 1958–2010, In the Reproduction of Bald Eagles of Florida Bay, Southern Coastal Everglades. *Journal of Raptor Research* 46(4) 336-348.
12. Green. M.L., D.L. Herzing, and J.D. Baldwin. 2011. Reproductive success of male Atlantic spotted dolphins (*Stenella frontalis*) revealed by noninvasive genetic analysis of paternity. *Canadian Journal of Zoology* 89 (3) 239-253.
13. Theisen, T.C., B.W. Bowen, W. Lanier, and J.D. Baldwin. 2008. Lack of global population structure in the pelagic wahoo, *Acanthocybium solandri* (tuna family Scombridae). *Molecular Ecology* 17 (19) 4233-4247.
14. Green, M.L., D.L. Herzing, and J.D. Baldwin. 2007. Noninvasive methodology for the sampling and extraction of DNA from free-ranging Atlantic spotted dolphins (*Stenella frontalis*). *Molecular Ecology Notes*. 7, 1287 – 1292.

Edited Book Chapters

Baldwin, J.D. and D. Snodgrass. 2007. Reproductive biology of Atlantic tarpon, *Megalops atlanticus*. In: Biology and Management of the World Tarpon and Bonefish Fisheries. J.S. Ault Ed., CRC Press.

Professional Organizations Memberships

American Fisheries Society, American Ornithologists' Union, American Society of Ichthyologists and Herpetologists, Association of Field Ornithologists, Bodega Marine Sciences Association, Raptor Research Foundation, FACT-Florida Atlantic Coastal Telemetry

Scientific Journal Reviewer

Restoration Ecology, Ecology and Evolution, PLoS, Journal of Raptor Research, The Auk, The Wilson Journal of Ornithology, Journal of Heredity, Biochemical Genetics, Molecular Phylogenetics and Evolution, Molecular

Ecology, Bulletin of Marine Science, Marine and Freshwater Research, The Biological Bulletin, Southeastern Naturalist

D. Additional Information: Research Support and/or Scholastic Performance

Ongoing Research Support

Project Period: 2018-2020
Award: $296,351
Role: co-PI
Agency: Florida Sea Grant
Title: Building Hatchery Capacity for Production of a Promising Shellfish Aquaculture Species: the Sunray Venus Clam
Goal: Develop methodologies to analyze genetic diversity in a new species. Aquaculture programs rely on genetic information for selecting broodstock, increasing production, maintaining sustainability of production, reducing inbreeding depression, and safeguarding against disease.

Project Period: 2017-2021
Award: $20,000
Role: PI
Agency: Wild Dolphin Project – FAU Foundation
Title: Wild Dolphin Project
Goal: Enhance undergraduate research experience through genetic analysis of wild dolphin populations.

Project Period: 2019-2020
Award: $10,000
Role: PI
Agency: West Palm Beach Fishing Club – FAU Foundation
Title: Marine Fisheries
Goal: Supports graduate student acoustic telemetry studies in marine fisheries investigating high discharge events and their effects on the St. Lucie estuary and an estuarine predator.

Select Completed Research Support

Project Period: 2012 -2016
Award: $16,000
Role: PI
Agency: Broward Undergraduate Research Training - Florida Department of Education
Title: Five annual individual undergraduate research projects in molecular ecology.

- *Genetic diversity of invasive apple snail populations in South Florida*
- *Assessing Genetic Population Structure of Wahoo,* Acanthocybium solandri*, on a Global Scale: Molecular Insight for Fisheries Management.*
- *Morphological and Genetic Identification and ecology of early life stages of invasive and native freshwater apple snails*
- *Genetic characterization of the threatened loggerhead sea turtle,* Caretta caretta*, nesting population in the Dry Tortugas, Florida*
- *Population and Health Assessment of Raptors*

Goal: To enhance undergraduate research experience through hands on training.

Project Period: 2009-2011
Award: $134,247
Role: PI
Agency: Everglades National Park, National Park Service, Dept of Interior
Title: Evaluation of Bald Eagle Population Dynamics and Foraging Ecology: Current and Historical Trends in Florida Bay and the Southern Estuaries of Everglades National Park
Goal: Assessment of Bald Eagle population in Everglades National Park, Florida

BRIAN WILLIAM BENSCOTER

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Education & Training

University of Guelph (Canada)	Integrative Biology	Postdoc, 2010
Michigan State University	Plant Biology	Postdoc, 2008
Southern Illinois University-Carbondale	Plant Biology	Ph.D., 2007
Villanova University	Biology	M.S., 2002
Villanova University	Biology	B.S., 2000

Appointments

2019-present	Chair, South Atlantic Chapter, Society of Wetland Scientists
2019-present	Chair, Diving & Boating Safety Committee, Florida Atlantic University
2017-2019	Vice Chair, South Atlantic Chapter, Society of Wetland Scientists
2016-present	Associate Professor of Plant Ecology, Florida Atlantic University
2015-2016	Chair-Local Host, Ecological Society of America 2016 Conference Committee
2014-2015	National Academies Education Fellow in the Life Sciences
2015-2016	Chair, Society of Wetland Scientists Peatland Section
2013-2014	Chair, Society of Wetland Scientists Biogeochemistry Section
2010-2016	Assistant Professor of Plant Ecology, Florida Atlantic University
2004-2006	President, Plant Biology Graduate Student Association, Southern Illinois University
2003-2006	Science To Achieve Results (STAR) Fellow, US Environmental Protection Agency
2001-2002	President, Graduate Student Council, Villanova University
2000-2001	Vice President, Graduate Student Council, Villanova University

Honors and Awards

Nominee, Mentor of the Year-High School Level, Broward County Public Schools, 2018
Researcher of the Year (Assistant Professor), Florida Atlantic University, 2013-2014
Outstanding Graduate Student Researcher, Southern Illinois University, 2006.
US Environmental Protection Agency STAR Fellowship. Southern Illinois University, 2004-2007.
Graduate Summer Research Fellowship. Villanova University, June 2001.
Graduate Summer Research Fellowship. Villanova University, June-July 2002.

Research & Scholarship

†† High School Intern Contributor
† Undergraduate Student Contributor
* Graduate Student Contributor
BOLD – student/technician supervised by BWB

Refereed Publications in Print

Weston, DJ, MR Turetsky, MG Johnson, G Granath, Z Lindo, LR Belyea, SK Rice, DT Hanson, K Engelhardt, J Schmutz, E Dorrepaal, ES Euskirchen, HK Stenøien, P Szövényi, M Jackson, BT Piatkowski, W Muchero, RJ Norby, JE Kostka, JB Glass, H Rydin, J Limpens, E-S Tuittila, KK Ullrich, A Carrell, BW Benscoter, JG Chen, TA Oke, MB Nilsson, P Ranjan, D Jacobson, EA Lilleskov, RS Clymo, and AJ Shaw. 2018. The Sphagnome Project: enabling ecological and evolutionary insights through a genus-level sequencing project. New Phytol. doi:10.1111/nph.14860

Smith, AP, B Bond-Lamberty, BW Benscoter, MM Tfaily, CR Hinkle, C Liu, and VL Bailey. 2017. Shifts in pore connectivity from precipitation versus groundwater rewetting increases soil carbon loss after drought. 2017. Nature Communications. doi:10.1038/s41467-017-01320-x

McClellan, M*, X Comas, BW Benscoter, R Hinkle, and D Sumner. 2017. Estimating belowground carbon stocks in isolated wetlands of the Northern Everglades watershed using ground penetrating radar and aerial imagery. Journal of Geophysical Research-Biogeosciences, 122. doi: 10.1002/2016JG003573 – ***Featured in AGU EOS Research Spotlight (https://doi.org/10.1029/2018EO089929)***

Bourgeau-Chavez, L, S Endres, R Powell, MJ Battaglia, BW Benscoter, MR Turetsky, ES Kasischke, EC Banda. 2017. Mapping boreal peatland ecosystem types from multi-temporal radar and optical satellite imagery. Canadian Journal of Forest Research. 47(4): 545-559. DOI: 0.1139/cjfr-2016-0192

Abbott, B, and others (98 co-authors). 2016. Biomass offsets little or none of permafrost carbon release from soils, streams, and wildfire: an expert assessment. Environmental Research Letters, 11: 034014 -***Featured in journal's 'Highlights of 2016' collection***

Budny, M*, and BW Benscoter. 2016. Shrub encroachment increases transpiration water loss from a subtropical wetland. Wetlands, 36: 631-638. DOI: 10.1007/s13157-016-0772-5

Schiks, T†, BM Wotton, MR Turetsky, and BW Benscoter. 2016. Variation in fuel structure in boreal fens. 21 pgs. Canadian Journal of Forest Research, 45: 683-695.

Benscoter, BW, D Greenacre†, and MR Turetsky. 2015. Wildfire as a key determinant of peatland microtopography. Canadian Journal of Forest Research, 45: 1133-1137. DOI:10.1139/cjfr-2015-0028

Miller, CM*, BW Benscoter, MR Turetsky. 2015. The effect of long-term drainage on plant community composition and productivity in boreal peatlands. Wetlands Ecology and Management. DOI: 10.1007/s11273-015-9423-5

Johnston, D*, MR Turetsky, BW Benscoter, and BM Wotton. 2015. Fuel load, structure, and fire behavior in forested bogs. Canadian Journal of Forest Research, 45(7): 888-899.

Kettridge, N, MR Turetsky, JH Sherwood, DK Thompson*, CA Miller*, BW Benscoter, MD Flannigan, BM Wotton, JM Waddington. 2015. Moderate drop in water table increases peatland vulnerability to post-fire regime shift. Nature-Scientific Reports, 5: 8063. DOI: 10.1038/srep08063.

Lauck, M†** and BW Benscoter. 2015. Non-destructive estimation of aboveground biomass in sawgrass communities of the Florida Everglades. Wetlands, 35(1): 207-210.

Turetsky, MR, BW Benscoter, S Page, G Rein, G van der Werf, A Watts. 2014. Global vulnerability of peatlands to fire and carbon loss. Nature-Geosciences. DOI: 10.1038/NGEO2325

Nungesser, M, C Saunders, C Coronado-Molina, J Obeysekera, **JT Johnson*,** C McVoy, BW Benscoter. 2014. Potential effects of climate change on Florida's Everglades. Environmental Management, DOI: 10.1007/s00267-014-0417-5.

Thompson, DK*, BW Benscoter, JM Waddington. 2014. Water balance of a burned and unburned forested boreal peatland. Hydrological Processes 28: 5954-5964.

Meingast, KM*, MJ Falkowski, ES Kane, LR Potvin, BW Benscoter, AMS Smith, LL Bourgeau-Chavez, and ME Miller. 2014. Spectral detection of near surface moisture content and water table position in northern peatland ecosystems. Remote Sensing of Environment, 152: 536-546.

Kettridge, N, DK Thompson*, L Bombanato*, MR Turetsky, BW Benscoter, JM Waddington. 2013 The ecohydrology of forested peatlands: simulating the effects of tree shading on moss evaporation and species composition. Journal of Geophysical Research-Biogeosciences, 118: 422-435.

Waddington, J.M., D.K. Thompson, M. Wotton, W.L. Quinton, M.D. Flannigan, B.W. Benscoter, S.A. Baisley†, M.R. Turetsky. 2012. Examining the utility of the Canadian Forest Fire Weather System in Canadian boreal peatlands. Canadian Journal of Forest Research 42: 47-58.

Turetsky, M.R., W. Donahue, BW Benscoter. 2011. Experimental drying intensifies burning and carbon losses in a northern peatland. Nature Communications 2:514

Benscoter, BW, DK Thompson*, JM Waddington, MD Flannigan, M Wotton, W DeGroot, and MR Turetsky. 2011. Interactive effects of vegetation, soil moisture, and bulk density on the depth of burning of thick organic soils. International Journal of Wildland Fire. 20 (3): 418-429. -***One of 10 papers featured in IJWF 25th Anniversary Special Issue***

Morris, PJ, JM Waddington, BW Benscoter, and MR Turetsky. 2011. Conceptual frameworks in peatland ecohydrology: looking beyond the acrotelm-catotelm model. Ecohydrology. 4: 1-11.

Wieder, RK, KD Scott, K Kamminga, MA Vile, DH Vitt, T Bone†, B Xu*, BW Benscoter, and J Bhatti. 2009. Post-fire carbon balance in boreal bogs of Alberta Canada. Global Change Biology. 15: 63-81.

Benscoter, BW and DH Vitt. 2008. Spatial patterns and temporal trajectories in bog ground layer composition along a post-fire chronosequence. Ecosystems. 11 (7): 1054-1064.

Benscoter, BW and DH Vitt. 2007. Evaluating feathermoss growth: A challenge to traditional methods and implications for the boreal carbon budget. Journal of Ecology. 95 (1): 151-158.

Benscoter, BW. 2006. Post-fire bryophyte establishment in a continental bog. Journal of Vegetation Science. 17 (5): 647-652.

Benscoter, BW, DH Vitt, and RK Wieder. 2005. Association of post-fire peat accumulation and microtopography in boreal bogs. Canadian Journal of Forest Research. 35 (9): 2188-2193.

Benscoter, BW, RK Wieder, and DH Vitt. 2005. Linking microtopography with post-fire succession in bogs. Journal of Vegetation Science. 16: 453-460.

Benscoter, BW and RK Wieder. 2003. Variability in organic matter lost by combustion in a boreal bog during the 2001 Chisholm fire. Canadian Journal of Forest Research. 33 (12): 2509-2513.

Book Chapter

Wieder, RK, DH Vitt, and BW Benscoter. 2006 Peatlands and the Boreal Forest. Pg 1-9 *in*: RK Wieder and DH Vitt (eds.) Boreal Peatland Ecology. Springer-Verlag, Berlin-Heidelburg-New York.

Technical Reports

Kolka, R., C. Trettin, W. Tang, K. Krauss, S. Bansal, J. Drexler, K. Wickland, R. Chimner, D. Hogan, E. J. Pindilli, B. Benscoter, B. Tangen, E. Kane, S. Bridgham, and C. Richardson, 2018: Chapter 13: Terrestrial wetlands. In Second State of the Carbon Cycle Report (SOCCR2): A Sustained Assessment Report. [Cavallaro, N., G. Shrestha, R. Birdsey, M. A. Mayes, R. G. Najjar, S. C. Reed, P. Romero-Lankao, and Z. Zhu (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 507-567, doi: 10.7930/SOCCR2.2018.Ch13

U.S. Department of Energy. 2017. Research Priorities to Incorporate Terrestrial-Aquatic Interfaces in Earth System Models: Workshop Report, DOE/SC-0187, U.S. Department of Energy Office of Science. tes.science.energy.gov (report writing team member).

Refereed Presentations and Proceedings (since 2010)

Presentations by supervised students at university research symposia have been excluded.

Benscoter, BW. "Will synergistic disturbances compromise resilient subtropical wetlands?" Society of Wetland Scientists Annual Meeting, Baltimore, MD May 28-31, 2019 (Invited)

Benscoter, BW. “Opportunities and challenges for prescribe fire in Everglades restoration.” Greater Everglades Ecosystem Restoration Conference, Coral Springs, FL April 22-25, 2019 (Invited)

Dell, J* and BW Benscoter. "Shrub encroachment impacts on carbon, water, and energy in herbaceous peatlands" Greater Everglades Ecosystem Restoration Conference, Coral Springs, FL April 22-25, 2019 (Invited)

Conrad, J* and BW Benscoter. “Assessing the effects of nutrient inputs on the primary mechanisms of vertical land movement in tidal mangrove forests of the Florida Everglades” Greater Everglades Ecosystem Restoration Conference, Coral Springs, FL April 22-25, 2019 (contributed talk)

Dell, J* and BW Benscoter. "The effects of willow encroachment on peat accumulation in an herbaceous peatland following drainage and fire." Society of Wetland Scientists Annual Meeting, Denver, CO, May 29-June 4, 2018 (poster)

Benscoter, BW. “Shifting fire regimes and the future of peatland carbon storage.” 12th International Symposium on Biogeochemistry of Wetlands, Coral Springs, FL, April 23-26, 2018 (invited)

Benscoter, BW. "Fire and water: The paradox of wetland fire and its vulnerability to regime change." 7th International Fire Ecology and Management Conference, Orlando, FL, November 28-31, 2017.

Dombrowski, J* and BW Benscoter. "Fire maintains ridge-slough patterning of the Everglades." 7th International Fire Ecology and Management Conference, Orlando, FL, November 28-31, 2017 (poster)

Hagood, DH* and BW Benscoter. "Effects of prescribed burning and soil disturbance on the spread of Caesar's weed (*Urena lobata*) in pine flatwoods." 7th International Fire Ecology and Management Conference, Orlando, FL, November 28-31, 2017 (poster)

Hinkle, CR, KE Becker*, S Graham, BW Benscoter, X Comas, D Sumner, B Shoemaker, D DeAngelis, J Li. "Carbon dynamics across the terrestrial-aquatic landscape of subtropical Florida." US Dept. of Energy Environmental System Science Annual PI Meeting, Potomac, MD, April 27-28, 2017 (Invited)

Benscoter, BW, J Cantlupe, and **JD Baldwin**††. "Bringing the classroom to the science: High school internship in Everglades ecosystem ecology." Greater Everglades Ecosystem Restoration Conference, Coral Springs, FL, April 17-20, 2017 (poster).

Conrad, J*, and BW Benscoter. "Identifying the effects of eutrophication on drivers of elevation change in Florida's mangroves." Greater Everglades Ecosystem Restoration Conference, Coral Springs, FL, April 17-20, 2017 (poster).

Dell, J*, and BW Benscoter. "The effects of willow encroachment on the resilience of peat carbon storage in an herbaceous wetland." Greater Everglades Ecosystem Restoration Conference, Coral Springs, FL, April 17-20, 2017 (poster).

Benscoter, BW and **DH Hagood***. "Influence of soil disturbance and fire on the distribution of Caesar's weed (Urena lobate) in pine flatwoods." Greater Everglades Ecosystem Restoration Conference, Coral Springs, FL, April 17-20, 2017 (poster).

McClellan, MD*, MJ Job*, BW Benscoter, CR Hinkle, and X Comas. "Carbon dynamics in isolated wetlands of the Northern Everglades watershed is revealed using hydrogeophysical methods and aerial imagery." American Geophysical Union Annual Meeting, San Francisco, CA, December 12-16, 2016 (poster).

Benscoter, BW, and **ML Budny***. "Wetland shrub encroachment alters landscape land-atmosphere carbon and water exchange in subtropical Florida." Ecological Society of America Annual Conference, Ft Lauderdale, FL, August 7-12, 2016 (invited)

Graham, S, DM Sumner, WB Shoemaker, D DeAngelis, BW Benscoter, KE Becker*, J Li, and CR Hinkle. "Carbon dioxide and methane dynamics in a subtropical peatland landscape." Ecological Society of America Annual Conference, Ft Lauderdale, FL, August 7-12, 2016 (invited)

Dombrowski, J*, and BW Benscoter. "Fire maintains spatial complexity of the central Everglades patterned landscape." Ecological Society of America Annual Conference, Ft Lauderdale, FL, August 7-12, 2016.

Hagood, D*, BW Benscoter, and J Nolte. "Effect of prescribed burning and soil disturbance on the spread of Caesar's weed (*Urena lobata*) in pine flatwoods." Ecological Society of America Annual Conference, Ft Lauderdale, FL, August 7-12, 2016 (poster).

Dombrowski, J*, and BW Benscoter. "Determining the effect of fire on the spatial complexity of ridges in the central Everglades." Society of Wetland Scientists Annual Meeting, Corpus Christi, TX, May 31-June 4, 2016 (invited)

Benscoter, BW. "Challenges and science needs of managing and conserving habitat in the northern Everglades." National Conference on Ecological Restoration, Coral Springs, FL, April 18-22, 2016 (invited panelist)

Benscoter, BW and SE Page. "Novel fuel conditions invert the fire regime across low-latitude peatlands." Association for Fire Ecology 6th Annual Fire Ecology and Management Congress, San Antonio, TX, November 16-20, 2015 (invited)

Benscoter, BW and **JT Johnson*.** "Understanding the vulnerability of Everglades peat soils to smouldering combustion." Society of Wetland Scientists Annual Meeting, Providence, RI, May 31-June 4, 2015 (invited).

Harshbarger, D, BW Benscoter, and R Gibble. "Effectiveness of aerial herbicide treatment of *Melaleuca* for habitat recovery of the Northern Everglades." Society of Wetland Scientists Annual Meeting, Providence, RI, May 31-June 4, 2015.

Reger, LM*, and BW Benscoter. "Post-fire succession and carbon storage in the Northern Everglades." Society of Wetland Scientists Annual Meeting, Providence, RI, May 31-June 4, 2015.

Harshbarger, D, BW Benscoter, and R Gibble. "Effectiveness of aerial herbicide treatment of *Melaleuca* for habitat recovery of the Northern Everglades." Greater Everglades Ecosystem Restoration Conference, April 2015 (poster).

Benscoter, BW, **J Lange*, D Harshbarger**, and R Gibble. "Effects of aerial herbicide treatment of *Melaleuca* on habitat recovery of the Northern Everglades." Greater Everglades Ecosystem Restoration Conference, April 2015 (invited).

Budny, M*, and BW Benscoter. "Impact of willow invasion on water and carbon exchange in the vegetation of a subtropical wetland." Greater Everglades Ecosystem Restoration Conference, April 2015 (poster).

Reger, LM*, and BW Benscoter. "Post-fire succession and carbon storage in the Northern Everglades." Greater Everglades Ecosystem Restoration Conference, April 2015 (poster).

Benscoter, BW and **JT Johnson***. "Understanding the vulnerability of Everglades peat soils to smouldering combustion." Greater Everglades Ecosystem Restoration Conference, April 2015 (invited)

Benscoter, BW, M McClellen*, **V Benavides†, D Harshbarger**, and X Comas. "Estimating Carbon Stocks and Atmospheric Exchange of Depressional Marshes on the Central Florida Landscape." American Geophysical Union Fall Meeting, San Francisco, CA, December 2014 (poster).

Graham, SL, DM Sumner, B Shoemaker, BW Benscoter, and R Hinkle. "Water level and fire regulate carbon sequestration in a subtropical peat marsh." American Geophysical Union Fall Meeting, San Francisco, CA, December 2014 (poster).

Budny, M*, and BW Benscoter. "Impacts of willow invasion on vegetation water and carbon exchange in the Florida Everglades." American Geophysical Union Fall Meeting, San Francisco, CA, December 2014 (poster).

Turetsky, MR, BW Benscoter and D Olefeldt. "Will climate change exceed the resilience of western Canadian peatlands?" American Geophysical Union Fall Meeting, San Francisco, CA, December 2014 (invited).

Watts, A., MR Turetsky, BW Benscoter, SE Page, G Rein, and G van der Werf. "Global perspective on peat fires." American Geophysical Union Fall Meeting, San Francisco, CA, December 2014.

Benscoter, BW. "Bryophyte community feedbacks to ecosystem structure and function in boreal peatlands." Botany 2014, Boise, ID, July 2014 (invited).

Benscoter, BW, and **D Harshbarger**. "Community carbon exchange along an ecosystem hydrological gradient in the Florida Everglades." Joint Aquatic Sciences Meeting, Portland, OR, May 2014 (poster).

Benavides, V†, D Harshbarger, and BW Benscoter. "Ecosystem carbon exchange across a depressional marsh ecotone in Central Florida." Joint Aquatic Sciences Meeting, Portland, OR, May 2014 (poster).

Harshbarger, D, BW Benscoter, R Gibble, C Mason, and M Kapsch. "Effectiveness of aerial herbicide treatment of *Melaleuca* for habitat recovery in the northern Everglades." Joint Aquatic Sciences Meeting, Portland, OR, May 2014 (poster).

Chapman, AD*, BW Benscoter and NJ Dorn. "Cascading effects of vegetation on peat soil properties and crayfish survival in the Florida Everglades." Joint Aquatic Sciences Meeting, Portland, OR, May 2014.

Benscoter, BW, and MR Turetsky. "Linking the fire regime to carbon cycling in peatlands." Society of Wetland Scientists Annual Meeting, Duluth, MN, June 2013 (invited).

Chapman, AD*, BW Benscoter and N Dorn. "Cascading effects of vegetation on peat soil properties and crayfish survival in the Everglades." A.R.M. Loxahatchee NWR Science Day Workshop, Boynton Beach, FL, September 2013 (poster).

Lange, J* and BW Benscoter. "Synergistic effects of invasive species (*Melaleuca quinquenervia*) and management practices on native plant community resilience in the Florida Everglades." A.R.M. Loxahatchee NWR Science Day Workshop, Boynton Beach, FL, September 2013.

Lauck, M† and BW Benscoter. "Adapting the pin-intercept method to estimate emergent biomass in sawgrass-dominated regions of the Florida Everglades." A.R.M. Loxahatchee NWR Science Day Workshop, Boynton Beach, FL, September 2013 (poster).

Yeyati, N†, J Lange* and BW Benscoter. "Limits to the spread of sawgrass: seed bank germination and vegetative growth rates at A.R.M. Loxahatchee National Wildlife Refuge." A.R.M. Loxahatchee NWR Science Day Workshop, Boynton Beach, FL, September 2013 (poster).

Bourgeau-Chavez, LL, LK Jenkins, ES Kasischke, MR Turetsky, BW Benscoter, EJ Banda, EJ Boren, SL Endres, and M Billmire. "Vulnerability of North American boreal peatlands to interactions between climate, hydrology, and wildland fires." American Geophysical Union Fall Meeting, San Francisco, CA, December 2012.

Benscoter, BW, MR Turetsky, and **JT Johnson*.** "Regulation of carbon storage by wildfire in boreal and subtropical peatlands." American Geophysical Union Fall Meeting, San Francisco, CA, December 2012.

Turetsky, MR, BW Benscoter, ES Kane, and D Olefeldt. "The burning of northern peatlands: evaluating evidence of potential regime shifts." American Geophysical Union Fall Meeting, San Francisco, CA, December 2012 (invited).

Benscoter, BW and MR Turetsky. "Fire and carbon cycling in boreal North American peatlands." Society of Wetland Scientists/INTECOL Joint Meeting, Orlando, FL, June 2012.

Johnson, JT* and BW Benscoter. "Estimating Everglades peat vulnerability to combustion." Society of Wetland Scientists/INTECOL Joint Meeting, Orlando, FL, June 2012 (poster).

Lange, J* and BW Benscoter. "Synergistic effects of invasive species (*Melaleuca quinquenervia*) and management practices on native plant community resilience in the Florida Everglades. Society of Wetland Scientists/INTECOL Joint Meeting, Orlando, FL, June 2012 (poster).

Benscoter, BW and MR Turetsky. "Fire and microtopography in peatlands: Feedbacks and carbon dynamics." American Geophysical Union Fall Meeting, San Francisco, CA, December 2011.

Kotowska, AM*, MR Turetsky, and BW Benscoter. "The role of sustained drainage and wildfire on C emissions in boreal peatlands." American Geophysical Union Fall Meeting, San Francisco, CA, December 2011 (poster).

Miller, CA*, MR Turetsky, and BW Benscoter. "The effect of long-term drainage on vegetation structure and productivity in boreal peatlands." American Geophysical Union Fall Meeting, San Francisco, CA, December 2011 (poster).

Turetsky, MR, ES Kane, and BW Benscoter. "Biomass burning in boreal forests and peatlands: effects on ecosystem carbon losses and soil carbon stabilization as black carbon." American Geophysical Union Fall Meeting, San Francisco, CA, December 2011 (invited).

Thompson, DK*, M Wotton, WR Turetsky, M Flannigan, BW Benscoter, and JM Waddington. "Ecohydrological controls on peat consumption during wildfire." American Geophysical Union Fall Meeting, San Francisco, CA, December 2011.

Benscoter, BW. "Linking form and function: Implications of disturbance in a changing climate." Florida Climate Change Task Force Workshop, University of Florida, Gainesville, FL, November 2011 (poster).

Benscoter, BW, MR Turetsky, DK Thompson* and JM Waddington. Community composition and disturbance in peatland ecosystems: feedbacks in a changing climate. West Siberian Peatlands and

Carbon Cycle: Past and Present, 3rd International Field Symposium. Khanty-Mansiysk, Russia, June 27-July 5, 2011.

Benscoter, B.W., M.R. Turetsky, D.K. Thompson*, and J.M. Waddington. Peatland carbon cycling in a fire-prone landscape. Reclamation and Restoration of Boreal Peatland Ecosystems: Toward a Sustainable Future, Edmonton, Alberta, Canada, 25-27 March, 2010 (Invited)

Invited Lectures

FAU Conservation Biology. "Climate Change and Conservation" Spring 2015.

Southern Illinois University-Carbondale General Biology for Non-majors. "Photosynthesis." Fall 2005.

Villanova University Introductory Ecology. "The Carbon Cycle and Climate Change." Fall 2002.

Villanova University Environmental Science for Non-majors. "Climate Change: Form, Function, and Future." Spring 2002.

Invited Seminars

"Possibilities and limitations of prescribed fire for management of Caesar's Weed (*Urena lobata*)" South Florida Interagency Fire Management Council Annual Meeting, October 24, 2017.

"Disturbance's Changing Role in Changing Peatland Ecosystems" US Department of Energy, Biological and Environmental Research Program, Spring 2017.

"Shifting Forces in the Everglades Carbon Cycle" University of Central Florida, Biology Seminar Series, Fall 2016

"Linking Structure and Function in the Greater Everglades" Archbold Biological Station, Distinguished Lecturer Seminar Series, Spring 2016

"Disturbance Ecology of Wetlands: Ecosystem Resilience in a Changing Climate" Florida International University, Environmental Science Seminar Series, Fall 2011.

"Community composition and disturbance in wetland ecosystems: feedbacks in a changing climate" University of Guelph, Department of Integrative Biology Seminar Series, Winter 2010.

"Answering the Burning Question: Effects of Fire on Western Canadian Peatlands" Lehigh University, Ecology and Environmental Science Seminar Series, Fall 2008.

"Post-Fire Compositional and Functional Recovery of Boreal Bogs." Southern Illinois University-Carbondale, Center for Ecology Seminar Series, Fall 2006.

"Seminar: Grant Writing for Graduate Students." Southern Illinois University-Carbondale, Fall 2004.

"Panel Discussion: The Impacts of Climate Change." Villanova University, Fall 2001.

Media Products

"Peatland Management" documentary series, Summer 2016, Kompas TV (Indonesian television company) program *Kompas Malam*, via US State Department Journalism Co-Op Program; provided location information for Everglades and Minnesota segments and on-air interview for Everglades management segment (*to be aired*).

Funding

Grant Funding

US National Park Service, 2018-2020. "Influence of shrub encroachment on fire behavior in Central Everglades wetlands." Total budget: $293,927. PI: BW Benscoter.

US Geological Survey, 2016-2018. "Research and technical assistance for assessing carbon and sea level rise dynamics in the Greater Everglades." Total Budget: $479,866. PI: C Polsky; Co-I: BW Benscoter ($84,000), X Comas.

US Department of Energy, Terrestrial Ecosystem Science 2012-2018. "Carbon dynamics of the Greater Everglades watershed and implications of climate change" Total Budget: $1,032,678 PI: R Hinkle (UCF); Co-I: BW Benscoter ($610,076), X Comas (FAU-Geo), D Sumner (USGS), D DeAngelis (USGS)

National Aeronautics and Space Administration (NASA), 2012-2016. "Fuel consumption and carbon cycling in northern peatland ecosystems: understanding vulnerability to burning, fuel consumption, and emissions via remote sensing of fuel moisture and radiative energy." Total Budget: $815,133. PI: M Falkowski (UMN); Co-I: ES Kane (MTU), L Bourgeau-Chavez (MTRI), N French (MTRI), E Levin (MTRI), ME Miller (MTRI), R Kremens (RIT); Unfunded Collaborator: BW Benscoter, AMS Smith (UID)

US Fish and Wildlife Service, 2012-2018. "Synergistic effects of invasive species (*Melaleuca quinquenervia*) and management practices on native plant community resilience in the Florida Everglades." Total Budget: $45,000. PI: BW Benscoter

US Geological Survey, 2011-2016. "Cooperative Agreement: Carbon Dynamics of the Greater Everglades" Total Budget: $405,827. PI: L Berry & Colin Polsky (FAU-CES); Co-I: BW Benscoter, X Comas (FAU-Geo)

US Bureau of Land Management, Joint Fire Sciences Program, January 2012-2015. "Influence of fuel moisture and density on black carbon formation during combustion of boreal peat fuels" Total Budget: $70,916. PI: BW Benscoter; Unfunded Co-I: ES Kane (MTU), M Falkowski (MTU)

US Fish and Wildlife Service. 2014-2015. "First-order fire effects monitoring at the A.R.M. Loxahatchee National Wildlife Refuge." Total Budget: $10,000. PI: BW Benscoter

US Environmental Protection Agency STAR Fellowship, 2004 – 2007 (PI: BW Benscoter).

Society of Wetland Scientists Student Research Grant, 2004. "Temporal and Spatial Variability of Peat Accumulation and Vegetation of Post-Fire Boreal Bogs." (PI: BW Benscoter)

Society of Wetland Scientists Student Research Grant, 2002. "Microtopographic Variation in Post-fire Vegetation Succession and Peat Accumulation in Boreal, Continental, Western Canadian Bog Peatlands." (PI: BW Benscoter)

FAU College of Science Seed Funding Program, 2012. "Cascading impacts of vegetation change in the Florida Everglades: linking vegetation to crayfish populations through peat characteristics." ($8,000; PI: BW Benscoter; Unfunded Co-I: N Dorn)

Grants & Awards to Supervised Students

† Undergraduate Student
* Graduate Student

Florida Exotic Pest Plant Council, Julia Morton Invasive Plant Research Program (DH Hagood*). 2017. "Influence of soil disturbance and fire on the distribution of Caesar's weed (*Urena lobata*) in pine flatwoods." ($2,000)

FAU Center for Environmental Studies-Janke Foundation Fellowship (J Dell*). 2016-2017. "Do shrubs compromise the resilience of peatland carbon storage in the Florida Everglades?" ($5,000)

FAU Environmental Science Program Retreat, Best Student Presentation (L Reger*). 2016. "Post-fire succession and carbon storage in the Northern Everglades" ($500)

FAU Environmental Science Program Retreat, Best Student Presentation-Runner Up (D Hagood*). 2016. "Effect of prescribed burning and soil disturbance on the spread of Caesar's weed (*Urena lobata*) in pine flatwoods" ($500)

FAU Undergraduate Research Award Program (M Eunson†). 2015. "Contrasting soil carbon emissions from two South Florida wetlands" ($500)

FAU Graduate Research and Inquiry Program (GRIP) Student Award Program (J Dombrowski*). 2015. "Effects of fire on ridge-slough patterning in the central Everglades" ($1,500)

FAU College of Science Research Day, Best First-Year Student Poster (J Dombrowski*). 2015. "Effects of fire on ridge-slough patterning in the central Everglades"

FAU Environmental Science Program Retreat, Best Proposal Poster (T Froud*), 2015. "Partitioning methane fluxes across the soil-water-atmosphere continuum in subtropical peatlands" ($50 for society membership)

FAU-National Park Service Environmental Science Everglades Fellowship (L. Reger*), 2014-2016. "Post-fire succession and carbon storage in the northern Everglades." ($43,899)

FAU Presidential Fellowship, Integrative Biology Doctoral Program (J. Dell*), 2014-2015 ($2,500).
FAU Environmental Science Program Retreat, Best Proposal Poster (L. Reger*), 2014. "Post-fire succession and carbon storage in the northern Everglades." ($50 for society membership)
FAU Broward Undergraduate Research Symposium, Best Undergraduate Poster (V. Benavides†), Spring 2014. "Measuring carbon dioxide exchange along a wetland-to-flatwoods gradient at The Nature Conservancy's Disney Wilderness Preserve."
FAU Broward Undergraduate Research Grant (V. Benavides†), Fall 2013. "Measuring Carbon Dioxide Exchange Along a Wetland-to-Flatwoods Gradient at The Nature Conservancy's Disney Wilderness Preserve." ($2,000)
FAU Provost Fellowship, Environmental Science Master's Program (M. Budny*), 2013-2014. ($2,500)
Southeast Ecology and Evolution Conference, Best Undergraduate Poster (M. Lauck†), 2013. "Adapting the pin-intercept method for non-destructive estimation of aboveground biomass in sawgrass communities of A.R.M. Loxahatchee National Wildlife Refuge." ($150)
Society of Wetland Scientists, South Atlantic Chapter Student Travel Grant (M. Lauck†), 2013 ($100)
FAU Broward Undergraduate Research Grant (M. Lauck†), Spring 2013. "Adapting the pin-intercept method for non-destructive estimation of aboveground biomass in sawgrass communities of A.R.M. Loxahatchee National Wildlife Refuge." ($3,500)
FAU Provost Fellowship, Environmental Science Master's Program (J. Lange*), 2011-2012 ($2,500)
FAU Undergraduate Research Grant (M. Transleau†), Fall 2012. "Soil Subsidence of *Typha domingensis* peat in response to Everglades hydrology." ($456)

Teaching & Instruction

Courses Taught

Department of Biological Sciences, Florida Atlantic University

- BOT 5155 & 5155L Flora of South Florida & Lab, Spring 2011
- PCB 4043 Principles of Ecology, Spring 2012, Fall 2012-2018
- BSC 6934 Plant Ecology & Lab, Spring 2013-2015
- BSC 6936 Writing Science for Ecologists, Spring 2016-2018, 2019 (tentative)
- EVS 6930 Environmental Science Colloquium, Spring 2017
- EVS 6917 Fundamentals of Environmental Research, Spring 2019 (tentative)

Supervision of Graduate Students

Italics – Graduated

James Johnson, FAU Environmental Sciences Master's Program (Major Advisor) - 2010-2012
Thesis Title: Examining the vulnerability of Everglades peat to combustion
James Lange, FAU Environmental Sciences Master's Program (Major Advisor) - 2011-2015
Thesis Title: Combined legacy impacts of *Melaleuca quinquenervia* and broadcast herbicide treatments in the Florida Everglades
Alex Chapman, FAU Biological Sciences Master's Program (Major Advisor) - 2012-2014
Thesis Title: The cascading impacts of vegetation on peat soil properties and crayfish survival in the Florida Everglades
Michelle Budny, FAU Environmental Sciences Master's Program (Major Advisor) - 2013-2015
Thesis Title: The impacts of willow encroachment on water and carbon exchange in the vegetation of a subtropical wetland
Lisa Reger, FAU Environmental Sciences Master's Program (Major Advisor) – 2014-2016
Thesis Title: Post-fire succession and carbon storage in the northern Everglades
Jessica Dell, FAU Integrative Biology Doctoral Program (Major Advisor) – 2014-present
Advance to candidacy: Sept. 2017
Master's-Along-the-Way MSc Degree (2017)
Dissertation Focus: Compounding disturbances and wetland resilience

Jacob Dombrowski, FAU Environmental Sciences Master's Program (Major Advisor) – 2014-2016
Thesis Title: Fire effects on ridge-slough patterning in the central Everglades
Daniel Hagood, FAU Environmental Sciences Master's Program (Major Advisor) – 2014-2017
Thesis Title: Effects of soil disturbance and prescribed burning on the invasive Caesar's Weed (*Urena lobata*)
Tristan Froud, FAU Environmental Science Master's Program – Non-Thesis (Independent Study Supervisor) – 2014-2016
Jeremy Conrad, FAU Integrative Biology Doctoral Program (Major Advisor) – 2016-present
Advance to Candidacy: December 2017
Dissertation Focus: Eutrophication and mangrove soil elevation

Graduate Student Committee Membership

Bethany Resnick, FAU Biological Sciences Master's Program (Comp. Examiner) – 2012
James Beerens, FAU Integrative Biology Doctoral Program (Committee Member) – 2011-2014
Jessica Klassen, FAU Integrative Biology Doctoral Program (Committee Member) – 2013-2016
Conall McNichol, FAU Integrative Biology Doctoral Program (Committee Member) – 2016-present
Matt McClellen, FAU Geoscience Doctoral Program (Committee Member) – 2014-present
William Wright, FAU Geoscience Doctoral Program (Committee Member) – 2015-2018
Joshua Holbrook, FAU Environmental Sciences Master's Program (Committee Member) – 2013-2014
Cara Abbott, FAU Environmental Sciences Master's Program (Committee Member) – 2014-2015
Liz Dutra, FAU Biological Sciences Master's Program (Committee Member) – 2014-2015
Corey Callaghan, FAU Environmental Science Master's Program (Committee Member) – 2014-2015
Sarah Huff, FAU Biological Sciences Master's Program (Committee Member) – 2016-2018
Andrew Davidson, FAU Biological Sciences Master's Program (Committee Member) – 2015-2016
Regina Zweng, FAU Biological Sciences Master's Program (Committee Member) – 2016-2017
Camille Herteaux, FAU Environmental Science Master's Program (Committee Member) – 2016-2018
Ashley Jackson, FAU Environmental Science Master's Program (Committee Member) – 2016-2018
Emilie Kohler, FAU Environmental Science Master's Program (Committee Member) – 2016-2018
Jordan Byrum, FAU Environmental Science Master's Program (Committee Member) – 2016-present
Caroline Smith, FAU Environmental Sciences Master's Program (Committee Member) – 2016-2018
Troy Bole, FAU Geosciences Master's Program (Committee Member) - 2017-present
Cali Munzenrieder, FAU Geosciences Master's Program (Committee Member) – 2015-2016
Karl Meingast, Michigan Tech University Forestry Master's Program (Committee Member) – 2012-2014

Research Supervision of Undergraduate & High School Students

DIR/DIS – Directed Independent Research/Study
URI – Undergraduate Research Internship

Date	Name	Home Institution	Experience
Summer 2011	Dan Greenacre	University of Guelph	Summer URI
Summer 2011	Tom Shicks	University of Guelph	Summer URI
Spring 2012	Manon Transleau	FAU	DIS
Spring 2012-Spring 2013	Marina Lauck	FAU	Volunteer/DIS
Summer 2012	Matt McGovern	University of Guelph	Summer URI
Fall 2012-Spring 2013	Nestor Yeyati	FAU	DIS
Fall 2013	Siham Aboul El Haoul	FAU	DIS
Fall 2013-Spring 2014	Joanne Pauyo	FAU	DIS
Fall 2013-Summer 2014	Victor Benavides	FAU	DIS & Summer URI
Summer 2014	Emily Persico	University of Florida	Summer URI
Fall 2014	Nadia Abouhana	FAU	DIS
Fall 2014	Amira Bahhur	FAU	DIS
2014- 2015	Juan Polanco	FAU	DIS
Fall 2014	Jacquelyn Roberto	FAU	DIS
Spring 2015-Summer 2016	Michael Eunson	FAU	DIS & Summer URI
Fall 2015	Samantha Arbonida	FAU	DIS
Fall 2015	Heather Smith	FAU	DIS
Fall 2016	Sarah Marcus	FAU	DIS
Fall 2016-Summer 2018	John Baldwin	South Plantation High School	Internship
Spring 2017-Summer 2018	Rodrigo Rios	South Plantation High School	Internship
Spring 2017-Summer 2018	Juan Cabrera	South Plantation High School	Internship
Fall 2017, Summer 2018	Crystal Leslie	FAU	DIS
Fall 2017	Neil Hatcher	FAU	DIS
Fall 2017	Janice Jackson	FAU	DIS
Fall 2017	Melissa Morales	FIU	Volunteer
Fall 2018	Jessica Domzalski	FAU	DIR
Fall 2018	Jennifer Avila	FAU	DIR
Fall 2018	Andrea Truc	FAU	DIR
Fall 2018	Vivian Mischiati	FAU	DIR
Fall 2018-Spring 2019	Jack Wu	McFatter Tech. High School	Internship
Spring 2019	Brenda Lozado	FAU	DIR
Spring 2019	Quantiniqua Barnhill	FAU	DIR
Spring 2019	Kevin Coombs	FAU	DIR

Service & Professional Development

Community Service

Science Fair Judge, South Plantation High School Everglades Restoration Magnet Program - 2016-2018
Research internship program, South Plantation High School Everglades Magnet Program -2016-present

- Research mentor for initial pilot program
- University coordinator for second phase expansion

University Service

FAU Division of Research, Diving and Boating Safety Committee - 2018-present

- Chair, January 2019-present

FAU Integrative Biology Doctoral Program – Environmental Science Program Committee – 2017-present
FAU Environmental Science Program - Program Committee – 2014-present

- Strategic Planning Committee Chair – 2014-present
- Curriculum Committee Chair – 2017-present

FAU Environmental Science Program - Admissions Committee – 2011-2014
Broward Campus U/C Library Governance Policy Advisory Committee – 2010-2015
FAU Climate Change Research Initiative Director Search Committee – 2010
Broward Campus University/College Library Dean Search Committee – 2011, 2012, 2013
Broward Campus Meeting with FL State Representative Katie Edwards – Spring 2013
Villanova University, Villanova Quality Initiative Committee, Graduate Student Representative - 2001-02
Villanova University, University Senate, Graduate Student Representative - 2001-2002
Villanova University, Biology Faculty Search Committee, Graduate Student Member - 2002

Professional Service

Membership & Leadership in Professional Organizations

Society of Wetland Scientists

- Vice-Chair, South Atlantic Chapter (SAC) 2017-present
- Wetlands of Distinction Committee, SAC representative, 2017-present
- Chair, Biogeochemistry Section 2013-2014
- Chair, Peatland Section 2015-2016
- Mentor, Undergraduate Diversity Program, 2014-2019 Annual Meetings
- Student Research Grant Reviewer, 2015-2019
- 2017 Conference Planning Committee, Symposium & Abstract subcommittees

American Geophysical Union

Ecological Society of America

- Meetings Committee, 2015-2017
- Local Chair, 2016 Meetings Committee

Association for Fire Ecology

American Bryological and Lichenological Society

Proposal Evaluation for Funding Agencies

Panelist, NASA, Earth Sciences Division (2017, 2019)
Panelist, US Department of Energy, Graduate Student Research Grant Program (2016)
Panelist, US Department of Energy, Oak Ridge National Laboratory SFA Review (2012, 2015)
Panelist, Society of Wetland Scientists, Student Research Grant Program (2015-2019)
Panelist, US Bureau of Land Management, Joint Fire Sciences Program (2012, 2015)
Ad-Hoc Reviewer, National Science Foundation (2010, 2012, 2013)
Panelist, NASA Arctic-Boreal Vulnerability Experiment (ABoVE) Campaign Evaluation Team (2012)
Panelist, National Science Foundation, EPSCoR Program (2019)
Panelist, National Science Foundation, Ecosystem Sciences (2011, 2017, 2018)
Panelist, National Science Foundation, Population and Community Ecology (2011)

Evaluation of Manuscripts for Professional Journals

Nature Geosciences
Ecology
Journal of Ecology
Ecological Applications
Ecosystems
Journal of Vegetation Science
Biogeochemistry
Biogeosciences
J. of Geophysical Research-Biogeosciences
Bryologist
Ecohydrology
Quaternary Reviews
Oecologia
PLOS One
Environmental Management
Plant, Cell & Environment
Ecosphere
Science of the Total Environment
New Zealand Journal of Ecology
International Journal of Wildland Fire
International Journal of Heat and Mass Transfer
Canadian Journal of Soil Science
Canadian Journal of Forest Research
Wetlands
Wetland Ecology and Management
Global Change Biology
Forests
Freshwater Science
Fire Ecology
Water Resource Research
Coasts & Estuaries

Organization of Professional Meetings

Greater Everglades Ecosystem Restoration Conference, Coral Springs, FL, April 17-21, 2017
- Pre-conference workshop co-organizer (with B Shoemaker and F Anderson), "Water, energy, and carbon cycling within the Greater Everglades Ecosystem"

Society of Wetland Scientists Annual Meeting, San Juan, Puerto Rico, June 5-8, 2017
- Conference planning committee, Symposium and Abstract subcommittees
- Symposium Co-Convener (with M Jones and W Connor), "Storms, sea level, climate, and humans: spatial and temporal impacts of disturbance to mangrove forests"

Ecological Society of America Annual Meeting, Ft Lauderdale, FL, August 7-12, 2016
- Local Host Chair, Meetings Committee

Society of Wetland Scientists Annual Meeting, Corpus Christi, TX, May 31-June 4, 2016
- Symposium Co-Convener (with M Jones), "Consequences of land use change and fire on peatlands"

Society of Wetland Scientists Annual Meeting, Providence, RI, May 31-June 4, 2015
- Symposium Co-Convener (with M Jones and B Shoemaker), "Carbon, water, and energy cycling from inland wetlands to coastal estuaries in a changing environment"

Greater Everglades Ecosystem Restoration (GEER) Conference, April 21-23, 2015, Coral Springs, FL
- Session Co-Convener (with X Comas), "Carbon storage and release in low latitude peatlands"

American Geophysical Union Fall Meeting, San Francisco, CA, December 15-19, 2014
- Session Co-Convener (with R Hinkle, B Shoemaker, and X Comas), "Carbon and Water Cycling within Low Latitude Wetlands"
- Session Co-Convener (with L Jenkins, S Goswami, and D Hayes), "Observations and model requirements for understanding drivers of disturbance processes in Arctic and Boreal terrestrial ecosystems"

INTECOL/Society of Wetland Scientists/Greater Everglades Ecosystem Restoration Joint Conference, June 3-9, 2012, Orlando, FL
- Session Co-Convener (with T Troxler), "Patterns and Drivers of Carbon Storage in Peatlands"
- Session Co-Convener (with MR Turetsky), "Impact of peatland fires on ecosystem function and feedbacks to climate: A global perspective"

American Geophysical Union-Canadian Geophysical Union Joint Meeting, May 2009, Toronto, Canada
- Session Co-Convener (with MD Flannigan), Wildfire in natural systems: vulnerability, impact, and response

25th Annual Midwest Ecology and Evolution Conference, March 2005, Carbondale, IL

- Conference Organizing Committee Chair

Professional Development

Attendance at Professional Workshops/Technical Meetings

Invited

South Florida Ecosystem Restoration Task Force Joint Working Group (WG)/Science Coordination Group (SCG) Meeting, West Palm Beach, FL, June 5, 2018 (invited; stand-in SCG member)

US Geological Survey-FAU Workshop, "Improving Confidence in Precipitation Projections for Everglades Restoration", Davie, FL, September 21, 2017 (invited)

South Florida Ecosystem Restoration Science Coordination Group, RECOVER 5-year Plan Conceptual Ecosystem Model Updates Science Meeting, West Palm Beach, FL, January 23-24, 2017 (invited)

South Florida Ecosystem Restoration SCG, RECOVER Ridge-Slough Conceptual Ecological Model Update Workshop, West Palm Beach, FL, May 5, 2017 (invited)

US Geological Survey Everglades Watershed Carbon Cycle Science Technical Meeting, Davie, FL, September 29, 2016 (invited)

US Department of Energy, Terrestrial Ecosystem Science Program, *Research Priorities to Incorporate Terrestrial-Aquatic Interfaces in Earth System Models*, September 6-9, 2016 (invited)

- Member, TAI Workshop Writing Team

South Florida Ecosystem Restoration Task Force Joint Working Group (WG)/ Science Coordination Group (SCG) Meeting, West Palm Beach, FL, April 30, 2015 (invited; stand-in SCG member).

"Scaling Evolution from Genomes to Ecosystems in the Peatmosses (*Sphagnum*)" NESCent workshop, Durham, NC, October 13-15, 2014 (invited)

"Recommendations for Everglades Restoration under a Future Climate Scenario." Florida Center for Environmental Studies & USGS Technical Meeting, Florida Atlantic University, April 28-29, 2014 (invited-vegetation working group)

"Predicting Ecological Changes in the Florida Everglades under a Future Climate Scenario." Florida Center for Environmental Studies and USGS Technical Meeting, Florida Atlantic University, February 14-15, 2013. (invited)

"Developing a Carbon Budget for the Greater Everglades Ecosystem in a Changing Climate." Florida Atlantic University, Davie, FL, July 2011 (organized by BW Benscoter and X Comas; sponsored by US-DOE and FAU Center for Environmental Studies).

"Establishing a Russian/American Peatland Research Program." Peatland Ecosystem Analysis and Training Network (PEATNET). Khanti-Mansiysk, Russia, May 21-30, 2006 (sole student participant).

"Functioning of Boreal Forest Ecosystems". Swedish University of Agricultural Sciences, Department of Forest Vegetation Ecology. Umea, Sweden, June 12-18, 2004 (sole US participant).

Attended

Upper St John's River Basin Research Consortium Meeting, St. John's River Water Management District, Palm Bay, FL, May 20, 2018

Upper St John's River Basin Research Consortium Meeting, St. John's River Water Management District, Palm Bay, FL, April 20, 2016

South Florida Ecosystem Restoration Task Force Meeting, South Florida Water Management District Headquarters, West Palm Beach, FL, June 29, 2016.

FAU Collaborative Research Retreat at DuPuis Wildlife Management Area, sponsored by FAU Center for Environmental Studies, July 10, 2015

FAU Sensing/Smart Systems Research Retreat, sponsored by FAU Division of Research and I-SENSE Center, Spanish River Library, Boca Raton, June 17, 2015

USGS-FAU Collaborative Research Meet-and-Greet, sponsored by FAU Center for Environmental Studies, FAU-Davie Campus, February 6, 2015.

Upper St John's River Basin Research Consortium Meeting, St John's River Water Management District, January 28, 2015

Comprehensive Everglades Restoration Plan RECOVER Science Meeting, South Florida Water Management District, January 21-23, 2015.

"A.R.M. Loxahatchee National Wildlife Refuge Science Workshop." South Florida Water Management District, West Palm Beach, FL, September 18, 2014.

"FAU-USGS Research Collaboration in Everglades Carbon and Water Cycling" US Geological Survey Technical Meeting, USGS Florida Water Science Center, Davie, FL, September 22, 2014

National Academies Summer Institute on Undergraduate Education, Gulf Coast Summer Institute, July 21-25, 2014, Baton Rouge, LA.

"Tamiami Trail-Northeast Shark River Slough Monitoring and Assessment Plan Workshop." Everglades National Park, Homestead, FL, January 27, 2014.

"A.R.M. Loxahatchee National Wildlife Refuge Science Workshop." South Florida Water Management District, West Palm Beach, FL, September 26, 2013.

"A.R.M. Loxahatchee National Wildlife Refuge Science Workshop." Boynton Beach, FL, August 30, 2011.

"Everglades-Pantanal Initiative Workshop." Florida International University-Florida Atlantic University-Everglades National Park, July 13-16, 2011.

"Influence of Sea Level Rise on Natural Systems of the Greater Everglades." Florida Atlantic University, Boca Raton, FL, April 2011.

"Decompartmentalization and Sheetflow Enhancement (DECOMP) Science Workshop 2." US Army Corp of Engineers-CERP Adaptive Management Planning Committee, UF/IFAS, Davie, FL, February 24, 2011.

"Decompartmentalization and Sheetflow Enhancement (DECOMP) Science Workshop 1." US Army Corp of Engineers-CERP Adaptive Management Planning Committee, A.R.M. Loxahatchee National Wildlife Refuge, Boynton Beach, FL, December 1-2, 2011.

"Incorporating Climate Change and Sea Level Rise in the Total System Conceptual Model for the Everglades." USGS/Everglades Science Coordination Group Workshop, UF Hurricane House, Davie, FL, October 19, 2010.

"Reclamation and Restoration of Boreal Peatland and Forest Ecosystems: Toward a Sustainable Future" Edmonton, Alberta, Canada, March 25-27, 2010.

"Fourth International Workshop on the Biology of *Sphagnum*." Juneau/Anchorage, Alaska, August 1-10, 2008.

Professional Certifications

Certified Wildland Fire Ecologist	Association for Fire Ecology	2018-present
Certified Airboat Operator (AOCC)	US Department of Interior	2014-present

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: David Binninger

eRA COMMONS USER NAME (credential, e.g., agency login): Binninger

POSITION TITLE: Associate Professor and Associate Chair

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
University of South Florida, Tampa, FL	B.A	08/1979	Biology
University of South Florida, Tampa, FL	M.A.	06/1981	Microbiology
University of North Carolina, Chapel Hill, NC	Ph.D.	12/1987	Molecular Genetics
University of California, Davis, CA	Postdoctoral	09/1990	Molecular Genetics

A. PERSONAL STATEMENT

I was hired as the first molecular biologist at Florida Atlantic University (FAU) in 1990. My research strategy was to collaborate with my postdoctoral advisor, James Boyd at U. California (Davis, CA) since the research infrastructure at FAU was minimal at that time. Sadly, Jim passed away shortly after I arrived at FAU. A visit from an electrical engineer at FAU got me interested in the question of whether the extremely low frequency (ELF) magnetic fields generated by electrical power lines might present a human health hazard. Together, we pursued this problem for a number of years and were supported by two grants (including an R01) from NIH. However, it eventually became clear that if these ELF magnetic fields present a health risk, it was not a question that could be investigated with the knowledge and technology available at the time.

Herbert Weissbach turned my attention to a new area of research while discussing his data showing that over-expression of bovine methionine sulfoxide reductase A (MSRA) in the central nervous system (CNS) of *Drosophila* significantly extends lifespan (Ruan, H., et al., Proc. Natl. Acad. Sci,, USA, 2002. **99(5)**: 2748-2753). It was clear that investigation into potential health risks from power line ELF magnetic fields was no longer a viable area of research. Therefore, I completely restructured my research program to focus on oxidative stress and its role in aging and the development of neurodegenerative disease. This was a challenge since there were no faculty in the biological sciences department that were using *Drosophila* as a research model at the time. Today, the research environment is dramatically different. There is a much stronger research infrastructure including a number of biology faculty who utilize *Drosophila* as a model organism. Some of these faculty have their labs near my lab on the Boca Raton campus. Others are working at the Jupiter campus (about a 30-45 minute drive from the Boca Raton campus) to facilitate collaborations with the scientists at The Scripps Research Institute and the Max Plank Florida Institute. The presence of these two world-renowned biomedical research institutes and their association with FAU has further strengthened the research environment. This includes a joint PhD program in neurobiology with the Max Plank Florida Institute.

Student Supervision in Research

The PI has a well-established record for supervising undergraduate and graduate students. In addition to supervising graduate students involved directly in research, he is also the Director for the Professional Masters Program (PSM) in business biotechnology. Over the past four years, the PI has served as the graduate advisor for eight Masters students and one PhD student. There are currently four Masters students working on their thesis projects in his lab. Among recent graduates, Lindsay Bruce (PhD student) continued her training with post-doctoral studies in Edinburgh, Scotland. William Hausman is working for DNA Labs International (Deerfield Beach, FL), a forensics laboratory. Karin Shey is in dental school at the University of Florida (Gainesville, FL). Caesar Hernandez is a PhD candidate in neurobiology at the University of Florida (Gainesville, FL). Jennifer Verrioto went on to earn her PhD student at the University of Miami (Miami, FL) and is currently working as a clinical trial project manager for a biotechnology company in Gainesville, FL.

The PSM program is a fairly new category of Masters degree that is intended to provide students with the skills and knowledge to move directly into the workforce in the emerging biotechnology industry. Since 2015, the PI has supervised 24 of these graduate students. More than 90% of the graduates of the program received a job offer during their internships or shortly after graduation.

Undergraduate students work side-by-side with the graduate students. There are usually 3-4 undergraduates in the lab every semester. Some of these students are in the Honors Program for the Biological Sciences Department. As a group, these are outstanding students who been successful in moving to the next phase of their career. For example, Nicole Wilson earned her PhD in neurobiology at the University of Miami (Miami, FL). Danielle Howard earned her MD from University of Miami (Miami, FL). James Martin is a PhD candidate at Princeton University (Princeton, NJ). Thomas Pelaez will begin his PhD in fall 2019. Tevin Ali will be graduating from a Masters program at Johns Hopkins while Lydia Musleh will begin her graduate studies in the same program at Johns Hopkins in fall 2019. Jessica Kriss is in medical school at the University of Central Florida (Orlando, FL).

Currently, there are four graduate students, one biology honors undergraduate and three other undergraduate students working in the lab.

B. Positions and Honors

Professional Experience

1990 — 1996	Assistant Professor, Department of Biological Sciences, Florida Atlantic University, Boca Raton, FL
1996 — Present	Associate Professor, Department of Biological Sciences, Florida Atlantic University, Boca Raton, FL
1998 — Present	Member, Center for Molecular Biology and Biotechnology, Florida Atlantic University, Boca Raton, FL
2000 — Present	Associate Chair, Department of Biological Sciences, Florida Atlantic University, Boca Raton, FL
2004 — 2007	Curriculum Director – partnership with the Workforce Alliance of Palm Beach. A grant for training in biotechnology. Funded by the Department of Labor under the President's High Growth Job Training Initiative.
2010 — Present	Director, Professional Science Masters (PSM) in business biotechnology

Honors

National Academies Education Fellow in the Life Sciences (2006-2007)
Eminent Advisor Award from the Multicultural Pre-Medical Society, FAU - 2001
Teaching Incentive Program (TIP) Award, Charles E. Schmidt College of Science, FAU - 1996
Shannon Award, National Institutes of Health, 1992–1994
National Institutes of Health Predoctoral Trainee, 1982-1987

C. Contributions to Science

My graduate training was at the University of North Carolina (Chapel Hill, NC) in the lab of Patricia Pukkila. The lab investigated the molecular basis of genetic recombination using a mushroom called *Coprinus* as a genetic model. My project was to develop a transformation system to allow genetic manipulation to facilitate our studies of meiosis and genetic recombination. At the time, this was a major undertaking since it predated PCR, electroporation and genomic sequencing. I was successful in transforming *Coprinus* and showed that the exogenous DNA underwent homologous recombination about 5% of the time. I also worked on a problem involving gene conversion in *Saccharomyces cerevisiae* (yeast).

> **Binninger, D.M**., J.L. Norris, L. Le Chevanton, C. Skrzynia, C.D. Shubkin and P.J. Pukkila (1991) Targeted transformation in *Coprinus cinereus*. Molecular and General Genetics. **227:**245-251.
>
> Skrzynia, C., **D.M. Binninger**, J.A. Alspaugh, II, and P.J. Pukkila (1989) Molecular characterization of the *Coprinus cinereus* tryptophan synthetase gene, *TRP 1.* Gene **81**: 73-82.
>
> **Binninger, D.M**., C. Skrzynia, P.J. Pukkila and L.A. Casselton (1987) DNA-mediated transformation of the basidiomycete *Coprinus cinereus*. European Molecular Biology Organization (EMBO) Journal. **6:** 835-840.
>
> Pukkila, P.J., M.D. Stephens, **D.M. Binninger** and B. Errede (1986) Frequency and directionality of gene conversion events involving the *CYC7-H3* mutation in *Saccharomyces cerevisiae.* Genetics **114:** 347-361.

I continued my training in molecular genetics and biochemistry as a postdoctoral student with James Boyd at the University of California (Davis, CA). My scientific interest remained focused on DNA metabolism by working to clone and molecularly characterize an important gene required for genetic recombination and DNA repair called *mei-9* in *Drosophila*. This was a challenging project at the time. While we had an early PCR thermocycler in the lab, there was no sequence information available to design primers. I also extended my training in biochemistry by collaborating with another post-doc in the lab to purify and characterize DNAase II from human lymphoblasts.

> Harosh, I., **D.M. Binninger**, P. Harris, M. Mezzina and J.B. Boyd (1991) Mechanism of action of deoxyribonuclease II from human lymphoblasts. European Journal of Biochemistry **202**: 479-484

I joined the faculty of the Biological Sciences Department at Florida Atlantic University (Boca Raton, FL) as the first molecular biologist in 1990. The research infrastructure for molecular biology was very rudimentary. For example, I had to use my modest start-up funds to buy an ice machine and an ultralow freezer. To my knowledge, I was the first faculty member in the department to receive NIH grant support (see below).

I had intended to continue my work on the *mei-9* gene of *Drosophila* in collaboration with the James Boyd lab at University of California (Davis, CA). Tragically, Jim passed away shortly after I started at FAU. It was not feasible to continue the project on my own because I did not have the infrastructure and resources needed. An electrical engineer from the engineering college visited one day and we started talking about the question of whether the extremely low frequency (ELF) magnetic fields from power lines presented a health risk. The approach was to use yeast as a model organism with the goal of cloning and characterizing genes whose expression was affected by these ELF magnetic fields. Together, we pursued this problem for a number of years and had support from NIH with two grants (including an R01). However, it eventually became clear that if these ELF magnetic fields present a health risk, it was not a question that could be investigated with the knowledge and technology available at the time

> **Binninger, D.M**. and V. Ungvichian (1999) Use of non-mammalian systems to investigate mechanism mediating biological interactions with electromagnetic fields. Proceedings of The Second World Congress For Electricity And Magnetism In Biology and Medicine. Plenum Press. pp. 183-185.
>
> **Binninger, David M.** (1998) Yeast — A paradigm for understanding EMF-mediated cellular effects. EMF Health Report. **6(3):** 1-6.

Binninger, D. M. and Vichate Ungvichian. (1997) Effects of 60 Hz AC magnetic fields on gene expression following exposure over multiple cell generations using *Saccharomyces cerevisiae*. Bioelectrochemistry and Bioenergetics **43(1):** 83-89.

Binninger, D. M. and V. Ungvichian. (1992) Effects of power-frequency electromagnetic fields on gene expression in the yeast *Saccharomyces cerevisiae*. Proceedings of the SouthCon 92 Electronics Conference Pages 124-128.

Around the time that I realized that funding for the project involving the ELF magnetic fields from power lines was going to be increasingly remote, Herbert Weissbach joined the faculty of the biology department. He shared his interest in methionine sulfoxide reductase (MSR) and we started a collaboration to use *Drosophila* as a model since he had recently shown that over-expression of a bovine *MSRA* within the central nervous system of *Drosophila* significantly extended the lifespan. There were no faculty in the department working with *Drosophila* at the time, so it was a boot-strap effort to get the project underway.

My lab has continued to explore the function of the two known MSR genes, designated MSRA and MSRB. Null (loss of function) deletion mutations were created for each gene by imprecise P-element transposon excision. Since both genes are located on the third chromosome, we obtained genetic lines that are completely deficient for any MSR activity by using traditional genetic recombination. We recently reported that *Drosophila* lacking any MSR activity have a markedly shortened lifespan. Additionally, the third larval instar development is delayed by nearly 20 hr because the larvae grow more slowly due to a reduced rate of feeding. We have also found that a subset of serotonergic neurons are truncated and do not properly innervate the prothoracic gland. Furthermore, increasing the level of serotonin by raising larvae in the presence of fluoxetine HCl (Prozac) or 5-hydroxytryptophan (5HTP) extends the time from egg-laying to eclosion by nearly 60 hr. (unpublished data). Interestingly, we have also observed that elevated levels of c-GMP Dependent Protein Kinase G (PKG) in the absence of MSR is lethal prior to the third larval instar (unpublished data). How serotonin and PKG contribute to the disparate phenotypes we have observed in the absence of MSR is actively under investigation at this time.

Bruce, L., D. Singkornrat, K. Wilson, W. Hausman, K. Robbins, L. Huang, K. Foss and **D. Binninger** (2018) In Vivo Effects of Methionine Sulfoxide Reductase Deficiency in Drosophila melanogaster. Antioxidant 7, 155; doi:10.3390/antiox7110155

Roesijadi, G., S. Rezvankhah, **D.M. Binninger**, and H. Weissbach (2007) Ecdysone induction of MsrA protects against oxidative stress in Drosophila. Biochem. Biophys. Res. Comm. **354:** 511-516.

Herbert Weissbach and I also collaborated on a project involving the NSAID sulindac as a potential anticancer treatment. This work resulted in three patent awards.

M. Marchetti, L. Resnick, E. Gamliel, S. Kesaraju, H. Weissbach, and **D. Binninger** (2009) Sulindac Enhances the Killing of Cancer Cells Exposed to Oxidative Stress. PLoS One. 4(6): e5804. doi:10.1371/journal.pone.0005804

D. Brunell, M. Marchetti, E. Gamliel, D. Sagher, N. Brot, H. Weissbach, and **D. Binninger** (2009) Metabolism and Biological Activity of Sulindac and its Epimers FASEB J. **23:** 527.2 (abstract)

L. Resnick, H. Rabinovitz, **D. M. Binninger**, M. Marchetti, H. Weissbach (2009) Topical Sulindac Combined with Hydrogen Peroxide in the Treatment of Actinic Keratoses: Rationale and Clinical Trial. J. Drugs Dermatol. **8:** 29-32

PATENTS

Weissbach, H., Resnick, L., Binninger, D. Treatment or prevention of cancer and precancerous disorders. Florida Atlantic University September 2012: US Patent: 8,258,181.

Weissbach, H., Resnick, L., Binninger, D. Treatment or prevention of cancer and precancerous disorders. Florida Atlantic University January 2013: US Patent: 8,357,720.

Weissbach, H., Resnick, L., Binninger, D. Treatment or prevention of cancer and precancerous

disorders. CHS Pharma, Inc. December 2013: US Patent: 8,603,985.

D. Additional Information: Research Support and/or Scholastic Performance

Active Research Support

Binninger, D. Role of oxidative stress on aging and age-related neurodegenerative diseases Faculty Research SEED Grant Program. Charles E Schmidt College of Science, Florida Atlantic University. $5,000. April 1, 2019 – March 31, 2020

Completed Research Support

Binninger, D. Role of oxidative stress on aging and age-related neurodegenerative diseases Faculty Research seed Grant Program. Division of Research, Florida Atlantic University. $5,000. January 1, 2012 – December 31, 2013

Binninger, D. Role of oxidative damage to protein in aging, Institute on Aging, National Institutes of Health (2R15AG022556-02A1) $175,275, August 1, 2008 – December 31, 2011.

Binninger, D. – Curriculum Director – partnership with the Workforce Alliance of Palm Beach. A grant for training in biotechnology. Funded by the Department of Labor under the President's High Growth Job Training Initiative. Total award was $2.3 million with $1.5 million for FAU. July 1, 2004 – June 30, 2007.

Binninger, D. Role of oxidative damage to protein in aging, Institute on Aging, National Institutes of Health (R15-AG22556-01) $210,750, Sept. 1, 2003 – Aug. 31, 2007.

Binninger, D. Oxidative stress, neurodegenerative diseases and aging, Center of Excellence in Biomedical and Marine Biotechnology, State of Florida, $35,000, Sept. 1 2003 – August 31. 2006

Binninger, D. Effects of 60 Hz EMF on transcription in yeast. National Institute of Environmental Health Sciences, National Institutes of Health (R01-ES07181A-01) $380,000. Sept. 1994—Sept. 1998

Binninger, D. Electromagnetic effects on gene expression in yeast. National Institute of Environmental Health Sciences, National Institutes of Health (R55-ES06130A-01). $100,000. Sept. 1992—Sept. 1994.

OMB No. 0925-0001 and 0925-0002 (Rev. 09/17 Approved Through 03/31/2020)

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: W. Randy Brooks

eRA COMMONS USER NAME (credential, e.g., agency login):

POSITION TITLE: Professor of Biology

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Start Date MM/YYYY	Completion Date MM/YYYY	FIELD OF STUDY
Southwestern College, Winfield, Kansas	BS	08/1975	05/1979	Biology
Florida State University, Tallahassee, Florida	MS	08/1979	05/1981	Marine Biology
Florida State University, Tallahassee, Florida	PhD	08/1981	08/1984	Marine Biology

A. Personal Statement

My research emphasis has been in the area of behavioral/physiological ecology of marine organisms, with a particular interest in symbiotic associations. These associations represent tremendous potential in demonstrating alternatives to competition as major selective agents. The significance of coevolutionary adaptations by associated organisms is just recently being acknowledged as a major evolutionary force (e.g., endosymbiotic hypothesis for development of eukaryotes). Specifically, I have usually studied associations involving organisms that live with cnidarians, including dinoflagellates, fishes, hermit crabs, and shrimp. I have also been involved in the long-term monitoring of coral reef conditions using video transects. Some recent projects involving graduate students involve: 1) temperature-induced bleaching response of zooxanthellae living in cnidarians; 2) behavioral interactions among echinoderms and symbiotic crabs; 3) predator/prey interactions within the sargassum community. My research has been extramurally funded.

B. Positions and Honors

1984-1987 Assistant Professor Biology, Auburn University at Montomgery, Alabama
1987-1991 Assistant Professor of Biology, Florida Atlantic University
1991-1996 Associate Professor of Biology, Florida Atlantic University
1992-2000 Adjunct Professor Biology, Broward County Community College
1993-1995 Visiting Researcher, Duke University Marine Laboratory, NC
1996-present Professor of Biology, Florida Atlantic University

C. Contributions to Science

Following are some projects demonstrating some of my contributions to science: 1) temperature-induced bleaching response of zooxanthellae living in cnidarians; 2) behavioral interactions among echinoderms and symbiotic crabs; 3) predator/prey interactions within the sargassum community.

D. Additional Information: Research Support and/or Scholastic Performance

2002-03 National Science Foundation, $74,999 project entitled, " Success by Design: Building Faculty Capacity to Improve Curriculum and Instruction" (with D. Lowell, J. Haky, and R. Jordan)

2001-02 National Science Foundation, $130,000 project entitled, "Exploring IDEAS: An Integrated Design Enhancing Academic Success in Science, Reading and Mathematics"(with N. Romance, D. Lowell, J. Haky and D. Ploger).

2001-02 National Science Foundation, $10,000 project entitled, "Peer-led Lifeline Workshops to Improve Student's Conceptual Understanding of Biology" (with D. Lowell, G. Mayer, K. Van Vliet and N. Romance).

1997-04 National Oceanic & Atmospheric Administration, $26,000 per year project entitled, "Coral Reef Monitoring off the Southeastern Florida Coast: Establishing Techniques and Baseline Data for Both Video and Fixed-Transect Monitoring"

1998-97 World Life Research Institute, $ 1000, one year project entitled, "Experimental Tests of the Efficacy of Topically Administered Treatment for Marine and Land-based Envenomation" (with M. Russell).

1994-97 National Science Foundation, $46,047 three year project entitled, "Chemical Mediation of Shell-Related Behaviors in Hermit Crabs"

1994-96 South Florida Water Management District, $50,000 two year project entitled, "Restoration of the Kissimmee River: Interactions between Non-indigenous and Native Fishes (with W. Courtenay and M. Salmon)

1993-94 National Science Foundation, $12,500 one year project entitled, "Shells, Symbionts and Predators of Hermit Crabs: Behavioral and Chemical Characterization of Odorants" (with D. Rittschof)

1990-91 Florida Atlantic University, Division of Sponsored Research, $3,700 one year project entitled, "Sexual Reproduction in the Symbiotic Sea Anemone *Calliactis tricolor*"

1989-90 Florida Endowment Fund for Higher Education, McKnight Award, $15,000 one year project entitled, "Behavioral Ecology of Marine Animals"

1989-90 National Science Foundation, $3,438 one year project, Research Experiences for Undergraduates Supplement for 1988-90 NSF Project, (with D. Rittschof)

1988-90 National Science Foundation, $22,953 two year project entitled, "Investigations on the Symbiosis Between Hermit Crabs and Sea Anemones"

1984 Auburn University at Montgomery Grants-in-Aid Program. $500 project entitled, "Protection of the Sea Anemone *Calliactis tricolor* (Lesueur) from Predatory Starfish by Being Transported on Hermit Crab Shells"

Curriculum Vitae

August 2019

Brenda J. Claiborne, Ph.D.
700 Ocean Royale Way, #202
Juno Beach, FL 33408

Current Position

Professor
Florida Atlantic University
5353 Parkside Drive, Building 19, #108
Jupiter, FL 33458
Phone: 561-400-3184; Email: brenda.claiborne@fau.edu

Education

1966 - 1968	Undergraduate, University of California, Davis
1970	Bachelor of Arts, Zoology, University of California, Berkeley
1975	Master of Science, Biology, University of Oregon
1981	Doctor of Philosophy, Biology, University of California, San Diego

Academic Appointments

1981 - 1985	Post-doctoral Fellow and Research Associate Mentor: Dr. W. Maxwell Cowan (deceased); Developmental Neurobiology The Salk Institute for Biological Studies, La Jolla, California
1986 - 1990	Assistant Professor, Division of Life Sciences, University of Texas at San Antonio
1990 - 1997	Associate Professor, Division of Life Sciences, University of Texas at San Antonio
1997 - 2007	Professor, Department of Biology, University of Texas at San Antonio
2007 - 2011	Professor, Department of Biology, University of New Mexico
2007 - 2011	Professor, Secondary Appointment, Department of Neurosciences School of Medicine, University of New Mexico
2011 - date	Professor, Department of Biology, Florida Atlantic University Professor, Secondary Appointment, Department of Biomedical Sciences, School of Medicine, Florida Atlantic University

Administrative Appointments (see attached Addendum with administrative accomplishments)

1992 - 1993	Interim Associate Vice President for Graduate Studies and Research University of Texas at San Antonio
1993 - 1996	Associate Vice President for Graduate Studies and Research University of Texas at San Antonio
1996 – 1997	Dean of Graduate Studies and Associate Vice President for Research (title change) University of Texas at San Antonio
2004 - 2007	Founding Director, UTSA Institute for Aging Research University of Texas at San Antonio
2007 - 2011	Dean, College of Arts and Sciences University of New Mexico
2011 - 2013	Provost and Chief Academic Officer Florida Atlantic University
2013 – 2015	Program Director, Jupiter Neuroscience Florida Atlantic University

Honors, Advisory Boards, and National Committees

1966 - 1968	Academic Scholarships, University of California, Davis
1968 - 1970	Academic Scholarships, University of California, Berkeley
1975	Master's Degree with Honors, University of Oregon
1981 - 1983	Fellow, The Salk Institute for Biological Studies
1986	Summer Faculty Research Fellow, USAFSOR
1990	Honorary Member, UTSA Pre-Med Society
1991	Division Nominee for Chancellor's Teaching Award
1991 - 1993	President, Alamo Chapter of the Society for Neuroscience
1992	Faculty of the Year, Minority Biomedical Research Program
1992	Honorary Faculty Member, Alpha Epsilon Delta
1994	Honorary Member of Golden Key National Honour Society
1993 - 1996	National Science Foundation Metacenter Advisory Board in Computational Neuroscience
1995 - 1998	Minority Education, Training and Professional Advancement Committee, Society for Neuroscience
1999 - 2002	Education Committee, Society for Neuroscience
2002	Chair, Women in Neurosciences (WIN) Award Committee (national)
2003	National Science Foundation Planning Group, "Building a Cyber-infrastructure for the Biological Sciences"
2004	Excellence in Teaching Award, Disabilities Services, UTSA
2004 - 2009	Finance Committee, Society for Neuroscience
2005 - 2007	Board of Directors, Biomedical Research Foundation of South Texas, Incorporated
2010 – 2011	Board of Regents Academic/Student Affairs & Research Committee, Univ. New Mexico
2011 – 2014	Treasurer-elect, Treasurer and Past Treasurer (elected), Society for Neuroscience
2011 – 2014	Council, Society for Neuroscience
2012 – 2013	Chair, Finance Committee, Society for Neuroscience
2011 – 2014	Investment Committee, Society for Neuroscience
2012 – 2013	Publications Committee, Society for Neuroscience
2013 – 2014	Audit Committee, Society for Neuroscience
2013 – 2018	Vice President, Palm Beach County Chapter, Society for Neuroscience
2014 – 2018	Board of Directors, Angel Forum of South Florida
2015	“Exceptional Faculty Award”; Northern Campus Achievement Award for 2014-2015, Florida Atlantic University
2015 – 2018	Audit Committee, Society for Neuroscience
2017 and 2019	“Exceptional Faculty Awards”; Northern Campus Achievement Award for 2016-2017, And for 2018 – 2019; Florida Atlantic University

Scientific Review Activities

1981 - date	Reviewer for numerous journals, including *Journal of Neuroscience, Journal of Neurophysiology, Hippocampus, Journal of Comparative Neurology, Brain Research Bulletin, Journal of Computational Neuroscience, Neuroscience, Brain Research, Behavioral Neuroscience, Nature*
1986 - 1996	Ad Hoc Reviewer, National Science Foundation
1988	Reviewer, Air Force Office of Scientific Research
1990	Reviewer, Neural Information Processing Conference Submissions
1991	Member, 2 Site Review Teams, National Institute of General Medicine Sciences
1991	Ad Hoc Reviewer, Behavioral Neurobiology Review Committee, National Institute of Mental Health
1992 - 1996	Member, Cognitive Functional Neuroscience Review Committee, National Institute of Mental Health
1993	Member, Site Review Team, National Institute of General Medical Sciences
1993	Member, Special Review Committee, National Institutes of Health
1993	Reviewer, *CNS*93* Conference Submissions

1994	Chairperson, Special Review Committee, National Institutes of Health
1994	Reviewer, *CNS*94* Conference Submissions
1995	Member, Special Review Committee, National Institutes of Health
1996	Member, Special Review Committee, National Institutes of Health
1999	Reviewer, Alzheimer's Association 1999 Grants Program
2000 - 2003	Ad Hoc Reviewer for National Science Foundation
2002 - 2006	Reviewer, Alzheimer's Association Grants Program
2003	Member, Special Emphasis Panel Study Section, National Institutes of Health
2004	Ad Hoc Reviewer, Neurodifferentiation, Plasticity, and Regeneration Review Committee, National Institutes of Health
2006	Panel Member, Computational Neuroscience, National Science Foundation
2008	Member, Special Review Committee, National Institutes of Health

Research

Research Interests

My research interests are focused on understanding the relationship between neuronal structure and function in the brain, and elucidating the factors that affect this relationship over the lifespan of the mammal. My most recent projects include 1) the effects of synaptic activity on neuronal development; 2) the effects of aging on neuronal structure and function; and, 3) the development of cortical lateralization. I use electrophysiological, computational, anatomical, and molecular methodologies to understand structure/function relationships in the hippocampal formation, a brain region that is necessary for certain forms of learning and memory in rodents and humans.

Funded Research Awards

National Institutes of Health (AG 07141-02)
Principal Investigator
Age-related structural changes in mammalian neurons
$322,505 total direct costs (8/1/87 - 7/31/92; Unfunded extension to 7/31/93)

National Science Foundation (BNS-8709366)
Principal Investigator
Axonal outgrowth and dendritic development of cortical neurons
$171,527 total costs (9/1/87 - 2/29/91; Unfunded extension to 7/31/91)

Air Force Office of Scientific Research
Principal Investigator
Long-term potentiation in interneurons in the mammalian brain
$19,918 total direct costs (1/2/87 - 12/31/87)

National Institutes of Health (RR08194-08)
Principal Investigator on sub-project
Structural changes in adult mammalian neurons
$138,550 total direct costs for sub-project (9/1/87 - 7/31/91)

Texas Higher Education Coordinating Board
Co-P.I. with Drs. David Senseman and Patrick Nash
High-speed optical imaging of information flow in single neurons
$147,780 total direct costs (7/1/88 - 6/30/90)
Office of Naval Research
Co-P.I. with J.P. Miller, U.C. Berkeley
Computational capabilities of hippocampal neurons
$280,335 total direct costs (4/15/90 - 9/30/92)

National Institutes of Health (GM 07717-17)
Principal Investigator on sub-project
Changes in neuronal structure during aging
$74,469 total direct costs for sub-project (6/1/90 to 5/31/91)

National Institutes of Health (GM 08194-12)
Principal Investigator on sub-project
Development of neuronal structure in the mammalian brain
$201,194 total direct costs for sub-project (8/1/91 - 7/31/95)

Texas Higher Education Coordinating Board (010115006)
Principal Investigator
Development of the computational capabilities of cortical neurons
$184,376 total direct costs (1/1/92 - 8/31/94)

National Institutes of Health (GM 08194-16)
Principal Investigator on sub-project; Andrew Tsin, PI on program project
Effects of neuronal activity on maturation of hippocampal neurons
$360,467 total direct costs for sub-project (8/1/95 - 7/31/99)

National Institutes of Health; RCMI (RR13646)
Principal Investigator on sub-project, 1998 to 2001; Ricardo Romo, PI on program project
Enhancement of UTSA Transmission Electron Microscope Facility
$68,883 direct costs for year 4 for sub-project (10/1/98 - 9/30/03)

National Institutes of Health (RR13646)
Principal Investigator on sub-project; Ricardo Romo, PI on program project
Estrogen replacement therapy and neuron structure
$506,499 direct costs for sub-project (10/1/98 - 9/30/03)

National Institutes of Health (GM 08194-20)
Principal Investigator on sub-project; Andrew Tsin, PI on program project
Synaptic activity and neuron development
$617,409 direct costs for sub-project (8/1/99 - 7/31/03)

San Antonio Area Foundation
Principle Investigator
Estrogen replacement therapy and neuroprotection
$18,733 direct costs (6/1/01 - 5/31/02)

National Institutes of Health (GM 08194-24)
Principal Investigator on sub-project; Andrew Tsin, PI on program project
Structure and function of single neurons in aged mice
$783,792 projected total direct costs for sub-project (8/1/03 – 7/31/07)

San Antonio Life Sciences Institute
Co-Principal Investigator with Dr. James Smith
San Antonio Center for the Advanced Studies of Comparative Longevity
$108,708 total direct costs for the project (10/1/04 to 3/31/07)

National Science Foundation
Principal Investigator
Development of lateralized gene expression patterns in the rodent brain
$173,387 total costs (5/1/07 to 4/30/09; Unfunded extension to 3/31/10)
Goals: To test the hypotheses that lateralized gene expression occurs in the embryonic hippocampus and that environmental stimuli affect lateralization of gene expression in the hippocampal formation after birth in the rodent.

Funded Equipment Awards
U.S. Department of Education
Role: Assisted in development and writing of proposal as part of college-wide effort
Development of an electron beam imaging laboratory
$249,883 (1986); Purchased equipment to set-up electron microscope facility

National Institutes of Health
Role: Led development of proposal and wrote substantial portions along with Dr. David Senseman as part of college-wide program.
Minorities in research and science achievement program: supplemental instrumentation grant
$116,750 (1986); Purchased computer-microscope reconstruction system

National Institutes of Health
Role: Led development of proposal and wrote proposal as part of college-wide program.
Minorities in research and science achievement program: supplemental instrumentation grant
$150,000 (1994); Purchased laser scanning confocal microscope

Publications (Publications prior to 1980 authored under Brenda J. Friend)

Friend, B.J. (1975) An electron microscopic study of dense core vesicles in the stomatogastric ganglion of the spiny lobster, Panulirus interruptus. Master's Thesis, University of Oregon, Eugene, OR.

Friend, B.J. (1976) Morphology and location of dense-core vesicles in the stomatogastric ganglion of the lobster, Panulirus interruptus. *Cell and Tissue Research*, 175: 369-390.

Sullivan, R.E., B.J. Friend, and D.L. Barker (1977) Structure and function of spiny lobster ligamental nerve plexuses: Evidence for synthesis, storage, and secretion of biogenic amines. *Journal of Neurobiology*, 8: 581-605.

Claiborne, B.J. (1981) Histamine as a putative neurotransmitter in the lobster stomatogastric nervous system. Doctoral Dissertation, University of California, San Diego, La Jolla, CA.

Claiborne, B.J. and A. Selverston (1984a) Histamine as a neurotransmitter in the stomatogastric nervous system of the spiny lobster. *Journal of Neuroscience*, 4: 708-721.

Claiborne, B.J. and A. Selverston (1984b) Localization of stomatogastric IV neuron cell bodies in lobster brain *Journal of Comparative Physiology, A.*, 154: 27-32.

Claiborne, B.J., D.G. Amaral, and W.M. Cowan (1986) A light and electron microscopic analysis of the mossy fibers of the dentate gyrus. *Journal of Comparative Neurology*, 246: 435-458.

Claiborne, B.J. and J. Ayers (1987) Functional anatomy and behavior. In *The Crustacean Stomatogastric Nervous System: A Model for the Study of Central Nervous Systems* (A. Selverston and M. Moulins, eds.), Springer-Verlag, New York. pp. 9-29.

Terrian, D.M., D. Johnston, B.J. Claiborne, R. Ansah-Yiadom, W.J. Strittmatter, and M.A. Rea (1988) Glutamate and dynorphin release from a subcellular fraction enriched in hippocampal mossy fiber synaptosomes. *Brain Research Bulletin*, 21: 343-351.

Claiborne, B.J., M.A. Rea, and D.M. Terrian (1989) Detection of zinc in isolated nerve terminals using a modified Timm's sulfide-silver method. *Journal of Neuroscience Methods*, 30: 17-22.

Amaral, D.G., N. Ishizuka, and B. Claiborne (1990) Neurons, numbers and the hippocampal network. *Progress in Brain Research*, 83: 1-11.

Claiborne, B.J., D.G. Amaral, and W.M. Cowan (1990) Quantitative three-dimensional analysis of granule cell dendrites in the rat dentate gyrus. *Journal of Comparative Neurology*, 302: 206-219.

Felthauser, A.M. and B.J. Claiborne (1990) Intracellular labeling of dentate granule cells in fixed tissue permits quantitative analysis of dendritic morphology. *Neuroscience Letters*, 118: 249-251.

Rihn, L.L. and B.J. Claiborne (1990) Dendritic growth and regression in rat dentate granule cells during late postnatal development. *Developmental Brain Research*, 54: 115-124.

Brown, T.H., A.M. Zador, Z.F. Mainen, and B.J. Claiborne (1991a) Hebbian modifications in hippocampal neurons. In *Long-term Potentiation: A Debate of Current Issues* (J. Davis and M. Baudry, eds.), MIT Press, Cambridge, MA. pp. 357-389.

Brown, T.H., A.M. Zador, Z.F. Mainen, and B.J. Claiborne (1991b) Self-organization of Hebbian synapses in hippocampal neurons. In *Advances in Neural Information Processing Systems 3* (R. Lippmann, J. Moody, and D. Touretzky, eds.), Morgan Kaufman Publishers, Inc. pp. 39-45.

Kairiss, E.W., Z.F. Mainen, B.J. Claiborne, and T.H. Brown (1991) Dendritic control of Hebbian computations. In *Analysis and Modeling of Neural Systems* (J.P. Miller, ed.), Kluwer Academic Publishers. pp. 69-83.

Brown, T.H., A.M. Zador, Z.F. Mainen, and B.J. Claiborne (1992) Hebbian computations in hippocampal dendrites and spines. In *Single Neuron Computation* (T. McKenna, J. Davis, and S.F. Zornetzer, eds.), Academic Press. pp. 81-116.

Claiborne, B.J. (1992) Use of computers for quantitative, three-dimensional analysis of dendritic trees. In *Methods in Neurosciences, Vol. 10: Computers and Computations in the Neurosciences* (P.M. Conn, ed.), Academic Press. pp. 315-330.

Claiborne, B.J., A.M. Zador, Z.F. Mainen, and T.H. Brown (1992) Computational models of the principal classes of hippocampal neurons. In *Single Neuron Computation* (T. McKenna, J. David, and S.F. Zornetzer, eds.), Academic Press. pp. 61-80.

Coleman, M.J., M.P. Nusbaum, I. Cournil, and B.J. Claiborne (1992) Distribution of modulatory inputs to the stomatogastric ganglion of the crab, Cancer borealis. *Journal of Comparative Neurology*, 325: 581-594.

Seay-Lowe, S., and B.J. Claiborne (1992) Morphology of intracellularly labeled interneurons in the dentate gyrus of the immature rat. *Journal of Comparative Neurology*, 324: 23-36.

Claiborne, B.J., Z. Xiang, and T.H. Brown (1993) Hippocampal circuitry complicates analysis of long-term potentiation in mossy fiber synapses. *Hippocampus,* 3: 115-121.

Tsai, K.Y., N.T. Carnevale, B.J. Claiborne, and T.H. Brown. (1994) Efficient mapping from neuroanatomical to electrotonic space. *Network,* 5: 21-46.

Carnevale, N.T., and B.J. Claiborne (1995) Machines that remember. *Contemporary Psychology,* 40: 267.

Carnevale, N.T., K.Y. Tsai, B.J. Claiborne, and T.H. Brown (1995a) Qualitative electrotonic comparison of three classes of hippocampal neurons in the rat. In *The Neurobiology of Computation* (J.M. Bower, ed.), Kluwer Academic Publishers, Boston, MA. pp. 67-72.

Carnevale, N.T., K.Y. Tsai, B.J. Claiborne, and T.H. Brown (1995b) The electrotonic transformation: a tool for relating neuronal form to function. In *Advances in Neural Information Processing Systems 7* (G. Tesauro, D.S. Touretzky, and T.K. Leen, eds.), MIT Press, Cambridge, MA. pp. 69-76.

Mainen, Z.F., N.T. Carnevale, A.M. Zador, B.J. Claiborne, and T.H. Brown (1996) Electrotonic architecture of hippocampal CA1 pyramidal neurons based on three-dimensional reconstructions. *Journal of Neurophysiology*, 76: 1904-1923.

O'Boyle, M.P., N.T. Carnevale, B.J. Claiborne, and T.H. Brown (1996) A new graphical approach for visualizing the relationship between anatomical and electrotonic structure. In *Computational Neuroscience: Trends in Research* (J.M. Bower, ed.), Academic Press, San Diego, CA. pp. 423-428.

Carnevale, N.T., K.Y. Tsai, B.J. Claiborne, and T.H. Brown (1997) Comparative electrotonic analysis of three classes of rat hippocampal neurons. *Journal of Neurophysiology*, 78: 703-720.

Chitwood, R.A., B.J. Claiborne, and D. Jaffe (1997) Modeling the passive properties of nonpyramidal neurons in hippocampal area CA3. In *Computational Neuroscience: Trends in Research* (J.M. Bower, ed.), Plenum, New York, N.Y. pp. 59-64.

Gonzales, R.B., C.J. De Leon Galvan, Y.M. Rangel, and B.J. Claiborne (2001) Distribution of thorny excrescences on CA3 pyramidal neurons in the rat hippocampus. *Journal of Comparative Neurol*ogy, 430: 357-386.

Jones, S. P., O. Rahimi, M.P. O'Boyle, D.L. Diaz, and B.J. Claiborne (2003) Maturation of granule cell dendrites after mossy fiber arrival in hippocampal field CA3. *Hippocampus*, 13: 413-437.

O'Boyle, M.P., V. Do, B.E. Derrick, and B.J. Claiborne (2004) *In vivo* recordings of long-term potentiation and long-term depression in the dentate gyrus of the neonatal rat. *Journal of Neurophysiology*, 91: 613-622.

Garza-Meilandt, A., R.E. Cantu, and B.J. Claiborne (2006) Estradiol's effects on learning and neuronal morphology vary with route of administration. *Behavioral Neuroscience*, 120: 905-916.

Moskal, J.R., R.A. Kroes, N.J. Otto, O. Rahimi, and B.J. Claiborne (2006) Distinct patterns of gene expression in the left and right hippocampal formation of developing rats. *Hippocampus*, 16: 629-634.

Cunningham, R.L., B.J. Claiborne, and M.Y. McGinnis (2007) Pubertal exposure to anabolic androgenic steroids increases spine densities on neurons in the limbic system of male rats. *Neuroscience*, 150: 609-615.

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O'Boyle, M.P., N.T. Carnevale, and B.J. Claiborne (1996) Changes in the electrotonic architecture of granule cells of the rat dentate gyrus with maturation. *Society for Neuroscience Abstracts*, 22: 913.

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Cantu, R.E., A. Garza-Meilandt, D. Zamora, E.J. Barea-Rodriguez, and B.J. Claiborne (2002) Effects of estrogen on performance in the radial arm water maze depend on dose and route of administration. *Society for Neuroscience Abstracts,* #574.13.

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Moskal, J.R., R.A. Kroes, N.J. Otto, O.Rahimi, R.E. Cantu, and B.J. Claiborne (2004) Distinct patterns of gene expression between right and left hippocampi in neonatal rats. *Society for Neuroscience Abstracts,* #616.9.

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Rahimi, O., R.A. Froes, R.B. Goertz, R.E. Cantu, J.R. Moskal, and B.J. Claiborne (2006) Reduction of synaptic activity differentially affects gene expression patterns in right and left hippocampi of developing rats. *Society for Neuroscience Abstracts,* #216.7.

Cantu, R.E., N. Ybarra, M.P. O'Boyle, and B.J. Claiborne (2007) Temporal pattern of spine density changes on hippocampal CA1 pyramidal neurons with increasing age in male mice. *Society for Neuroscience Abstracts*, #53.8.

Gross, A., O. Rahimi, R. Kroes, J. Moskal, and B.J. Claiborne (2007) Experimental manipulation affects lateralized gene expression patterns in the hippocampal formation of developing rats. *Society for Neuroscience Abstracts*, #37.2.

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Claiborne, B.J., N. Ybarra, and E.J. Barea-Rodriguez (2008) Behavioral and morphological correlates of learning and memory in GFP-expressing male mice trained in the Morris water maze. *Society for Neuroscience Abstracts*, #389.24

Gross, A., M. Schmidt, J. Bergdorf, R. Kroes, J. Moskal, and B.J. Claiborne, B. (2008) Lateralized gene expression patterns in the hippocampal formation of embryonic rats. *Society for Neuroscience Abstracts*, #820.16

Ybarra, N., E.J. Barea-Rodriguez, and B.J. Claiborne (2008) Effects of water maze training and testing on neuronal morphology in the hippocampus of GFP-expressing transgenic male mice. *Society for Neuroscience Abstracts*, #389.23

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Barea-Rodriguez, E.J., N. Ybarra, and B.J. Claiborne (2009) Age-related cognitive impairments and morphological correlates in CA1 pyramidal neurons in GFP-expressing mice. *Society for Neuroscience Abstracts*, #783.11.

Gross, A.L., M. Schmidt, J.S. Burgdorf, R.A. Kroes, J.R. Moskal, and B.J. Claiborne (2010) Genes related to gap junction signaling are differentially expressed at embryonic day 18 in the rat hippocampal formation. *Society for Neuroscience Abstracts*, #336.1.

Claiborne, B.J., A.L. Gross, M. Schmidt, J.S. Burgdorf, R.A. Kroes, and J.R. Moskal (2010) N-methyl-D-aspartate receptor-mediated synaptic activity affects hippocampal formation gene expression patterns during early postnatal development. *Society for Neuroscience Abstracts*, #336.2

Recent Research Presentations

Session Organizer: “Novelty and hippocampal circuitry: role of the temporo-ammonic pathway”; Spring Hippocampal Research Conference, Taormina, Sicily, June 7 to June 11, 2015. International Conference.

Research Presentation: “Temporo-ammonic pathway: dendritic changes in stratum lacunosum-moleculare in aged mice” Spring Hippocampal Research Conference, Taormina, Sicily, June 7 to June 11, 2015.

Previous Mentoring Activities

One of my personal priorities has been to mentor both undergraduate and graduate students, particularly in research. Over the course of my career, I have formally and informally mentored hundreds of students with a focus on mentoring female and minority students. More specifically, I mentored over 60 undergraduate and graduate students in my research lab, including 26 minority students: 13 Hispanic females, 8 Hispanic males, 3 African-American females, and 2 African-American males. I also mentored at least 23 female and 11 male students who were not classified as under-represented minorities. All of these students participated in research in my lab for at least 2 semesters and most participated for at least 2 years. (I also mentored many other minority and female students who were part of the lab for only 1 or 2 semesters.) Six minority students were first author or co-author on published papers, and 34 of my published abstracts have included one or

more minority students as co-author(s) or first author. The majority of the minority students who were in my lab completed postgraduate degree programs: at least 10 obtained doctoral degrees, 5 obtained master's degrees, and 5 are physicians.

Students in My Research Lab, 2005 – 2011 (list of previous students available upon request)

Brian Bauresis	Doctoral degree student, Laboratory Rotation, UTSA
Rebecca Cunningham	Doctoral degree student, Laboratory Rotation, UTSA
Julie Everett	Undergraduate student, UNM
Annette Garza-Meilandt	Doctoral degree student, supported - Minority Biomedical Research Support – Research Initiative for Scientific Enhancement (MBRS-RISE), UTSA
Richard Goertz	Doctoral degree student, Laboratory Rotation, UTSA
Amanda Gross	Doctoral degree student, UTSA and UNM
Stacie Harris	Doctoral degree student, MBRS-RISE program, Laboratory Rotation, UTSA
Natividad Ybarra	Doctoral degree student, MBRS-RISE program, UTSA
Rachel Norberg	Master's degree student, UTSA
Chris Pena	Undergraduate student, UTSA
Jessica Perez	Undergraduate student, Honor's degree program, supported by the Minority Access to Research Careers (MARC) program, UTSA
Kimberly Walsh	Master's degree student, UTSA
Pat Wongsuwan	Master's degree student, UTSA

Supervisor: Postdoctoral Fellows
Lutz Slomianka, 1992
Patricia Brewer, 1992 – 1993
Omid Rahimi, 2000 – 2004

Supervisor: Doctoral Dissertations and Master's Theses at Previous Institutions
Blake, N. (1994) Possible role of the NMDA receptor in dendritic development of dentate granule cells. Master's Thesis, The University of Texas at San Antonio, San Antonio, TX.
Gomez, G. (2000) A morphometric analysis of granule cells in the developing rat dentate gyrus. Master's Thesis, The University of Texas at San Antonio, San Antonio, TX.
Garza-Meilandt, A. (2005) The effects of estrogen on spatial learning and neuronal morphology in the rat hippocampus. Doctoral Dissertation, The University of Texas at San Antonio, San Antonio, TX.
Ybarra, N. (2009) The effects of aging on neuronal morphology and on learning and memory in male mice. Doctoral Dissertation, The University of Texas at San Antonio, San Antonio, TX.
Gross, A. (2011) Development of lateralization in the rat hippocampal formation. Doctoral Dissertation, The University of New Mexico, Albuquerque, NM.

Member: Doctoral Dissertation Committees at the University of Texas at San Antonio: Randy Chitwood, Allen Gulledge, Cindy Davis-Hart, Julissa Villarreal, Dario Dieguez, Floretta Jones, Rebecca Cunningham, Debora Zamora, Alberto Muniz.

Supervisor: Senior Honors Theses at University of Texas at San Antonio
Truett, K.A. (1992) The effects of early environmental enrichment on the morphology of dentate granule cells. Honors Thesis, The University of Texas at San Antonio, San Antonio, TX.
De Leon, C. (1994) Locations of excrescence clusters on pyramidal neurons in the CA3a/b subregion of the rat hippocampus. Honors Thesis, The University of Texas at San Antonio, San Antonio, TX.
Bauleth, D. (1995) Quantitative morphological analysis of granule neurons in the dentate gyrus of the developing rat. Honors Thesis, The University of Texas at San Antonio, San Antonio, TX.

Boyer, K. (1997) Effects of NMDA on early postnatal development. Honors Thesis, The University of Texas at San Antonio, San Antonio, TX.

Prock, T. (1999) Electrotonic architecture of developing granule cells in the rat dentate gyrus. Honors Thesis, The University of Texas at San Antonio, San Antonio, TX.

Boyer, M. (2000) An investigation of a critical period for dendritic maturation in the rat dentate gyrus. Honors Thesis, The University of Texas at San Antonio, San Antonio, TX.

Farino, J. (2002) Does fixation methodology affect the density of dendritic spines in the mammalian cortex? Honors Thesis, The University of Texas at San Antonio, San Antonio, TX.

Perez, J. (2005) Morphological analysis of spine densities on hippocampal CA1 neurons in young and older adult mice. Honors Thesis, The University of Texas at San Antonio, San Antonio, TX.

Current Mentoring Activities at Florida Atlantic University

Since arriving at Florida Atlantic University, I have mentored numerous students in the College of Science and the Honors College. For example, I am currently the FAU Co-chair for doctoral dissertation committees in the Integrative Biology – Neuroscience (IBN) program, and a member of thesis and dissertation committees for master's and doctoral students in the same program, as well as in Psychology. I have also served as a reader for Honors Theses and as a mentor/advisor for Honors College students who are participating in research labs at Scripps Research Institute Florida, and mentored Honors College students as Student Assistants in my courses. In addition, I developed a post-doc mentoring program for post-doctoral fellows at Max Planck Florida Institute for Neuroscience and Scripps Research Institute Florida. I should also note that over the past several years, I have held workshops for students on writing an effective academic cv, and I have written approximately 100 recommendation letters for students applying to medical school or graduate school and for students applying for scholarships or awards.

FAU Co-chair: Doctoral Dissertation Committees

Sossi, Serena. Doctoral student in FAU IBN program; currently working in lab at FAU; expected graduation with master's degree in 2020

Sun, Ye (Sunny): Doctoral student in FAU IBN program; currently working in lab at Max Planck Florida Institute for Neuroscience; expected graduation 2019

Tu, Xu (Molly): Doctoral student in FAU IBN program; currently working in lab at Max Planck Florida Institute for Neuroscience; expected graduation 2022

Member: Doctoral Dissertation Committees: Herborg (Nanna) Asgeirsdottir – graduated December 2017; Claire Kuchera-Rice, Kazuma Murakami; David Cinelli

Member: Master's Thesis Committee: Shannon Sanguinetti (2015)

Reader: Senior Honors Theses – Honors College students: Colton Hoffer (2015); Kelly Konicki (2015); Arthur Speziale (2016); Roberto Hernandez (2016); Monique Tromp (2016); Don Woody (2016); Namrata Godela (2018); Heather Gilchrist (2018)

FAU Mentor for Honors College Students: Lee Sutherland (2015; URM grant; Outstanding Interactive Poster at 5th Annual Undergraduate Research Symposium); Eamonn Byrnes (2016, SURF program, research completed at Scripps Research Institute Florida); Anna Riso (2017, OURI Research Award; research completed at Scripps Research Institute Florida)

Mentor for Student Assistants: Meera Patel (2017); Rodeania Peart (2017 and 2018); Yasasvi Sabbineni (2017 and 2018); Shereen Jeyakumar (2018); Hannah Levine (2019); Liza Lanzon (2019)

Teaching

1978 - 1981: Department of Biology, University of California, San Diego; Teaching Assistant
Neurophysiology Laboratory; Mammalian Physiology; Mammalian Cell Culture Laboratory; Comparative Physiology

1986 - 2007: Department of Biology (formerly Division of Life Sciences), UT San Antonio

Principles of Biology, BIO 1103 (changed course number to Bio 1223). Primary core course for Biology majors at UTSA; enrollments up to 328 students/section.

Principles of Biology Lab, BIO 1112. Lab course that was an integral part of the Principles of Biology course and an important component of the curriculum for our freshman majors.

Biology of Aging, BIO 3613. Elective course for biology majors. This course focused on the biological mechanisms that underlie aging in the human.

Neuroanatomy, BIO 5423. Core course for the doctoral degree program in neurobiology and an elective course for the master's degree programs in biology and biotechnology.

Developmental Neurobiology, BIO 5473. Elective course for the doctoral degree program in neurobiology and for the master's degree programs in biology and biotechnology.

Special Problems, BIO 6973. Elective course for the doctoral degree program in neurobiology and for the master's degree programs in biology and biotechnology.

Additional Courses: Independent Study, BIO 4911; Directed Research, BIO 5973; Independent Study, BIO 6953; Master's Thesis, BIO 6983; Doctoral Research, BIO 7213; Dissertation Research, BIO 7313.

2007 – 2011: Department of Biology, University of New Mexico

Developmental Neurobiology Seminar, BIOL 402/502. Elective course for the Department of Biology.

Additional Courses: Undergraduate Problems, BIOL 499; Senior Honors Thesis, BIOL 400; Research Problems, BIOL 551; Dissertation, BIOL 699.

2014 – date: Department of Biological Sciences and Honors College, Florida Atlantic University

Honors Essentials of Human Anatomy and Physiology, BSC 2084. Elective course for the Honors College.

Human Morphology and Function 1, PCB 3703. Elective course for the Dept. of Biological Sciences.

Honors Human Morphology and Function 1, BSC 4930, and then approved for inclusion in University Catalogue as PCB 3703, Honors. Required course for the Neuroscience concentration in the Honors College.

Human Morphology and Function 2, PCB 3704. Elective course for the Dept. of Biological Sciences.

Honors Human Morphology and Function 2, BSC 4930, and then approved for inclusion in University Catalogue as PCB 3704, Honors. Elective course for the Honors College.

Human Neuroanatomy, BSC 4930. Elective course for the Department of Biological Sciences.

Honors Human Neuroanatomy, BSC 4930. Elective course for the Honors College.

Principles of Human Neuroanatomy, ZOO 4742. Elective course for the Department of Biological Sciences.

Honors Principles of Human Neuroanatomy, ZOO 4742. Elective course for the Honors College.

Human Neuroanatomy, BSC 6936, and then approved for inclusion in University Catalogue as ZOO 6748. Elective course for the doctoral degree program in the Department of Biological Sciences.

Neuroscience Journal Club, BSC 6905. Elective course for the doctoral degree program in the Department of Biological Sciences.

Neuroscience Journal Club, BSC 4905; Elective course for Department of Biological Sciences

Honors Neuroscience Journal Club, BSC 4905: Elective course for the Honors College.

Additional Courses: Honors Directed Independent Study, BSC 4905; Elective for the Honors College.

University Service

Department and College Service, University of Texas at San Antonio

1986 - 1990	Health Related Professions Advisory Committee
1987	Faculty Search Committee: Biochemistry-Neurochemistry
1987	Faculty Search Committee: Molecular Cell Biology
1988	Biomedical Research Support Program Grant Funds Advisory Committee
1988	Faculty Search Committee: Physiology
1988 - 1990	Minority Access to Research Careers (MARC) Advisory Board
1988 - 1992	Chair, Advisory Committee for Transmission Electron Microscope Facility
1989	Faculty Search Committee: Biochemistry/Molecular Cell Biology
1989	Faculty Search Committee: Molecular Cell Biology and Immunology
1990	Faculty Search Committee: Anatomy, Physiology, or Endocrinology
1990 - 1993	Faculty Supervisor, UTSA Small Animal Facility
1991	Presentation to College Advisory Council
1991 - 1992	Institutional Minority Biomedical Research Support Program (MBRS) Advisory Committee
1991 -1992	Multi-user Facility Advisory Committee
1991 - 1993	Co-Chair, Minority Biomedical Research Support Program (MBRS) Admissions and Retention Committee
1991 - 1994	Curriculum Committee for Neurobiology
1992	Chair, Institutional Minority Biomedical Research Support Program (MBRS) Advisory Committee
1992 - 1993	Chair, Faculty Search Committee: 5 positions
1992 - 1993	Co-Chair, Doctoral Studies Committee
1992 - 1994	Minority Biomedical Research Support Program (MBRS) Executive Committee
1993	Faculty Search Committee: Computational Biology/Biostatistics
1993 - 2000	Institutional Minority Biomedical Research Support Program (MBRS) Advisory Committee
1994	Chair, Faculty Search Committee: Computational Neurobiology

1994	Minority Biomedical Research Support Program (MBRS) Re-submission Task Force
1995	Chair, Advisory Committee for Confocal Microscopy
1995	Faculty Search Committee
1995 - 2007	Minority Biomedical Research Support/Minority Access to Research Careers (MBRS/MARC) Advisory Board Committee on Grievance and Appeals
1998 - 2000	Advisory Committee for NIH Research Initiative for Scientific Enhancement (RISE) Grant Application
1998 - 1999	Chair, Faculty Search Committee: Computational Neurobiology, Professor position
1998 - 1999	Faculty Advisory Committee for Division of Life Sciences
1999 - 1999	Budget Committee, Division of Life Sciences
1998 - 1999	Nominating Committee, Division of Life Sciences
1999 - 2001	Chair, Ad Hoc Transmission Electron Microscope Use Committee
1999	MBRS-RISE Advisory Committee
1999 - 2000	Faculty Search Committee: Computational Neurobiology, Assistant Professor position
1999 - 2003	Steering Committee, Cajal Neurosciences Research Center
1999 - 2004	Seminar Committee, Cajal Neurosciences Research Center
2000 - 2002	Doctoral Studies Committee, Department of Biology
2001 - 2002	Faculty Search Committee: Bioinformatics
2001 - 2002	Nominating Committee, Department of Biology
2001 - 2002	Periodic Performance Evaluation Committee, Department of Biology
2002 - 2004	Graduate Studies Committee, Department of Biology
2002 - 2004	Parliamentarian for Faculty Forum, Department of Biology
2003	Faculty Search Committee: Associate/Full Professor in Neural Plasticity
2003	Ad Hoc Project Review Committee for the MBRS/SCORE program
2003 - 2004	Faculty Search Committee: Assistant Professor in Cognitive/Systems Neuroscience
2003 - 2005	Faculty Review Advisory Committee for the College of Sciences
2003 - 2005	Faculty Advisory Committee, Department of Biology
2003 - 2007	Academic Policy and Curriculum Committee, Department of Biology
2004 - 2005	Faculty Search Committee: Assistant/Associate Professor in Biophysics
2004 - 2006	Doctoral Studies Committee, Neurobiology
2004 - 2007	Periodic Performance Evaluation Committee, Department of Biology

University Service, University of Texas at San Antonio

1986	Who's Who Among Students Selection Committee
1986 - 1991	Animal Care and Utilization Committee
1987	UTSA Day Volunteer
1988	Division Representative, United Way Campaign
1990 - 1991	Planning Group for UTSA Library
1990 - 1992	Elected Member, University Assembly (Faculty and Administrative Governing Body)
1990 - 1992	Administrative and Agenda Committee of the University Assembly
1990 - 1992	Human Resources Committee of the University Assembly
1990 - 1991	Presidential Ad Hoc Committee on Research Development
1991	Advisory Search Committee for Associate Vice President for Graduate Studies and Research
1991 - 1992	Presidential Working Group on Governance Models
1991 - 1992	Search Advisory Committee for Provost and Vice President for Academic Affairs
1992	Reviewer for Grant Development Program
1992	Workshop Leader for Research Conference
1992	Speaker, Junior College Counselor's Conference
1992	Speaker, Women's Research Forum
1992 - 1993	Chair, University Radiation Safety Committee

1992 - 1993	Chair, Ad Hoc Space Evaluation Committee
1992 - 1993	Chair, Ad Hoc Equipment Needs Committee
1992 - 1993	Chair, Graduate Council
1992 - 1993	Chair, Graduate Council Administrative and Agenda Committee
1992 - 1996	Member, University Strategic Planning Committee
1992 - 1997	Chair, Faculty Research Awards Committee
1993	Chair, Search Advisory Committee for Dean of the College of Sciences and Engineering
1993	Presidential Task Group on Efficient Resource Allocation
1993 - 1997	Ex-Officio Member, Faculty Senate
1993 - 1997	Ex-Officio Member, Graduate Council
1993 - 1997	Graduate Council Administrative and Agenda Committee
1994	Presidential Campus Efficiency and Effectiveness Committee
1994	Presidential Task Force on Jobs for the 21st Century
1994 - 1998	Bioscience Addition (Building) Implementation Committee
1994 - 1997	Chair, Graduate Education and Research Planning Committee, Strategic Planning
1995	Chair, Search Advisory Committee for Dean of the College of Fine Arts and Humanities
1995	Search Advisory Committee for Vice President for Business Affairs
1995	Screening Committee for Distinguished Achievement Awards
1995	Speaker, Who's Who Award Breakfast
1995	Speaker, New Faculty Orientation Program
1996	Presidential Learning Vision Planning Group
1997 - 1998	University Standing Committee on Animal Care and Use
1997 - 1999	UTSA Campus Art Commission
1998	College of Fine Arts and Humanities Faculty Review Advisory Committee
1998	Institutional Compliance Team
1998 - 1999	Chair, University Standing Committee on Animal Care and Use
1999	College of Business Faculty Review Advisory Committee
1999	Chair, University Provost Search Process Committee
2000	College of Urban Professional Programs Faculty Review Advisory Committee
2000 - 2002	Faculty Development Leave Award Committee for University
2000	Search Committee for Dean of the College of Engineering
2001 - 2005	University Committee on the Advancement of Women
2002	Advisory Committee to the Provost for the Director of the Women's Study Institute
2002	Provost's Ad Hoc Committee to Review Graduate Studies and Research Development
2003	UTSA Committee on Electronic Plagiarism
2003 - 2006	UTSA Staff Coordinating Group for Historically Underutilized Businesses
2003 - 2006	San Antonio Life Sciences Institute (SALSI) Research Enhancement Fund Committee
2004 - 2007	University Review Committee for Senior Faculty Recruitments
2005 - 2006	Search Advisory Committee for Provost and Vice President for Academic Affairs
2005 - 2006	Search Committee for Briscoe Chair, College of Business
2005 - 2007	Steering Committee, San Antonio Neuroscience Alliance
2006	Promotion and Tenure Committee – outside member, Department of Anthropology
2006 - 2007	University Faculty Grievance Committee
2006 - 2007	Institutional SCORE Advisory Board
2006 - 2007	Executive Committee, Barshop Institute for Longevity and Aging Studies

University Service, University of New Mexico

2007 - 2011	Deans' Council
2007 - 2011	Co-Director, with Dean of the Medical School, BA/MD program
2007 - 2011	Executive Committee, Nanosciences and Microsystems Program
2007 - 2011	Executive Committee, Optical Sciences Program

2007 - 2011	Executive Committee, Interdisciplinary Film and Digital Media Program
2007 - 2008	Provost Search Committee
2007 - 2009	Chair, Outcomes Assessment Committee, University Reaccreditation
2007 - 2009	University-wide Steering Committee for University Reaccreditation
2008 - 2009	Chair, Search Committee for Dean of the School of Law
2008 - 2009	Chair, University Planning Committee, Lincoln-Darwin Celebration
2008 - 2011	Advisory Committee for Animal Facilities
2008 - 2011	University-wide Research Budget Council
2009 - 2010	H1N1 Main Campus Planning/Communications Team
2009 - 2011	President's Executive Cabinet (one of two Deans on the Cabinet that meets weekly)
2009 - 2011	Academic Planning Task Force for UNM's West Campus
2009 - 2011	Provost's Task Force on Performance-based Budgeting
2010 - 2011	Presidential Task Force on Retirement Incentives
2010 - 2011	Board of Regents Committee on Academic/Student Affairs and Research
2010 - 2011	Athletic Student Success Review Committee

Department and University Service, Florida Atlantic University (does not include service during tenure as Provost)

2013 – 2015	FAU Representative, Executive Committee, Life Sciences South Florida
2013 – date	Vice President, Palm Beach Chapter, Society for Neuroscience
2013 – date	Co-Chair, Jupiter Life Sciences Faculty Search Committee
2013 – 2017	Chair, IBAN Graduate Student Admissions Committee
2014	Member, Search Committee for the Director of Neuroscience and Chair of the Department of Biomedicine in the College of Medicine
2014 – date	Organizer, SYNAPSE, annual poster event for local neuroscientists
2014 – date	Organizer/Instructor for weekly Jupiter Neuroscience Journal Club
2015	Organized Summer Program for undergraduate courses and science activities on the FAU Jupiter Campus along with Dr. Paul Kirchman and Dr. Monica Maldonada
2015 - 2016	Speaker at Florida Biomedical Career Symposium; The Scripps Research Institute Florida

Administrative Addendum to Academic Curriculum Vitae

Brenda J. Claiborne, Ph.D.
Administrative Appointments at the University of New Mexico and the University of Texas at San Antonio
(Does not include accomplishments as Provost and Academic Vice President at Florida Atlantic University)

Overview of the University of New Mexico

The University of New Mexico is classified as a Carnegie RU/VH institution and federally designated as Hispanic-serving. It is the flagship institution for the State of New Mexico and is composed of the main campus, four branch campuses, a new instructional site (UNM West) and the Health Sciences Center. The Health Sciences Center includes the School of Medicine and the UNM Hospital. The total UNM annual budget is approximately $2 billion, including $168 million in external grant and contract revenue. As of Fall 2009, the University enrolled 34,674 students, of which 27,304 attended classes on the main campus. Approximately 37% of undergraduates on the main campus self-identified as Hispanic, 7% as Native American, 3% as African American and another 4% as Asian American.

Overview of the College of Arts and Sciences, University of New Mexico during my Tenure as Dean

- Composed of 20 academic departments encompassing the Humanities, Social Sciences, and Sciences, 10 interdisciplinary programs, 20 research centers and institutes, and 4 museums; largest academic unit at the University of New Mexico.

- Offered 103 degree programs: 56 undergraduate degree programs, 26 masters degrees and 21 doctoral degrees.

- Enrolled 6,203 undergraduate majors and 1,347 graduate students (Fall 2009 data).

- Employed 375 tenured/tenure-track faculty, 58 lecturers, 51 research professors and postdoctoral fellows, approximately 200 adjuncts, 858 teaching and graduate assistants, and 314 staff.

- Annual budget of approximately $70 million, excluding external grant and contract funding. About $58 million of the total is in the instructional and general portion of the budget, with the remainder in internal research support, public service, student scholarships, program support, and internal services.

- Awarded $42.8 million in new external grants and contracts in FY10 (annual award dollars only).

- Produced about 56% of the total credit hours and about 76% of lower division credit hours generated on the UNM main campus; provides instruction for over 75% of core curriculum courses.

- Offered over 4,500 course and laboratory sections per year and instructs about 14,000 students (including non-majors, undergraduate majors and graduate students).

- Provided extensive community service, including teacher training programs, outreach by museum staff, and clinical services offered by the Departments of Psychology and Speech and Hearing.

Accomplishments as Dean of the College of Arts and Sciences
University of New Mexico

Instruction and Budget

- **Met Demand of Increased Undergraduate Majors:** Between 2007 and 2011, undergraduate majors in the College increased by over 20%, while our recurring instructional allocation decreased. I worked with Chairs to increase caps on sections, condense sections, reduce elective offerings, and reduce number of sections with low enrollments.
- **Met Demand of Increased Enrollment of Freshmen and Sophomores (non-majors)**: Freshmen enrollment increased by 6% and sophomore enrollment increased by 10% at UNM in FY10; the College was responsible for over 75% of the core curriculum for these students. I worked with the Provost's office to secure additional one-time funding in order to add 90 sections of core classes, and we continued to increase course caps to keep costs under control while maintaining quality.
- **Increased On-line Courses:** I worked with the VP for Extended University to enhance the incentive program for offering on-line courses. The number of semester credit hours generated by on-line courses offered in the College doubled between FY09 and FY2011, generating additional dollars for faculty and departments.
- **Balanced the College Budget:** Shortly after I arrived at UNM in 2007, it became apparent that the College would face a shortfall at the end of FY08 because expected retirements had dropped, leaving the College overextended on recurring commitments. Thus, I met with the President and Interim Provost and reviewed the budget situation, the College needs, and my proposed action plan. After receiving approval to move forward, I took a number of actions; one was to pause hiring for tenure-track lines. In addition, we were able to decrease our budget for adjuncts. By the end of FY09, we had balanced the

recurring commitments, and I had worked with the Provost to secure additional funding for faculty lines.

- **Initiated Transparency of the College Budget**: I attended faculty meetings in each department last year to explain the College budget, and I instituted an Ad Hoc Committee on Budgets composed of Chairs and Directors to provide advice on budgetary decisions. I led Chairs and Directors through various budget-reduction exercises to manage allocation reductions while increasing instruction.
- **Exceeded Fund-Raising Goals in FY09 and FY10**: I hired a new College development team and worked with College development officer to exceed the fund-raising goals established by the Foundation in both FY09 and FY10. In FY10, the College raised over $6 million, exceeding our goal for the year by 26%.

Strategic Planning

- **Led Strategic Planning Efforts and Met Goals:** I led a strategic planning process for the College in 2007-2008, and I updated College goals each year in alignment with University-wide objectives. Working with faculty and chairs, I met all major goals each year during my service as Dean, including our three top priorities: we improved student success, increased faculty diversity, enhanced excellence in scholarship, and increased private donations.
- **Launched College-wide Initiative:** In 2010, I launched a new initiative for the College entitled "Shaping the College of Arts and Sciences for the Next Decade." Under the umbrella of this initiative, I worked with the faculty to articulate an encompassing vision, a set of critical objectives and a series of implementation strategies that will guide College-wide decisions and, importantly, would help to ensure that the College remains a vibrant and strong academic unit as the institution worked through financial challenges.

Diversity

- **Increased Faculty Diversity:** I instituted review of all faculty search files at the Dean's level to ensure minorities and women were represented in the applicant pools. I also developed a new faculty retention policy that emphasized need to retain minority faculty and women in the sciences. Between August 2007 and January 2011, I hired 11 minority tenure-track/tenured faculty (out of 39 total), some with assistance from the Provost and the Vice President for Equity and Inclusion.

Excellence in Instruction and Scholarship

- **Expanded Participation of Departments and Programs in Outcomes Assessment:** I served as Chair of the University-wide committee on Outcomes Assessment for reaccreditation by the Higher Learning Commission (accrediting agency). Within the College, I increased participation in both course and program assessment from less than 30% of our departments and programs to about 90% in 1 year. We had a successful reaccreditation site visit that praised our outcomes assessment programs across campus and in the College.
- **Improved Quality and Usefulness of Academic Program Reviews**: I instituted new guidelines to improve the quality of external reviewers and to include the Dean's office in our University-wide academic program review process. I also linked College budget decisions to action plans resulting from program reviews, and thus involved faculty in budgetary planning.
- **Strengthened Interdisciplinary Programs:** I instituted evaluations of Directors' performances as part of my leadership training initiative. I served on the Executive Committees for our three interdisciplinary degree programs that spanned colleges: Nanosciences and Microsystems, Optical Sciences, and Interdisciplinary Film and Digital Media.
- **Fostered Success of Joint BA/MD Program with the School of Medicine**: I co-directed the BA/MD program with the Dean of the Medical School. This program encouraged students to remain in New Mexico as physicians. Students matriculated into a BA program in the College of Arts and Sciences,

were supported with scholarships, and were guaranteed acceptance into the UNM Medical School if their grades and MCAT scores met established criteria. This was a highly visible and critical program in New Mexico, and I worked with the Dean of the Medical School to ensure its success.

- **Research Awards Increased by 9% since FY09:** New external grant awards (including renewals) increased from $39.2 million in 2009 to $42.8 million in 2010, primarily because of faculty, College and University support of applications for stimulus funding. The $42.8 million only includes annual award dollars

Building Initiatives

- **Provided Academic Oversight of Planning and Construction of $21 million Learning Center:** I was responsible for the final planning of a new Science and Mathematics Learning Center, a $21 million building of approximately 60,000 square feet. I also provided oversight of the academic aspects of the construction. The Center opened for classes in the Spring 2011 semester and housed the Department of Mathematics and Statistics, as well as a number of freshmen science labs.
- **Secured #1 Priority Ranking on the State-wide List of Higher Education Building Projects for $10 million Chemistry Building Renovation:** Our $10 million Chemistry renovation project was ranked #1 by the University and #1 by the State by the New Mexico Higher Education Department (HED) in 2010-2011. Our $3.7 million Biology renovation was also ranked highly by both entities. Unfortunately, the bond funding was not approved by the voters in November 2010.
- **In Collaboration with the College of Education, Secured Approvals at University and State Levels for Additional $4 million for New Classroom Building**: I partnered with College of Education to secure a high ranking by the University and by the Higher Education Department for a $4 million request. The request was approved by Legislature for bond funding but, unfortunately, was not approved by the voters in November 2010.
- **Secured New Space for College Advising Center**: Although undergraduate majors in the College increased by almost 50% between 2000 and 2007, the College Advising Center occupied only a small space; students actually had to wait outside for their appointments. One of my first priorities upon arriving in 2007 was to find additional space for Center in order to improve retention and graduation rates. We were successful in working with the Provost's office and obtained renovated space of over 7,740 sq ft.

Mentoring and Leadership Training

- **Expanded Mentoring of New Faculty:** I instituted meetings twice a year with me, my associate deans, and all new faculty in the College to learn about their successes and concerns. We revised our mentoring approaches based on feedback from this vibrant group of young faculty.
- **Initiated Leadership Training Programs:** I initiated programs to build leadership capabilities in the College. For example, I expanded our annual "School" for new Chairs and Directors to include a leadership component, and I brought in academic leadership consultants to hold a leadership workshop at our Annual Retreat for Chairs and Directors. I also appointed an ad hoc committee of Chairs to revise chair evaluation guidelines to ensure they were receiving useful feedback on management and leadership skills. I instituted the position of "Special Assistants to the Dean" to develop leadership capabilities among promising mid-career faculty and to handle special projects; four faculty have served in this role, including two women. In addition, I formed Ad Hoc Committees composed of Chairs and Directors to involve them in decision-making on issues such as budget and diversity. I recently instituted 360 degree evaluations of my associate deans as part of leadership mentoring. And I participated in two workshops to improve my own leadership skills: "Insight into Philanthropy Workshop" (April 24, 2008) and "Leadership Seminar on Openness and Dealing with the Media" (May 6, 2008)
- **Formed Task Force to Improve University-wide Hiring Processes and Enhance Staff Morale**: In 2009-2010, I formed a task force composed of me, a representative group of our lead administrative

staff in the departments and the Vice President for Human Resources to directly address process issues that the staff found frustrating. We made progress the first year and staff asked that we continue the group.

Hiring

- **Leveraged College Funds for Faculty Hires:** In spite of the budget challenges, we hired 39 tenure-track/tenured faculty between 2007 and 2010. Although most were replacement hires, I obtained funding from the Provost for additional lines for the College.
- **Appointed new Chairs and Directors:** I appointed over 25 new departmental chairs and program directors. All were selected by departmental and program faculty, with final approval and hiring done by me.
- **Led Successful Search for Dean of the School of Law:** I chaired the Search Committee for Dean of the School of Law (did not use search firm); search was successful.

Overview of the University of Texas at San Antonio

The University of Texas at San Antonio is a comprehensive, public metropolitan university that is now the second largest component of the University of Texas System. It is a Hispanic-serving institution and about 58% of the students come from groups that are under-represented in higher education. The University of Texas at San Antonio has been one of the state's fastest growing institutions over the past decade and currently enrolls about 30,000 students in 133 degree programs, including 64 bachelor's degree programs, 48 master's degree programs, and 21 doctoral degree programs.

Founding Director, UTSA Institute for Aging Research

Interactions with the Barshop Institute at the University of Texas Health Sciences Center at San Antonio: I was the founding Director of the UTSA Institute for Aging Research, a cross-disciplinary Institute established in 2004. As Director, I reported to the Vice President for Research at UT San Antonio. A major impetus for establishing the Institute was to extend and formalize our interactions with the Barshop Institute for Longevity and Aging Studies, one of the premier institutes in the country for the study of aging, and a component of the University of Texas Health Sciences Center at San Antonio. As Director of the UTSA Institute for Aging Research, I worked closely with the Director of the Barshop Institute and served on the Barshop Institute's Executive Committee.

Scope and Mission: The UTSA Institute for Aging Research encompassed faculty from across the UTSA campus, and members represented a wide variety of colleges and departments, including the Departments of Anthropology, Biology, Communications, Health and Kinesiology, Management Sciences and Statistics, Mechanical Engineering, Psychology, and Sociology. The Institute's mission was to foster research related to aging; to assist faculty members in their efforts to understand the nature, causes, and the effects of the aging process in animal models and in diverse human populations; and to assist faculty in obtaining local, state, and federal research support. To accomplish this mission, I worked collaboratively with the Provost and the Vice President for Research, the Deans of the Colleges, and the Director of the Barshop Institute for Longevity and Aging Studies at UT Health Sciences Center San Antonio.

Dean of Graduate Studies and Associate Vice President for Research
University of Texas at San Antonio

As Dean of Graduate Studies and Associate Vice President for Research (title changed from Associate Vice President for Graduate Studies and Research), I reported directly to the Provost and was the administrator responsible for all graduate education and research development on campus. My major accomplishments and my responsibilities are described below. I also played a key role in a number of University-wide academic projects that included developing undergraduate program reviews and new faculty governance structures.

Accomplishments as Dean of Graduate Studies

- **Successfully Led Implementation of New Doctoral Degree Program**: I successfully led the implementation of Doctor of Philosophy degree program in Biology, with an Emphasis in Neurobiology.

- **Successfully Led Development, Approval Process and Implementation of New Doctoral Degree Program**: I successfully led the effort to develop, obtain approvals for (from faculty governing bodies as well as from the UT System and the Texas Higher Education Coordinating Board), and implement a new Doctor of Philosophy degree program in Computer Science.

- **Successfully Led Development, Approval Process, and Implementation of Five New Master's Degree Programs**: I successfully led the effort to develop, obtain approvals for (from faculty governing bodies as well as from the UT System and the Texas Higher Education Coordinating Board), and implement five degree programs: Master of Science in Psychology, Master of Arts in Art History, Master of Architecture, Master of Arts in Political Science and Master of Science in Sociology. I also facilitated the development of curricula and policies for all of new degree programs, and I developed and implemented the use of a feasibility study for internal assessment of potential graduate degree programs for strategic planning purposes.

- **Successfully Led Institution through Accreditation for a Status Level Change:** I led the institution through a successful site visit and review by the Southern Association of Colleges and Schools (accrediting agency) that focused on graduate education, resulting in change of status to a Level V institution.

- **Increased Graduate Student Enrollment by 16%:** I developed and implemented a new campus-wide graduate recruitment plan targeted primarily at minority students in South Texas and based on a demographic study of potential graduate students. Graduate enrollment increased by 16% between 1992 and 1996. Our new plan included an advertising campaign in local and South Texas newspapers for graduate degree programs at UTSA, a university-wide theme for graduate student recruiting materials, and a "Graduate Program Fair" on campus that highlighted our own graduate programs, as well as those at other institutions. We were especially interested in increasing our enrollment of students from under-represented group and were successful at doing so. For example, 50% of our students enrolled in our new doctoral degree program in Biology were Hispanic. In addition, I implemented orientation programs for graduate students in both master's and doctoral degree programs to foster retention and graduation.

- **Increased Graduate Student Support:** I increased university support of doctoral students through a combination of state and gift funds from 1992 to 1997, and I developed and implemented a Small Grants Program for master's degree students to encourage them to complete their degree work.

- **Enhanced Excellence in Graduate Degree Programs:** I ensured that program quality was maintained and enhanced by working with members of the Graduate Council on periodic Graduate Program Evaluations, and I developed action plans as part of our administrative follow-ups to the Evaluations. I also successfully led the completion of a feasibility study on the appropriate administrative structure for graduate education. In addition, I implemented the first steps in creating new Office of Graduate Studies to better serve both graduate programs and graduate students.

- **Ensured Compliance with Graduate Policies**: I ensured compliance with university policies for graduate assistants, and reviewed requests for exceptions to university policies related to graduate programming. I handled all inquiries/complaints from graduate students. I also supervised revisions and publication of the Graduate Catalogue every two years, and obtained University of Texas System approval of all revisions to the Graduate Catalogue before publication.

- **Revised Faculty Workload Policies**: I worked closely with my colleagues in the Provost's office, the Deans, and key leaders of faculty governing bodies to develop and implement new faculty workload policies that fostered excellence in both teaching and research.

Accomplishments as Associate Vice President for Research

- **Improved Efficiency and Effectiveness of the Office of Research Development:** I improved our turn-around times on grants and contracts, and I reorganized and expanded the Office of Research Development to better assist faculty in grant development and submission. This Office handled all pre-award functions of the institution, including internal approvals for grant applications**.** I supervised the staff and ensured that all grant applications were submitted on time. To my knowledge, we did not miss a deadline in the 5 years that I was Associate Vice President for Research. I created three new positions for grant development coordinators who focused on specific academic disciplines and helped faculty identify funding sources and prepare proposals. I also added additional staff positions, and I increased the funding for faculty to obtain preliminary data or undertake scholarly activities that led to the submission of grant applications.

- **Expanded Faculty Research Awards**: I led the development and the expansion of the number and amount of Faculty Research Awards so faculty in disciplines other than the sciences could benefit. I also served as Chair of the Faculty Research Award Committee.

- **Increased Matching Funds for Research Grants:** I worked with the Vice President for Business and the Provost to increase matching funds for research grants. I ensured matching commitments on funded projects were met (in collaboration with Academic Budget Officer and Vice President for Business).

- **Revised Research Policies and Developed Guidelines for Research Centers and Institutes**: I revised the policies governing research activities and ensured compliance with internal and external research policies and regulations. I developed and implemented new procedures for establishing, monitoring, and evaluating research centers and institutes. Using an evaluation committee and a set review process, we identified centers and institutes that were no longer central to the mission of the institution.

- **Ensured Compliance with Research Policies**: I was responsible for ensuring that all policies related to research were followed on campus, and I served as official university signatory for all grant applications related to research.

Accomplishments Relevant to Both Graduate Studies and Research

- **Developed Working Relationships with UT System, Texas Higher Education Coordinating Board, and Southern Associate for Colleges and Schools:** As the UTSA liaison to the University of Texas System and to the Texas Higher Education Coordinating Board on all matters pertaining to graduate education and research, I developed excellent working relationships with personnel at both institutions. I attended Coordinating Board meetings and prepared reports. I also served as the UTSA liaison to the Southern Association of Colleges and Schools on all matters related to graduate programs and policies.

- **Assumed Leadership Role in Budgeting at the University Level:** I provided recommendations to the Provost and President on funding for all programs and projects related to graduate education and research, and I participated in annual budget hearings with Provost and other deans. I was responsible for budgets for the Office of Research Development, faculty research awards, grant matching funds, grant development funds, small grants program, doctoral and master's student fellowships, strategic initiatives related to graduate programs and research, and staff salaries and wages. I developed budgets for new graduate degree programs, in conjunction with chairs and other deans, and I ensured budget obligations for new graduate degree programs were met.

- **Assumed Leadership Role in University-wide Planning:** I reviewed and recommended approval of strategic initiatives submitted to the Provost by the Colleges, and I initiated university-wide strategic initiatives related to research and graduate programs. I served as the representative of the Office of the Provost on the University-wide Strategic Planning Committee. UTSA had a robust strategic planning process that linked budget allocations to unit plans; all budgetary decisions were in alignment with the strategic plan.

- **Created Positions of Associate Deans for Graduate Studies and Research**: I worked with the Provost and other deans to create associate dean positions in each of the four Colleges. I initiated an Associate Deans' Council that met monthly; this Council dealt with all issues related to graduate education and research.

- **Coordinated Administrative Efforts with Faculty Governing Bodies:** I coordinated all functions of the Graduate Council (unit of Faculty Senate) with administrators and faculty, and I served as Chair of the Graduate Council from 1992 to 1993. I then served as an ex-officio member of the Graduate Council from 1993 to 1997, and as a member of the Administrative and Agenda Committee of the Graduate Council from 1992 to 1997. I coordinated graduate program matters with the secretary of the Graduate Council on a weekly basis and with chairs of standing committees of the Graduate Council at least monthly. I served as ex-officio member of the Faculty Senate, and I coordinated all issues related to graduate education and research with officials of the Faculty Senate and the University Assembly. I worked with graduate faculty to increase faculty involvement in Graduate Council, Faculty Senate, and the decision-making process. In addition, as a member of the Deans' Council, and chair of the monthly meetings of Associate Deans for Graduate Studies and Research, I facilitated communication between the Provost, Deans, and Associate Deans on matters related to graduate programs and research.

- **Developed and Implemented Academic Quality Enhancement Program:** In conjunction with my colleagues in the Provost’s office, I devised an Academic Quality Enhancement Program as an adjunct to the University's strategic plan. This program provided a conceptual umbrella for improving policies and performance in all areas, including teaching and research.

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Dawson-Scully, Ken

eRA COMMONS USER NAME (credential, e.g., agency login): dawsonscully

POSITION TITLE: Associate Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Queen's University, Canada	B.Sc. (Hons.)	5/1996	Biology
Queen's University, Canada	M.Sc.	5/1998	Neuroscience
University of Toronto	Ph.D.	11/2003	Neuroscience
University of Toronto	Postdoctoral	8/2008	Neuroscience

A. Personal Statement

I am a trained neurophysiologist and behavior geneticist, and have been interested in how insects employ genetic and molecular strategies to protect themselves from high temperature (hyperthermic) or low oxygen (anoxic) insult for the past 16+ years represented by the majority of my publications. My independent research lab at Florida Atlantic University is poised to examine both behavior and neurophysiological mechanisms for protection in the fruit fly *Drosophila*, where I have had 9 students receive their PhD degrees from direct supervision in my lab and where I now have 4 PhD students trained in these techniques. Further, I have a number of undergraduates (7 students as of April 2019) who work in the lab year round to assist with development and behavior experiments. Over the past 11 years as an independent researcher I have published 22 manuscripts, received a corporate research grant from Eco Neurologics Inc. and a federal grant as Co-PI from the NIH, been granted two US patents (concerning the neuroprotective PKG pathway), and have submitted 1 more patent (pending). I have a very strong undergraduate research program in my lab where I strive to have them participate in publishable research. One of my undergraduates who went on to graduate school in mathematics was first author on a (Chen et al) J Comp Physiol A manuscript in 2011, and another, who went on to medical school is a co-author on our recent manuscript in Nature Sci Rep (Hernandez). The current seven undergraduates in my lab are all working towards publications.

B. Positions and Honors

Positions and Employment

2018- Associate Vice President for Strategic Initiatives, Florida Atlantic University
2018- Head of Institutional Partnerships, Max Planck Florida Institute for Neuroscience
2018- Director, FAU Max Planck Honors Program, Florida Atlantic University
2014- Associate Professor with tenure, Florida Atlantic University, Department of Biological Sciences
2014- International Max Planck Research School (IMPRS) Faculty, Max Planck Institute for Neuroscience
2013- Visiting Professor, The Scripps Research Institute, Dep. Of Metabolism and Aging
2018 Associate Dean for Graduate Studies, College of Science, FAU

2016-18 Associate Director of the FAU Brain Institute, Florida Atlantic University
2013-16 Assocate Director, Inegrative Biology PhD Program, Flroida Atlantic University
2008-14 Assistant Professor, Florida Atlantic University, Department of Biological Sciences
2007-08 Post-doctoral research fellow at the University of Toronto
2005-07 Heart and Stroke Foundation Post-doctoral research fellow at the University of Toronto
2004-05 CIHR Post-doctoral research fellow at the University of Toronto

Other Experience and Professional Memberships

2018- Member, American Physiological Society
2018 College of Medicine Biomedical Seed Grant Reviewer
2017 FAU Brain Institute Seed Grant Reviewer
2017 i-Heal FAU Internal Seed Grant Reviewer
2016 Puerto Rico Science Trust Grant Reviewer, Puerto Rico
2016 FONDECYT Grant Reviewer, Chile
2014-17 Natural Science and Engineering Research Council of Canada NSERC Grant Reviewer
2013-14 National Aeronautics and Space Administration, ad hoc reviewer
2012-13 Frontiers in Genomic Physiology, review editor
2012 Swiss National Science Foundation, ad hoc reviewer
2010 Canadian Foundation for Innovation (CFI), panel reviewer
2008-09 National Science Foundation: Organismal Systems, ad hoc reviewer
2000- Member, Society for Neuroscience

Honors

2018 Inducted into the FAU National Academy of Inventors, FAU
2018 Welcome Speaker, College of Science Graduate Student Association, FAU
2017 Distinguished Researcher of the Year Award, FAU Research Park
2016 FAU Tech Runway Business Competition Winner: Neuroscience Designee
2016 Outstanding Faculty Award, FAU Northern Campuses
2013 Outstanding Academic Advisor of the Year, Florida Atlantic University, Graduate Student Assoc.
2012 Research: Assistant Professor of the Year, Florida Atlantic University, College of Science
2010 Save a Student Award, Florida Atlantic University, Center for Learning and Student Success
2005-07 Heart and Stroke Foundation of Canada Research Postdoctoral Fellowship
2004-05 Canadian Institutes of Health Research (CIHR) Postdoctoral Research Fellow

C. Contribution to Science

As a graduate student my contributions to science followed my personal interests in cellular neuroprotection from high temperature insults (hyperthermia). I was a part of a team that demonstrated that a Heat Shock pretreatment/preconditioning could protect animal flight behavior during high temperature stress. I went on to further characterize the mechanisms of this effect where my first author manuscript in NeuroReport led to the demonstration of how a Heat Shock pretreatment of the entire animal led to cellular protection of the synapse during synaptic transmission (the first time this was ever shown in the field). I also demonstrated that synaptic machinery was likely a target of a Heat Shock preconditioning since synaptic delay was preserved in protected animals during hyperthermia. To further this body of work, I went on to learn the Drosophila NMJ preparation for neurophysiology using both Ca^{2+} imaging and synaptic transmission assays to examine the effects of chaperone proteins that are either constitutively expressed or upregulated by a Heat Shock preconditioning. I characterized cysteine string protein (CSP) in 3 publications, heat shock cognate 70 (HSC70), and even other orphan synaptic proteins such as Methuselah (a GPCR). In the end, my work in the chaperone/neuroprotection

was additive. My interests in this field, through my graduate work, produced several manuscripts in excellent peer reviewed journals.

a. Dawson-Scully, K., & Robertson, R. M. (1998). Heat shock protects synaptic transmission in flight motor circuitry of locusts. *Neuroreport*, *9*(11), 2589-2593.

b. Dawson-Scully, K., Bronk, P., Atwood, H. L., & Zinsmaier, K. E. (2000). Cysteine-string protein increases the calcium sensitivity of neurotransmitter exocytosis in Drosophila. *The Journal of Neuroscience*, *20*(16), 6039-6047.

c. Song, W., Ranjan, R., Dawson-Scully, K., Bronk, P., Marin, L., Seroude, L., Lin, Y.J., Nie, Z., Atwood, H.L., Benzer, S., & Zinsmaier, K. E. (2002). Presynaptic regulation of neurotransmission in Drosophila by the G protein-coupled receptor Methuselah. *Neuron*, *36*(1), 105-119.

d. Bronk, P., Nie, Z., Klose, M. K., Dawson-Scully, K., Zhang, J., Robertson, R. M., Atwood, H.L., & Zinsmaier, K. E. (2005). The multiple functions of cysteine-string protein analyzed at Drosophila nerve terminals. *The Journal of Neuroscience*, *25*(9), 2204-2214.

During my postdoctoral fellowship my interests were consistent with my past work in neuroprotection, but I also noticed an interesting effect resulting from a Heat Shock response neurophysiologically that was brought to a solid foundation in 1999 when two publications came out from the Wu and Sokolowski lab (Renger et al) and the Robertson and Ramirez labs (Ramirez et al). Ramirez et al showed that whole cell K^+ currents became far more transient (not sustained) after a Heat Shock pretreatment, where Renger et al showed that a reduction in protein kinase G (PKG) activity also led to whole cell K^+ currents become far more transient. This allowed me to postulate that there was a plausible connection between K^+ channel modulation and the neuroprotection of synaptic transmission which set off my current interests stemming from 2004 up to today. Using the PKG "platform" I clearly have shown that we can induce neuroprotection of synaptic transmission and/or animal locomotion through the inhibition if the PKG pathway either pharmacologically or genetically. We have shown that using pharmacology, that we can induce this protection rapidly thereby giving rise to a possible therapeutic. During my postdoctoral fellowship, this core finding was established, however, as an independent investigator we have delved much deeper into the breadth of this type of neuroprotection and the mechanisms involved.

a. Dawson-Scully, K., Armstrong, G. A., Kent, C., Robertson, R. M., & Sokolowski, M. B. (2007). Natural variation in the thermotolerance of neural function and behavior due to a cGMP-dependent protein kinase. *Plos One*, *2*(8), e773-e773.

b. Dawson-Scully, K., Lin, Y., Imad, M., Zhang, J., Marin, L., Horne, J. A., Meinertzhagen, I.A., Karunanithi, S., Zinsmaier, K.E. & Atwood, H. L. (2007). Morphological and functional effects of altered cysteine string protein at the Drosophila larval neuromuscular junction. *Synapse*, *61*(1), 1-16.

My independent research group at FAU has shown that this protection goes beyond hyperthermia, and extends to low oxygen stress (anoxia), oxidative stress caused by H_2O_2, and stress from the dysregulatuion of Excitation/Inhibition balance, like what is seen in seizure susceptibility. We also discovered that neuroprotection caused by PKG inhibition is valid only for protecting function acutely, and that it comes at a cost of lower cellular survival under chronic prolonged stress conditions. Though this seems like a negative, we found, and published that the opposite is true; where activation of the PKG pathway leads to profound cellular protection during chronic stress conditions. This work has contributed to the neuroprotection field through 6 peer reviewed publications, 2 patents granted for therapeutics for humans with the indication of febrile seizure and neural anoxia, and 1 patent pending for the use of our findings in stroke. This work also allowed for the hypothesis that the downstream modulator of this pathway, dicholoracetate (DCA), could enhance cancer cell killing and protect normal cells as shown in out Ayyanathan et al 2012 publication. This proposed work is an extension of these findings, where the modulation of K^+ channels through our PKG pathway can modulate electroconvulsive seizure duration.

a. Risley MG, Kelly SP, Minnerly J, Jia K, Dawson-Scully K. (2018). egl-4 modulates electroconvulsive seizure duration in C. elegans. *Invert Neurosci;18(2):8*.

b. Kelly SP, Risley MG, Miranda LE, Dawson-Scully K. (2018). Contribution of a natural polymorphism, protein kinase G, modulates electroconvulsive seizure recovery in D. melanogaster. *J Exp Biol. pii: jeb.179747.*.

c. Caplan, S. L., Zheng, B., Dawson-Scully, K., White, C. A., & West, L. M. (2016). Pseudopterosin A: Protection of Synaptic Function and Potential as a Neuromodulatory Agent. *Marine drugs*, *14*(3), 55.

d. Risley, M. G., Kelly, S. P., Jia, K., Grill, B., & Dawson-Scully, K. (2016). Modulating Behavior in C. elegans Using Electroshock and Antiepileptic Drugs. *PloS one*, *11*(9), e0163786.

e. Krill, J. L., & Dawson-Scully, K. (2016). cGMP-Dependent Protein Kinase Inhibition Extends the Upper Temperature Limit of Stimulus-Evoked Calcium Responses in Motoneuronal Boutons of Drosophila melanogaster Larvae. *PloS one*, *11*(10), e0164114.

Complete List of Published Work in My Bibliography:

http://www.ncbi.nlm.nih.gov/myncbi/browse/collection/48149830/?sort=date&direction=descending

D. Research Support

Ongoing

NSF 1829243
NSF i-CORPS Site Grant (2018-2021)
Total Award: $254,000
PI (co-PIs: Rhys Willams and Dimitrios Pados)

NIH R15 GM110651-0.2
Synthesis of a Bridged Bicyclic Natural Product Using Allenyl Esters (2017-2020)
Total Award Value: $450,000
co-PI (PI: Salvatore Lepore)

Pfizer WI225058: Compound Transfer Program Grant (CTP) (2017-2019)
Establishing a role for Viagra® as an antiepileptic drug using two invertebrate model systems
PI Dawson-Scully

Division of Research SEED Grant, Selective manipulation of hippocampal PKG activity to modulate memory processes (2018-2019)
$15,000
Lead Investigators: Ken Dawson-Scully and Salvatore Lepore

Completed

Eco Neurologics Inc., Neuroprotection via the PKG Pathway (2013-2018; grant ended early: 2016)
$353,000
Lead Investigator: Ken Dawson-Scully

Division of Research SEED Grant, Selective manipulation of hippocampal PKG activity to modulate memory processes (2013-2014)
$20,000
Lead Investigators: Ken Dawson-Scully and Robert W. Stackman

Division of Research SEED Grant, Protecting Stroke-like Injury in Mammals (2012-2013)
$20,000
Lead Investigator: Ken Dawson-Scully and Sarah Milton

Research Priorities Grant, FAU, Neuroprotection of Anoxia in Mammalian Neurons (2011-2012)

$18,000
Lead Investigators: Sarah Milton and Ken Dawson-Scully

American Cancer Society, The Discovery of New Anticancer Drugs from Marine Organisms (2011-2012)
$30,000
Lead Investigator: Ken Dawson-Scully

Research Priorities Grant, FAU, Comparison of *C.elegans* and *D.melanogaster* and Anoxic Neuroprotection via the PKG Pathway (2011)
$15,000
Lead Investigators: Ken Dawson-Scully and Kailiang Jia

Nathan J. Dorn
Professor
Department of Biological Sciences
Florida Atlantic University
Davie, FL 33314

Education/Training:

Institution	Field of Study	Degree	Year
Calvin College, Grand Rapids, MI	Biology	B.S.	1997
Michigan State Univ., East Lansing, MI	Zoology/EEB	Ph.D.	2003
Florida International Univ., Miami, FL	Ecology	Postdoc	2003-2005

A. Personal Statement

I am a freshwater ecologist broadly trained in experimental and population ecology. My research is currently focused in four areas: 1) elucidating the factors regulating population sizes of freshwater invertebrates in the Everglades and other wetlands, 2) identifying trophic connections between wildlife and freshwater animals in the Everglades, 3) comparative studies of the parthenogenetic crayfish, *Procambarus virginalis* and the parent species found in the wetlands of southern Florida (*P. fallax*) and 4) critical analyses of the non-consumptive effects of predators in ecology (i.e., a meta-review with 5 North American collaborators). The first two research areas have characterized the past 15 years of my research program and have brought most of the research dollars to my lab as they are associated with Everglades ecosystem restoration, wildlife conservation and wetland management questions. Graduate students in Environmental Science or Biological Sciences, plus technicians are funded to do much of that work and altogether 14 graduate students have been trained in the lab. All three of my empirical research areas (1-3) also bring undergraduate students into the lab as I have had 39 undergraduate students conduct projects in the lab with me or with the graduate students. Research areas 3 and 4 are largely collaborative with colleagues outside of FAU, both in the USA and abroad. I have published 30 manuscripts in peer-reviewed journals ranging from comparative zoology to freshwater and ecology venues.

B. Employment and Positions

2018-	Full Professor, Biological Sciences, Tenured, Florida Atlantic University
2011-2018	Associate Professor, Biological Sciences, Florida Atlantic University,
2016	Visiting Associate Professor, Florida International University
2005-2011	Assistant Professor, Biological Sciences, Florida Atlantic University
2004-2005	Visiting Research Associate, Biological Sciences, Florida International University
2009-2019	Graduate Admissions Committee Chair for Environmental Science Program
2011-2014	Member of Institutional Animal Care and Use Committee
2013-2019	Handling Editor, Southeastern Naturalist

Ad hoc Reviewer for the National Science Foundation (Panel Review and Full Proposal Reviews), Czech Science Foundation, and 27 Peer Reviewed Journals (more than 60 papers).

2017-2018 External P&T Evaluator for three N. American Universities

C. Contributions to Science

(*student authors)

Vogt, G., **N. J. Dorn**, M. Pfeiffer, C. Lukhaup, B. W. Williams, A. Schrimpf. 2019. The dimension of biological change caused by autotriploidy: a meta-analysis with marbled crayfish and *Procambarus fallax*. *Zoologischer Anzeiger*

Vogt, G., C. Lukhaup, B. W. Williams, M. Pfeiffer, **N. J. Dorn**, R. Schulz & A. Shrimpf. 2018. Morphological characterization and genotyping of the marbled crayfish and new evidence on its origin. *Zootaxa* 4524: 329-350.

Davidson*, A. T. & **N. J. Dorn**. 2018. System productivity alters predator sorting of a size-structured mixed prey community. *Oecologia* 186: 1101-1111.

Davidson*, A. T. & **N. J. Dorn**. 2017. Life history traits determine the vulnerability of two species of apple snails (*Pomacea* spp.) to a shared juvenile-stage predator. *Aquatic Ecology* 51: 331-341.

van der Heiden* C. A. & **N. J. Dorn**. 2017. Benefits of adjacent habitat patches to the distribution of a crayfish population in a hydro-dynamic wetland landscape. *Aquatic Ecology* 51: 219-233.

Dorn, N. J. & M. Hafsadi*. 2016. Native crayfish consume more non-native than native apple snails. *Biological Invasions* 18: 159-167.

Holbrook*, J. D. & **N. J. Dorn**. 2016. Effects of fish on reptile and amphibian assemblages in wetlands of variable permanence. *Freshwater Biology* 61: 100-109.

Knorp*, N. E. & **N. J. Dorn**. 2016. Consumptive effects of fish predators drive composition of emerging dragonfly assemblages in structured and unstructured habitats. *Freshwater Science* 35: 114-125.

Dorn, N. J. & M. I. Cook. 2015. Hydrological disturbance diminishes predator control in wetlands. *Ecology* 96: 2984-2993.

Knorp*, N. E. & **N. J. Dorn**. 2014. Dissimilar numerical responses of macroinvertebrates to disturbance from drying and predatory sunfish. *Freshwater Biology* 59: 1378-1388.

Boyle*, R. A., **N. J. Dorn** & M. I. Cook. 2014. Importance of crayfish prey to nesting White Ibis (*Eudocimus albus*) populations. *Waterbirds* 37: 19-29.

Dorn, N. J. 2013. Consumptive effects of crayfish limit snail populations. *Freshwater Science* 32: 1298-1308.

Bransky*, J. W. & **N. J. Dorn**. 2013. Prey use of three wetland sunfishes: effects of ontogeny, gape size and seasonal prey variation. *Environmental Biology of Fishes* 96: 1329-1340.

Boyle*, R. A. **N. J. Dorn** & M. I. Cook. 2012. Dietary niche relationships of three species of wading birds nesting together in the Florida Everglades. *Waterbirds* 35: 154-159.

Kellogg*, C. M. & **N. J. Dorn**. 2012. Consumptive effects of fish reduce wetland crayfish recruitment and drive species turnover. *Oecologia* 168: 1111-1121. DOI: 10.1007/s00442-011-2162-2

Dorn, N. J., M. I. Cook, G. Herring, R. Boyle*, J. Nelson* & D. E. Gawlik. 2011. Diet variation among White Ibis (*Eudocimus albus*) chicks: prey composition depends on recent hydrologic conditions*. Ibis* 153: 323-335.

P. Martin, **N. J. Dorn**, T. Kawai, C. van der Heiden* & G. Scholtz. 2010. The enigmatic Marmorkrebs (marbled crayfish) is the parthenogenetic form of *Procambarus fallax*. *Contributions to Zoology* 79: 107-118.

Dorn, N. J. & J. C. Volin. 2009. Resistance of crayfish (*Procambarus* spp.) populations to wetland drying depends on species and substrate. *Journal of the North American Benthological Society* 28: 766-777.

Dorn, N. J., G. Herring, & D. E. Gawlik. 2008. Estimation of crayfish abundance and size-structure in White Ibis diets. *Waterbirds* 31: 417-423.

Dorn, N. J. 2008. Colonization and reproduction of large macroinvertebrates are enhanced by drought-related fish reductions. *Hydrobiologia* 605: 209-218.

Dorn, N. J., & J. C. Trexler. 2007. A shifting predator-permanence gradient promotes crayfish regional coexistence in an open wetland landscape. *Freshwater Biology* 52: 2399-2411.

Dorn, N. J., J. C. Trexler, & E. E. Gaiser. 2006. Exploring the role of large predators in marsh food webs: evidence for a behaviorally-mediated trophic cascade. *Hydrobiologia* 569: 375-386.

Dorn, N. J., R. Urgelles, & J. C. Trexler. 2005. Evaluating active and passive sampling methods to quantify crayfish density in a freshwater marsh. *Journal of the North American Benthological Society* 24: 346-356.

Steiner, C. F., T. L. Darcy, **N. J. Dorn**, E. A. Garcia, G. G. Mittelbach, & J. M. Wojdak 2005. The influence of consumer diversity and indirect facilitation on trophic-level biomass and stability. *Oikos* 110: 556-566.

Dorn, N. J. & G. G. Mittelbach. 2004. Effects of a native crayfish (*Orconectes virilis*) on the reproductive success and nesting behavior of sunfish (*Lepomis* spp.). *Canadian Journal of Fisheries and Aquatic Sciences* 61: 2135-2143

Mittelbach G. G., T. L. Darcy, **N. J. Dorn**, E. A. Garcia, C. F. Steiner, & J. M. Wojdak. 2004. The impact of density-independent mortality on species coexistence: an experimental test with zooplankton. *Oikos* 107: 415-421.

Dorn, N. J. & J. M. Wojdak. 2004. The role of omnivorous crayfish in littoral communities. *Oecologia* 140: 150-159.

Hamilton, S. K., J. L. Tank, D. F. Raikow, E. Siler, **N. J. Dorn**, & N. Leonard. 2004 Stable isotope enrichments to study stream food webs: a new approach to data interpretation. *Journal of the North American Benthological Society* 23: 429-448.

Dorn, N. J., G. Cronin, & D. M. Lodge. 2001. Feeding preference and performance of a semi-aquatic lepidopteran on aquatic macrophytes: plant hosts as food and habitat. *Oecologia* 128: 406-415.

Dorn, N. J. & G. G. Mittelbach. 1999. More than predator and prey: a review of interactions between fish and crayfish. *Vie et Milieu* 49: 229-237.

Research Support

External Ongoing:

Dorn, N. J. Biological comparisons of clonal and sexually-reproducing crayfish. $16,400.00 ($4,000 to Dorn) (May – Sept 2019). STEM Undergraduate Research Award through Miami-Dade College supporting J. Fuentes. Dorn is Co-PI.

Dorn, N. J. Population Responses of Macroinvertebrates to Wet Season Depth Variation. $149,977.00 (Dec. 2018-Sept. 2021, South Florida Water Management District). Dorn is PI.

Dorn, N. J. DECOMP Physical Model: Biological Responses to Flow. $550,000.00 (April 2017 – December 2020, South Florida Water Management District).
Dorn is PI.

External Completed:

Dorn, N. J. Analysis of White Ibis chick diets in Lake Okeechobee. $2,775.00. (May 2018-Feb 2019 South Florida Water Management District)
Dorn was PI.

Dorn, N. J. Wading bird foraging and prey concentrations: effects of proximate deep water. $50,000.00 (Jan 2018-Sept. 2018, South Florida Water Management District).
Dorn was PI.

Dorn, N. J. Analysis of White Ibis chick diets in Lake Okeechobee. $4,500.00. (April 2017-Feb 2018 South Florida Water Management District). Dorn is PI.

Dorn, N. J. Identifying and quantifying the prey of nesting White Ibis in Everglades National Park. $41,800.00 (Jan. 2017- December 2018 Everglades National Park: Cooperative Ecosystems Studies Unit).
Dorn was PI.

Dorn, N. J. Wading bird foraging and prey concentrations: effects of proximate deep water. $50,000.00 (October 2016-September 2017, South Florida Water Management District).
Dorn was PI.

Dorn, N. J. Analysis of White Ibis chick diets in Lake Okeechobee. $9,400.00. (April 2016-Feb 2017 South Florida Water Management District)
Dorn was PI.

Dorn, N. J. Analysis of White Ibis chick diets in Lake Okeechobee. $7,900.00. (June 2015-January 2016 South Florida Water Management District)
Dorn was PI.

Dorn, N. J. Wildlife and Nutrient Cycling Review. $6,000.00. (Jan. 2013- June 2013 South Florida Water Management District)
Dorn was PI.

Dorn, N. J. Experimental Examination of the Predator-Release Hypothesis on Wading Bird Supercolony formation in the Florida Everglades. $149,966.00. (May 2010-Sept. 2013, South Florida Water Management District)
Dorn was PI.

Dorn, N. J. Habitat suitability models for Everglades and Slough Crayfish. $10,000.00 (May 2009-April 2010, United States Geological Survey: Joint Ecological Modeling lab).
Dorn was PI.

Dorn, N. J. Assessing Aquatic Animal Community Responses to Hydrological Variation in Sloughs. $25,000.00 (Dec. 2009-July 2010, South Florida Water Management District)
Dorn was PI.

Dorn, N. J. Crayfish population studies. $30,000.00 (Dec. 2008-Oct. 2009, South Florida Water Management District.
Dorn was PI.

Dorn, N. J. Diet Analysis of White Ibis chicks. $15,000.00 (Jan. 2009-Feb. 2010 South Florida Water Management District).
Dorn was PI.

Dorn, N. J. Habitat Suitability Models for Procambarid crayfish of the Everglades. $10,000.00 (Feb. 2008-Jan. 2009, United States Geological Survey: Joint Ecological Modelling lab).
Dorn was PI.

Dorn, N. J. Diet Analysis of White Ibis chicks. $6,000.00 (May 2008-Feb. 2009, South Florida Water Management District).
Dorn was PI.

Dorn, N. J. & J. C. Volin. Crayfish population dynamics: Hydrological Influences. $180,000.00 (July 2007-July 2009, South Florida Water Management District).
Dorn was PI.

Dorn, N. J. Assessment of fish communities in waterways of Big Cypress Seminole Indian Reservation. $25,000.00 (June-Dec. 2007, Seminole Tribe of Florida/USFWS).
Dorn was PI.

Dorn, N. J. & J. D. Baldwin. Assessment of fish communities in waterways of Big Cypress and Brighton Seminole Indian Reservations. $56,713.00. (Jan.-Dec. 2006, Seminole Tribe of Florida/U. S. Fish and Wildlife Service).
Dorn was PI.

Internal Completed:

Dorn, N. J. Reproduction and competition between sexual and parthenogenetic crayfishes. $4,000.00. (April – Sept 2018). STEM Undergraduate award through Miami-Dade College supporting A. Fall.
Dorn was investigator

Dorn, N.J. $3000.00 (2015) Quantifying Wading Bird Foraging Activity in Drying Wetlands with Time-Lapse Imagery. FAU Broward Undergraduate Research Award for H. Campbell.
Dorn was mentor/PI

Dorn, N. J. & J. D. Baldwin. $3,000.00 (2014) Morphological and genetic identification and ecology of early life stages of invasive and native apple snails. FAU Broward Undergraduate Research Award for P. Polpornvitoon and E. Santos.
Dorn was mentor/PI

Benscoter, B. & **N. J. Dorn.** (2012) $8,000.00 “Cascading impacts of vegetation change in the Florida Everglades: linking vegetation to crayfish populations through peat characteristics.” SEED Grant from Florida Atlantic University.
Dorn was co-PI.

BIOGRAPHICAL SKETCH

NAME: ESIOBU, Nwadiuto

eRA COMMONS USER NAME (credential, e.g., agency login): NESIOBU

POSITION TITLE: Professor of Microbiology and Biotechnology

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
University of Benin, Nigeria	B.Sc (Hons)	1981	Microbiology
University of Ife (now OAU), Nigeria	M.S.	1984	Environ Microbiology
University of Louvain, LLN, Belgium	Post Grad Cert	1985	Agronomic Science
University of Louvain, LLN, Belgium	Ph.D. (Grand dist)	1988	Microbiology
University of Louvain, LLN, Belgium	Post-doc	1993	Biotechnology
Massachusetts Inst. of Technology, USA	Post-doc	1996	Molecular biology

A. Personal Statement

I have extensive expertise and experience in multidisciplinary research involving applied microbiology. Being trained in some of the best life science laboratories on three continents in very broadly different yet complementary fields of applied biology enables me to bring a unique perspective to research and instruction. My specific strength is in solving problems related to molecular microbial ecology, environmental health risk assessment and interactions between microbes and their hosts. I have employed standard microbiology methods, molecular biology analysis, genetic cloning / sequencing and next generation sequencing as well as Fluorescent in-situ hybridization (FISH), and more recently, metagenomics in detecting bacteria, assessing health risks and studying microbiomes and their interactions with plants and animal hosts. As PI, Co-PI and collaborating scientist in funded and unfunded research, I have developed fluorescent in situ hybridization probes for detecting bacteria in complex beach sand matrices in addition to leading studies that helped define the dynamics of potential health risk indicators in the beach ecosystems. We continue to test and develop reliable technologies for fast and comprehensive risk assessments using novel biomarkers and whole genome shot gun protocols. My pioneering studies of plant vs microbiome interactions is providing new insights into the possible roles of microbes in the dreaded Brazilian peppertree plant invasion in Florida. We are currently probing the rhizobiomes of the Citrus plants in undisturbed tribal regions to find plant probionts for combatting some key citrus diseases. On another front, my early studies of the oral microbiomes confirmed the presence of a core community which is grossly perturbed by smoking, with the resulting dysbiosis paving the way for oral diseases. All these may seem like jack of all trades …… but the uniting force of the threads is - Microbiomes - problem solving using the same set of tools. As our focus on microbiome research deepens, I look forward to leading a project that will attract solid support from funding agencies…

My passion and impact in academia and beyond is rooted in the deep conviction that the applications of science hold the key to solving societal problems around the world. My multidisciplinary research subjects address issues ranging from climate change; water quality and hydrology to the threats of food and nutrition insecurity as well as high disease burdens and emergence of pathogens. So, driven by deep insight into the workings of science, I have helped advise and direct the US science policy at the State Department, create and train quality workforce and research entities in Florida / internationally; and helped transform the scientific enterprise in Africa through capacity building and collaborative research. I am often described as strategist, positive, full of novel ideas and a great team player and hope to learn more about higher education administration.

B. Summary of Scholarship & Experience

National and International Board membership (5)

Refereed journal articles and proceedings (>50)

Invited Book Review (2 Books)

National and international professional leadership recognitions and awards (>50)

National and international Talks, Posters & Professional Paper presentations (>150)

Newspaper and web-based articles on our research (>10)

Postdoctoral Fellows and Research Associates (4)

Doctoral Dissertations (Chair/Committee)(6)

Masters Theses (Chair and Committee member) (24)

Undergraduate Honors Theses and Research (>250; several award recipients)

Editorial Boards / Reviewer of 7 Journals;

Professional Organization Membership (4)

C. Positions and Honors

APPOINTMENTS

2018 – 2019	Visiting Scientist, Department of Biological Engineering (Center for Microbiomes) Massachusetts Institute of Technology, Cambridge MA.
2018 -	Visiting Professor, University of Maiduguri, Nigeria
2013-present	Professor, Department of Biological Sciences, Florida Atlantic University FL
2011-2012	Senior science advisor, Global Food Security & Int'l Health Bureau, U.S. Department of State, Washington DC
2003-2013	Associate professor, Dept. of Biological Sciences, Florida Atlantic University, FL
2005-2006	Visiting Scholar, Environmental Health Dept. University. of Georgia, Athens
1997-2003	Assistant professor, Division of Science, Florida Atlantic University, Davie, FL

Other Experience and Professional Memberships

- Education Board, American Society for Microbiology, Committee member
- Fellow, Biotechnology Society of Nigeria

- International Committee, American Society for Microbiology Board of Directors
- Association of Women in Science
- Grant Reviewer --- USDA-NIFA, USAID, Bio-Innovate, Eastern Africa (A Swedish Govt SIDA project), FAU OURI Grants, NSF, Carnegie African Diaspora Fellowship Program
- Editorial board and Journal reviews - Canadian Journal of Microbiology. Advances in Microbiology African journal of laboratory medicine, PLOS One, Journal of Plant Protection and Research, Applied Microbiology and Biotechnology

HONORS, DISTINCTIONS, PROFESSIONAL LEADERSHIP & SYNERGISTIC ACTIVITIES

Honors

2016 *Legacy-Maker- One of 100 most influential women* in Florida Atlantic University
2013 *World Class Faculty* by the Greater Fort Lauderdale Alliance for Economic Development
2012 Fellow, Carnegie African Diaspora
2011 Faculty of Distinction for academic excellence and contributions to national and global scientific enterprise. Florida Atlantic University
2011 Outstanding Faculty mentor award; Health Science and Related Studies club
2011 *Outstanding Online Mentor and Service*, American Society for Microbiology

Distinctions and Professional Leadership

2019	Guest Lecturer, Harvard University, Cambridge MA. The Role of Biotechnology in the Development of the Bio-economy in Africa
2018 – 2019	Invited Speaker, Seminole Indian Reserve Conferences on hydrology and water quality
2018 – 2019	Carnegie African Diaspora Fellowship Program with Ebonyi State University, Nigeria
2018	Invited Speaker, Global Bio-Economy Summit, Berlin, Germany. Harnessing Africa's expansive Bioresource for the Bio-economy, Germany.April 18 – 20, 2018
2017	International Judge of the acclaimed synthetic biology competition, www.iGEM.org Boston MA
2014	Carnegie Diaspora Visiting scholar, Ebonyi State University Biotech Center, Nigeria
2013 - 2015	Founding Senior Vice President, UN Women Palm Beach & Broward Chapter of US National Commission on UN Women
2012-present	Member & Participant, Global Diaspora Forum at USAID and State, Diaspora Alliance
2011-present	Jefferson Science Fellow, U.S. Department of State, Washington DC
2006-2013	Strategic advisor, National Biotechnology Development Agency (NABDA) Abuja
2008	Chair, International Advisory Board, World Bank STEP B Project in Nigeria.
2008-2012	Chair, Biological sciences department Learning assessment committee, FAU.
2008,2009	Visiting Professor, Federal University of Agriculture Abeokuta with a UNESCO/TWAS
2006-present	Founder / Chief scientific advisor, Applied Biotech Inc. Fl. USA

2004-2006 Member (chair, 2006), Awards Committee for U.S. Presidential Awards for excellence in Science and Math education, Washington DC.

2004, 2006 Reviewer, National Science Foundation, Environmental Bio & Biol Infrastructure

2001-2006 Electronic Mentor, High School science teachers, Society for the Advancement of Chicanos and Native Americans in Science (SACNAS)

1999-2014 Member in various capacities, International Committee & Education Board, American Society for Microbiology, Washington DC.

1998-2000 Reviewer and Contributor, Undergraduate teaching resources. www.MicrobeLibrary.org

D. Publications and Contributions to Science

Refereed Journal articles (Sample)

1. Louis P, Mercer B, Cirone AM, Johnston C, Lee ZJ**, Esiobu N**, Li Z, Wei J, Dorey CK, Shibata Y, Nan C. Dietary chitin particles, "mimetic fungi", ameliorate colitis in TLR2/CD14- and sex- dependent manners. Infection and Immun (accepted 2/5/19)
2. Bukar, M. , Sodipo, O. , Dawkins, K. , Ramirez, R. , Kaldapa, J. , Tarfa, M. and **Esiobu, N.** (2019) Microbiomes of Top and Sub-Layers of Semi-Arid Soils in North-Eastern Nigeria Are Rich in Firmicutes and Proteobacteria with Surprisingly High Diversity of Rare Species. Advances in Microbiology, 9, 102118. doi: 10.4236/aim.2019.91008
3. Dawkins K and **Esiobu N** (2018) The Invasive Brazilian Pepper Tree (Schinus terebinthifolius) Is Colonized by a Root Microbiome Enriched With Alphaproteobacteria and Unclassified Spartobacteria. Front. Microbiol. 9:876. doi: 10.3389/fmicb.2018.00876
4. Dawkins Karim and Esiobu Nwadiuto (2017) Arbuscular and Ectomycorrhizal Fungi Associated with the Invasive Brazilian Pepper Tree (Schinus terebinthifolius) and two Native Plants in South Florida . Frontiers in Microbiology, Vol 8: 665 – 672.
5. Ibrahim A., Xiao-Lu Jin, Yu-Bin Zhang, Jessica Cruz, Paveena Vichyavichien, Nwadiuto Esiobu and Xing-Hai Zhang (2017) Tobacco plants expressing the maize nitrate transporter ZmNrt2.1 exhibit altered responses of growth and gene expression to nitrate and calcium. Botanical Studies 58:51 DOI 10.1186/s40529-017-0203-9 • Chakraborty S. and Esiobu N (2017) Metagenomic rDNA Profiles of the Oral Microbiome in Healthy Subjects Are Distinctive Compared to That in Smokers and Disease Subjects Despite High Variations between Subjects. Advances in Microbiology, 2017, 7, 158-174

6. C. Coarsey, N. Esiobu, R. Narayanan, M. Pavlovic, H. Shafiee, W. Asghar, (2017) “Strategies in Ebola Viral Disease (EVD) Diagnostics at the Point of Care,” Critical Reviews in Microbiology, Vol 37, Iss 4:
7. Dawkins, K and Esiobu, N. (2016). “Emerging insights on the role of soil microorganisms in plant invasion: the case of the brazilian pepper tree (Schinus terebinthifolius)”. Frontiers in Plant Sci. 7: 712 doi: 10.3389/fpls.2016.00712
8. Mohammadali Safavieh, Chad Coarsey, Nwadiuto Esiobu, Adnan Memic, Jatin Mahesh Vyas, Hadi Shafiee & Waseem Asghar (2016) Advances in Candida detection platforms for clinical and point-of-care applications. Critical Reviews in Biotechnology Apr 19:1 – 18.
9. Esiobu N. (2016) The case for bio-based economies in Africa. The African Technopolitan Ed-in chief Cosmas M. O. Ochieng, Vol 4: 66 – 73.
10. Toluleke Famuyiwa, James Kumi Diaka, Andrew Boe, Joubin Jebelli, Erik Noonburg, and Nwadiuto Esiobu (2015) Vitamin C impact on genistein-induced cell death in prostate cancer doi: 10.3390/ecms-1-b004, published: 16 October 2015.
11. Florida Atlantic University // M.S. Thesis 2016 (Supervised by Esiobu) “Microbial Aspects of Plant Invasion: An analysis of soil microbial communities associated with the Invasive Plant –Schinus terebinthifolius (Brazilian Peppertree) across Southeastern Florida”
12. Chakraborty, S., Persaud, V., Vanegas, S., Gautier, G. and Esiobu, N. (2014) Analysis of the Human Oral Microbiome of Smokers and Non-Smokers Using PCR-RFLP and Ribotyping. Advances in Microbiology, 2014, 4, 681-691
13. Igwe Enerst C., N Esiobu, P. C. Ojimelukwe (2014) Variations in the traditional starter culture for production of a Nigerian fermented milk product- (Kindirmo). J. Focusing on Modern Food Industry (FMFI) Vol 3:35-42
14. Esiobu N., Green M., Echeverry A., Bonilla T.D., Stinson C.M., Hartz A., Rogerson A. and McCorquodale D.S. (2013) High numbers of Staphylococcus aureus at three bathing beaches in South Florida. Int J Environ Health Res. 2013;23(1):46-57.
15. Mohammed R. L., Echeverry A., Stinson C.M., Green M., Bonilla T.D. Hartz A., McCorquodale D. S, Rogerson A. and N. Esiobu (2012) Survival trends of Staphylococcus aureus, Pseudomonas aeruginosa, and Clostridium perfringens in a sandy South Florida beach. Marine Pollution Bulletin 64 : 1201–1209.
16. Yamazaki Koske and Esiobu Nwadiuto (2012) Environmental Predictors of Pathogenic Vibrios in South Florida Coastal Waters. The Open Epidemiology Journal 5, 9-12

17. Adelekan OA and Esiobu N. (2012), Bacterial Succession Studies during Fermentation of African Locust Bean (Parkia biglobosa) to Iru Using Molecular Methods. British Biotechnology Journal 2(1): 49–59
18. Conway C.A, Esiobu N, and Lopez J.V. (2012), Co-Cultures of Pseudomonas aeruginosa and Roseobacter denitrificans reveal shifts in gene expression levels compared to solo cultures. The Scientific World Journal, Volume 2012, Article ID 120108, 5 pages doi:10.1100/2012/120108.
19. Hartz A., Cuvelier M., Nowosielski K., Bonilla T.D, Green M., Esiobu N., McCorquodale D.S, & Rogerson A. (2008) Survival Potential of Escherichia coli and Enterococci in the subtropical beach sand: Implications for water quality managers. J. Environ Qual. 37 (3) 898 – 905.
20. Tonya D. Bonilla, Kara Nowosielski, Marie Cuvelier, Aaron Hartz, Melissa Green, Nwadiuto Esiobu, Donald McCorquodale, Jay M Fleisher, Andrew Rogerson (2007). Prevalence and distribution of fecal indicator organisms in South Florida beach sand and preliminary assessment of health effects associated with beach sand exposure. Marine Pollution Bulletin 54 (9) p. 1472 – 1482.
21. Bonilla T.D., K. Nowosielski, N. Esiobu, D. McCorquodale, A. Rogerson (2006) Species assemblages of Enterococcus indicate potential sources of fecal bacteria at south florida recreational beach. Marine Pollution Bulletin 52 (2006) 807-810. (Published. Research &interpreted data)
22. Esiobu N. Mohammed R. Echeverry A. Green M., Bonilla T., Hartz A. McCorquodale D. & Rogerson A. (2004) The application of peptide nucleic acid probes for rapid detection and enumeration of Eubacteria, Staphylococcus aureus and Pseudomonas aeruginosa in recreational beaches of S. Florida. J. of Microbiological Methods, 57 (2) 157 – 162.
23. Esiobu N. and Hoosein N. (2003) An Assessment of the in vitro antimicrobial effects of two antiepileptic drugs – sodium valproate and phenytoin. Antonie van Leeuwenhoek 83: 63 – 68 • Esiobu N. and Yamazaki K. (2003) Analysis of Bacteria Associated with the Gut of Healthy Wild Penaeid Shrimps: A step towards effective probiotics in Aquaculture. J. Aqua. Trop., 18(4)275 – 286.
24. Esiobu N., Armenta, L. and Ike J.O. (2002) Antibiotic resistance in soil and water environments used for various activities. Int. J. of Environ. And Health Research 12 (2):133 – 144.
25. Rowen D., Esiobu N., and Magasanik B. (1997) Role of GATA-Factor Nil2p in Nitrogen Regulation of Gene Expression in Saccharomyces cerevisiae J. Bacteriology 179. 3761- 3766.
26. Esiobu N. (1994) Indigenous Bradyrhizobia populations in tropical farm-lands. Letters in Applied Microbiology 19: 466 – 467.
27. Amund, O.; Omole C A, Esiobu N. and Ugoji E O (1993) Effects of waste engine oil on soil physico-chemical and microbiological properties. Journal Sci, Res, Dev. Vol 1, No 1, pp61 – 64.

28. Esiobu N.; Amund O.O.; Fakile O. & O.H. Popoola (1991): Occurrence and distribution of sulphate reducing bacteria in a polluted lagoon. Biomedical Letters 46: 129 - 132.
29. Okoronkwo N. & Van Hove C. (1987): Dynamics of Azolla - Anabaena nitrogenase activity in the presence and absence of combined nitrogen. Microbios 45:39-45.
30. Okoronkwo N. and Odeyemi O. (1985): Effects of a sewage lagoon effluent on the microbiological quality of the receiving stream. Environmental Pollution (Series A) 37: 71 - 86.
31. Obiekwe C. O. and Okoronkwo N. (1982): Incidence of sulphate reducing bacteria in a tropical soil environment. Microbios Letters 21:113 - 116.

Book and Chapters in Books

1. Esiobu N. (2006) Use of Peptide Nucleic Acid Probes for Rapid Detection and Enumeration of Viable Bacteria in Recreational Waters and Beach Sand. In: Methods in Molecular Biology, vol 345: Diagnostic Bacteriology Protocols, 2nd Ed. Edited by: L. O'Connor, Humana Press In. Totowa, NJ pp. 131 -140.
2. Esiobu N., Mulongoy K. & Van Hove C. (1990): Nitrogen contribution of Azolla and Sesbania rostrata to rice. In: Nitrigen Fixation: Achievements and objectives. Eds. Gresshoff R. and Newton S. Chapman and Hall, New York. 656 – 657

Proceedings

1. Van Hove, C. Derouck, M. Ramirez, C. and Esiobu-Okoronkwo, N (1990). Differential sensitivity to salinity of Azolla and Anabaena azollae Proceedings of the 3rd conference of the African Assoc. for Biological Nitrogen Fixation. Collection Actes de l'ISRA, 22 – 28.
2. Odeyemi O. & Okoronkwo N. (1985):The suitability of local materials as carriers for rhizobia in legume inoculant production in Nigeria. Proceedings of the first conference of the African Association for Biological Nitroge Fixation (AABNF) held in Nairobi, Kenya; 23 – 27. July 1984. Eds H. Ssalli and S.O. Keya. (AABNF, Nairobi). pp 135 - 150.

Refereed Abstracts / Poster Presentations

- Lovenie Talien, Zach Hollendonne and Nwadiuto Esiobu (2019) Using a High-Throughput System to Manipulate Biotic Signaling and Physicochemical Parameters While Screening for Bioactive Molecules (No Bacterium Left Behind) - (Second place winner, FAU Research Symposium, April 2019, Boca Raton)
- Hadiza Umar. Erica Hennessy, Brian Mercer and Nwadiuto Esiobu (2019) Keeping Florida Beaches safe: Use of HF183 and Bac Hum Biomarker genes for rapid public health risk assessment of Florida Beaches

- Lee M Sanchez, Mariana Zuleta, Brian Mercer and Nwadiuto Esiobu (2019) Rapid Method for Human health risk assessment of the swash zone (wet beach sand) of South Florida Beaches (Overall best in show winner of 200 participants. FAU Research Symposium, April 2019, Boca Raton)
- Laurent Lorquet, Alejandro Acuna and Nwadiuto Esiobu (2019) Early Detection of Ganoderma Butt Rotin Palm Trees: Finding the Silent Killer, (First Place winner
- Yasmine Sanhaji, Karina Murillo, Melissa Voom, Karim Dawkins, Don McCorquordale and Nwadiuto Esiobu (2019) Data mining of 16S rDNA Sequence Reads from Rhizobiomes of Cultivated and non-cultivated Citrus Fields of Central Florida
- Ali Hamadeh. Brian Mercer and Nwadiuto Esiobu (2019) Improving public health risk assessment in warer ways using qPCR and metagenomic shot gun sequencing (FAU Research Symposium, April 2019, Boca Raton)
- Esiobu N., Dawkins, K, *Faiza N, *Hill Z. and McCorquodale (2018) "Assessment of the bacterial community structure of Citrus plants on managed and undisturbed historical groves in Florida and at different levels of infection" - American Society for Microbiology Annual Meeting, Atlanta, GA USA (*OURI Undergraduates)
- Lisa Meday, Brian Mercer and Nwadiuto Esiobu (2018) DNA Analysis of Bacteria in Tribal Surface Waters. EPA Region 4 RTOC Meeting; June 12-14, 2018. Seminole Tribe of Florida. EPSIII Seminole Tribe ERMD Water Quality.
- Esiobu N. 2018. The Role of Biotechnology in the Restoration of the Lake Chad Basin Ecosystem. UNESCO and GON Multinational Summit on Revitalizing Lake Chad for Sustainable Livelihood, Security and Development; Feb 2018. Lagos Nigeria
- Michael Teti; Douglas Holmes; Rachel St Clair; Abrian Miller; Rachel Vanzant; Valentina Buitrago; David Dunleavy; Sherlee Rivera; Ariana Staton; Karim Dawkins; PhD; Mirjana Pavlovic, PhD; Elan Barenholtz, PhD; William Edward Hahn, PhD; and Nwaduito Esiobu Ph.D. (PI) (2017) Deep Learning Sequence Prediction for Synthetic Biology and Genetic Engineering. iGEM2017, Boston MA. Nov. 10 – 13, 2017
- Holmes D., Coarsey C, Asghar W. and Esiobu, N. (2019) Synthetic Biology Constructs of Bacteria Surrogates for Ebola Virus are Stable and Safe for Rapid Detection studies in a BSL-2 Laboratory Setting. Applied Microbiology and Biotechnology (journal article in prep)

RECENT PROPOSALS SUBMITTED AND RESEARCH ACTIVITIES

Department of Energy pre-applications submitted to the Terrestrial Ecosystem Science Funding Opportunity Announcement, DE-FOA-0002043. 500,000. Encouraged to apply 2/8/2019

Florida Sea-Grant 2018 – 2020 from National Oceanographic Agency (NOAA), Advancing public health risk assessments of beaches using metagenomics whole genome sequencing: Evaluation of indicator-based protocols & emerging cost-effective sequencing technologies (Co-PI), $200,000.00 with D. McCorquodale and S. Elmir. Submitted in Summer 2017.

Florida Department of Agriculture and Consumer services. (FDAC). A NOVEL & VERSATILE VECTOR SURVEILLANCE PROTOCOL FOR EFFECTIVE RISK PREDICTION & CONTROL OF MOSQUITO-BORNE ARBOVIRUSES IN FLORIDA (PI) $140,706.00 with W. Asghar Summer 2017.

Florida Citrus Development Research Council. Sequencing and Functional Genomics of Microbiomes Associated with Florida Citrus Plants in Health and Citrus Greening Disease: A first step toward potential selective induction of resistance. (PI) $308,000? With McCorquodale and G. Duncan Fall 2016

GRADUATE ADVISORS AND POSTDOCTORAL SPONSORS

Boris Magasanik, Massachusetts Institute of Technology (Late); Charles Van Hove, Univeristy of Louvain, LLN, Belgium (Emirutus); David Eskew, International Atomic Energy Agency, Vienna; Olu Odeyemi, Obafemi Awolowo University, Ife, Nigeria

THESIS ADVISOR AND POSTGRAGUATE –SCHOLAR SPONSOR

Ph.D. Students – Karim Dawkins (Current), Victoria Nwaokolo (Current), Lilian Ekpete (Committee member - current), Ernest Igwe 2010 (CoAdvisor), now at Nnamdi Azikiwe University, Gabby 2016 (Member Advisors), Aminat Adelekan 2012 (Co-Advisor), Bells University of Technology, Ota Nigeria, Kendra Merchant (University in Georgia) and Abhijeet Kate (In Idia) M.S. Students – Douglas Holmes, Erick Espana, Brian Mercer (current) Past – Shreya Charkraborty, Sushma Ponukumati, Caroline Efstathion, Koske Yamazaki, Melissa Green, Ian Moench, Crystal Conway, Renuka Mohammed, Britany Coldwell and many more . Undergraduate researchers – More than 100 undergraduates Visiting scholars – Yubin Zhang, China, Abubakar Ibrahim, Danlami Bello, Adamu Wurochekke, Nigeria and Dr Kate Nnamani, Nigeria

Other presentations, invited talks and activities

1) Esiobu N. 2017 Lifestyle & Microbiomes: Key to Good Health in a sustainable Environment Inaugural Lifestyle Medicine Conference 2017. Lifestyle Medicine Association of Nigeria. Global Distance Learning Institute, CBD, Abuja, Nigeria. August 5, 2017

3) Esiobu N. 2018 Bioenterprises and Biotechnology for Development: Plenary talk at BSN Minna

4) Esiobu N. 2018. BIOTECHNOLOGY: Key to Achieving Sustainable Development Goals (SDGs) Keynote Address at the 31st International Conference Of The Biotechnology Society Of Nigeria Covenant University, Ota, Ogun State, Nigeria. August 5 – 9, 2018

5) Esiobu N. 2018 MICROBIOMES: Next Frontiers in Medicine, Agriculture, Industry and Environment A Plenary talk at the 31st International Conference of The Biotechnology Society Of Nigeria Covenant University, Ota, Ogun State, Nigeria. August 5 – 9, 2018

D. <u>Ongoing Research Support</u>

- Microbial Aspects of Plant Invasion – (PI) Personal sources, FAU Faculty development funds, FAU Graduate School Grants to PhD student – Karim Dawkins 2016 – 2020

- Advancing public health risk assessments of beaches using metagenomics whole genome sequencing: Evaluation of indicator-based protocols & emerging cost-effective sequencing technologies (PI) Personal sources, FAU Faculty development grants, Teaching Assistant-ship to MS candidate Brian Mercer

- Rapid detection of pathogens of agricultural and environmental relevance in Florida using various molecular techniques. FAU Undergraduate research grant (PI) 2019 -2020

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Frazier, Evelyn M.

eRA COMMONS USER NAME (credential, e.g., agency login): EFRAZIER

POSITION TITLE: Senior Instructor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
State University of Campinas –UNICAMP- S. P., Brazil	B.S.	12/1987	Biology (and Biology Education)
State University of Campinas, - UNICAMP- S.P., Brazil	M.Sc.	04/1991	Ecology
Northern Arizona University. USA	Ph.D.	04/1996	Biological Sciences
Federal University of Minas Gerais, M.G., Brazil	Postdoctoral	07/1999	Insect Plant Interactions

A. Personal Statement

I am a trained in insect ecology and have been conducting research on gopher tortoise biology in South Florida. The research projects on gopher tortoise biology have been conducted by undergraduate students over the past 10 years. The gopher tortoise biology research project was developed with the intention of providing data for management of the gopher tortoise population at the FAU Boca Raton, and field research experiences for undergraduate students. My lab has trained one master student and close to 70 undergraduate students since 2010. All research projects were funded by FAU undergraduate research grants (US$15,000), and FAU tech fee grants (US$81,624.9). Four publications with undergraduates as co-authors have been published and several more are in the writing process.

I am also interested in biology education through my involvement as a co Pi in two NSF undergraduate research training grants (2009-2013; 2015-2020), and with the HHMI funded Summer Institutes (2006, 2009, 2012) and the National Research Mentoring Network (2016-current). I have developed two undergraduate research programs: Introduction to Biological Research and Honors Thesis Program which have trained 188 undergraduate students and 96 students respectively in 10 years. I have also collaborated in the development of the research mentoring curriculum for NSF LEARN program for freshman and transfer students across three institutions. I have collaborated with 10 modules for the second version of the book “Entering Research: A Curriculum to Support Graduate and Undergraduate Research Trainees” (Branchaw, J.l., Butz, A.R. and Smith, A.R. 2019). My involvement with NRMN has resulted in my certification as a Master Facilitator to implement the Entering Mentoring Seminars and as a Facilitator of the Entering Research Curriculum. I hope on training more faculty at FAU to implement these curricula.

B. Positions and Honors

2019 – University Instructor in the Department of Biological Sciences, FAU
2012 – Senior Instructor in the Department of Biological Sciences, FAU
2004 – Instructor in the Department of Biological Sciences, FAU
2000 – Visiting Researcher in the Department of Biological Sciences, FAU

C. Contributions to Science (undergraduate students indicated by *; author’s maiden and married names in bold).

As an undergraduate and master students at the State University of Campinas (UNICAMP) in Brazil, my interests in arthropod ecology resulted on a project on the population biology of social spiders in the genus *Anelosimus*. The project led to a master thesis and two publications on the social behavior of three *Anelosimus* species: *A. jabaquara, A. dubiosus* and *A. eximus.* Two undergraduate students were co-authors in these publications (*).

Vasconcelos-Netto, Joao, Andrea Luisa Tome Souza*, **Evelyn Sodre Alckmin Marques** and Fabiana Ferraz. 1995. Comportamento social de *Anelosimus eximus* (Theridiidae: Araneae) Anais de Etologia 13: 217-230.

Marques, Evelyn Sodre Alckmin, Joao Vasconcelos-Netto and Maeve Britto Mello*. 1998. Life History and Social Behavior of *Anelosimus jabaquara* and *Anelosimus dubiosus* (Theriddidae: Araneae). Journal of Arachnology 26: 66-76.

In 1991 I was awarded a fellowship by the Brazillian government research agency –CNPq - to conduct my Ph.D at Northern Arizona University under the advisement of Dr. Peter Price. My research interests in studying insect community ecology led to a project comparing factors that structured insect herbivore communities on legumes in the Sonoran Desert in Arizona to those in the Brazillian Cerrado. Resource availability seemed to be the main driving force structuring insect communities within the legumes in the Sonoran Desert (temperate), given the short window of time available for plant growth and reproduction. No clear pattern emerged for insect herbivore communities in the tropics, were we documented a high number of insect herbivore species with consistently very low abundances year round on cerrado legumes. Four publications resulted from my Ph.D. work.

Marques, Regina Sodre Alckmin*, **Evelyn Sodre Alckmin Marques** and Peter Winfred Price. 1994. Female Behavior and Oviposition Choices by an Eruptive Herbivore, *Dysonycha pluriligata* (Coleoptera: Chrysomelidae). Environmental Entomology 23: 887-892.

Price, Peter Winfred, Ivone Roberta Diniz, Helena Castanheira Morais and **Evelyn Sodre Alckmin Marques**. 1995. The Abundance of Insect Herbivore Species in the Tropics: The High Local Richness of Rare Species. Biotropica 27: 468-478.

Marques, Evelyn Sodre Alckmin and Peter Wilfred Price. 1998. Altitudinal Gradients in Insect Herbivore Communities on Tropical Legumes. Brazilian Journal of Ecology 2: 66-73.

Marques, Evelyn Sodre Alckmin, Neil Cobb and Peter Winfred Price. 2000. Resource Abundance and Insect Herbivore Diversity on Woody Fabaceous Desert Plants. Environmental Entomology 29 (4): 696-703.

I returned to Brazil in 1997 for a postdoctoral fellowship funded by CNPq at the Insect Plant Interactions Laboratory working along side Dr. Geraldo Wilson Fernandes at the University of Minas Gerais (UFMG) in Belo Horizonte. I had the opportunity to work on galling insect species on several plant species but focusing on the genus Baccharis. As a postdoc in the lab I mentored several undergraduate and graduate students on their research projects and conducted my own project on determining the role of plant growth on structuring the galling insect community on *Baccharis concinna*. Four publications resulted with undergraduate (*) and graduate students.

Allain, Luciano Roberto*., Angela Camila Flores Lara*, Geraldo Wilson Fernandes and **Evelyn Sodre Alckmin Marques**. 1998. Leaf Tannin Concentration, Toughness in Woody Species of the Savannas of Southeastern Brazil. BIOS 6:5-10.

Riberio-Mendes, Humberto Neto*, **Evelyn Sodre Alckmin Marques**, Ivoneide Maria Silva* and Geraldo Wilson Fernandes. 2002. Influence of host-plant sex and habitat on survivorship of insect galls within the geographical range of the host-plant. Tropical Zoology 15:5-15.

Fernandes, Geraldo Wilson, Fabiana Maria Camila Castro* , Mauricio Lima Faria*, **Evelyn Sodre Alckmin Marques** and Mario Brito Grego. 2004. Effects of Hygrothermal Stress, Plant Richness, and Architecture on Mining Insect Diversity. Biotropica 36 (2): 240-247

Marques, Evelyn Sodre de Alckmin and Geraldo Wilson Fernandes. 2016. The gall inducing insect community on *Bacharis concinna* (Asteracea): the role of shoot growth rates and seasonal variations. Lundiana International Journal of Biodiversity 12(1): 17-26 – ISSN 1676-6180

As a visiting professor/instructor at Florida Atlantic University (2000) I expanded my research interests to the biology and conservation of the Gopher tortoise population at the FAU Boca Raton campus. I developed research projects that could engage undergraduate students in field research and provide data for the University to adequately manage the gopher tortoise population on campus. I collaborated with several faculty to develop projects that were outside of my area of expertise.

Scholl, Joshua*,Tobin Hindle and **Evelyn Marques Frazier**. 2012. Population structure and burrow placement of *Gopherus polyphemus* in a small, declining southeast Florida conservation area. FAU Undergraduate Research Journal, Volume 1 (1): 23-26.

Lauck, Marina*, Owen, Diane and **Frazier, Evelyn Marques** 2013. An analysis of the vegetation within the FAU preserve as a basis for management of scrub habitat for *Gopherus polyphemus*. Florida Atlantic University Undergraduate Research Journal. 2 (1): 7-14.

Jessica N. Huffman, Kent S. Haizlett*, Dana K. Elhassani*, Brian T. Cooney*, and **Evelyn M. Frazier. 2018**, "A Survey of *Gopherus polyphemus* Intestinal Parasites in South Florida," Journal of Parasitology Research, vol. 2018, Article ID 3048795, 10 pages, 2018. https://doi.org/10.1155/2018/3048795.

Cooney, Brian*, Danna Elhassani*, Arafat Bari*, Jessica Huffman, and **Evelyn Marques Frazier**. 2019. Prevalence and Parasitaemia levels of *Hepatozoon* sp. (Apicomplexa: Adeleorina) within four South Florida *Gopherus polyphemus* populations. Journal of Wildlife Diseases 55(3) In press. DOI:10.7589/2018-02-034

My involvement with the development of undergraduate research programs at FAU through two NSF grants and with the Summer Institutes and the National Research Mentoring Network let to a collaboration with the authors of the second edition of the book below, to which I collaborated with 10 modules.

Branchaw, Janet, Amanda Butz and Amber Smith. 2nd edition. 2019. "Entering Research: A Curriculum to Support Undergraduate and Graduate Research Trainees. Macmillian. Collaborated with 10 chapters. Page numbers not available at this time. Available for Free download at http://cimerproject.org

Full publication record and citations:

https://scholar.google.com/citations?user=vPxhGl0AAAAJ&hl=en

D. Additional Information: Research Support and/or Scholastic Performance

Ongoing support:

NSF- IUSE- 1524601
NSF-LEARN (2015-2020)
LEARNing To Build STEM Research Communities- A Collaborative Proposal to Strengthen, Expand, and Disseminate a Successful Retention Model.
Total Award: US$400,00
Co-Pi (PI: Donna Chamely-Wiik; CoPi: Daniel Meeroff)
Co-PIs (with titles and institutions):
University of Central Florida: PI Kimberly Schneider; Co-PI Michael Aldarondo-Jeffries
Florida Atlantic University: PI:Donna Chamely-Wikk, Co-PI's:D. Meeroff, E. Frazier
Western Carolina University: PI Allison Morrison-Shetlar, CoPI William Kwochka

Completed
NSF – URM- 0829250
NSF –Undergraduate Research and Mentoring Program (2009-2013)
Total Award: US$700,000.00,
Co-Pi (PI: Rodney Murphey)

BIOGRAPHICAL SKETCH
Dale E. Gawlik

Education

University of Wisconsin Stevens Point;	B.S. Wildlife	1984
Winthrop College	M.S. Biology	1988
Texas A&M University	Ph.D. Wildlife Science	1994

Academic appointments

2007-present	Director, Environmental Science Program, Florida Atlantic University
2013-present	Professor, Department of Biological Sciences, Florida Atlantic University (advised 10 PhD students, 20 MS students, 35 BS students, and 2 Postdoctoral Associates)
2011-2012	Senior Visiting Fellow, Australian Wetlands and River Centre, University of New South Wales.
2008-2013	Associate Professor, Department of Biological Sciences, Florida Atlantic University
2003-2008	Assistant Professor, Department of Biological Sciences, Florida Atlantic University
1994	Postdoctoral Research Associate, Texas A&M University
1993-1994	Tom Slick Senior Graduate Fellow, Texas A&M University

Non-academic appointments

1994-2003	Senior Environmental Scientist, Everglades Division, South Florida Water Mgt. District

Certifications

Certified Senior Ecologist, The Ecological Society of America, 2006 to present.
Master Bird Bander, U.S. Geological Survey Bird Banding Lab, 2004 to present.
Certified Wildlife Biologist, The Wildlife Society, 1999 to present.

Current membership in professional organizations

American Society for Ornithology
Association of Field Ornithologists
Ecological Society of America
Florida Chapter of The Wildlife Society
Florida Ornithological Society
IUCN Heron Specialist Group
IUCN Stork, Ibis, and Spoonbill Specialist Group
The Wildlife Society
Waterbird Society
Wilson Ornithological Society

Honors and awards

Keynote address, Florida Ornithological Society, Davie, FL, 2018
Plenary Speaker, Annual Conference of the Florida Chapter of The Wildlife Society, Gainesville, FL, 2017.
Researcher of the Year (Professor level), Charles E. Schmidt College of Science, Florida Atlantic University, 2016.
Researcher of the Year (Associate Professor level), Florida Atlantic University, 2009.
Plenary speaker, Symposium on Coastal Restoration and Enhancement through Science and Technology (CREST), Thibodaux, LA, 2003.
Elective Member, American Ornithologists Union, 2002 to present.

Select service activities

Elected positions:

Councilor, Waterbird Society, 2017-2019
Secretary, Association of Field Ornithologists, 2016-2017, 2018-2019
Councilor, Wilson Ornithological Society, 2016-2018.
Councilor, Association of Field Ornithologists, 2013-2016.
President-elect, President, Past President, Vice President, Secretary, Representative to the Southeast Section of The Wildlife Society, Executive Board Member at Large, Florida Chapter of The Wildlife Society, 2001 -2014.
Chair Elect, Chair, Past Chair, Restoration Working Group, The Wildlife Society, 1999-2003.
Other service activities:
Steering Committee, IUCN Heron Specialist Group Symposium, 2016
Research Advisory Council, Rookery Bay National Estuarine Research Reserve, 2015.
Program Committee, 2015, 2017, and 2019 Greater Everglades Ecosystem Restoration Conferences, 2013-2019.
Science Advisory Committee, Gulf Coast Bird Observatory, Lake Jackson, TX, 2012–15.
Science Advisory Committee for the Whooping Crane Eastern Partnership, U.S. Fish and Wildlife Service, 2011-present.
Dissertation Reviewer, University of New South Wales, Sydney, Australia, 2010.
Dissertation Reviewer, University of New England, Armidale, Australia, 2010.
Chair, Boating Diving Safety Committee, Florida Atlantic University, 2017-2018
Search Committee for Director of Harbor Branch Oceanographic Institute, Florida Atlantic University, 2015-2016.

Select peer-reviewed publications (9 recent out of 71 total)

- Calle, L., L. Green, A. Strong, and D. E. Gawlik. 2018. Time-integrated habitat availability is a resource attribute that informs patterns of use in intertidal areas. Ecological Monographs 88: 600-620.
- Klassen, J. A. and D. E. Gawlik. 2018. Does a long-term shift in Wood Stork diet foreshadow adaptability to human-induced rapid environmental change? Journal of Field Ornithology 89:126-139.
- Chastant, J. E. and D. E. Gawlik. 2018. Water-level fluctuations influence wading bird prey availability and nesting in a managed lake ecosystem. Waterbirds 41: 35-45.
- Klassen, J. A. and D. E. Gawlik. 2017. Tradeoffs between fine-scale site measurements and coarse sensory data for long-term monitoring of pulsed wetlands. Freshwater Biology 62: 649-663.
- Chastant, J. E., M. L. Petersen, and D. E. Gawlik. 2017. Nesting substrate and water-level fluctuations influence wading bird nesting patterns in a large shallow eutrophic lake. Hydrobiologia 788: 371-383.
- Klassen, Jessica A., D. E. Gawlik, and P. C. Frederick. 2016. Linking Wading Bird Prey Selection to Number of Nests. Journal of Wildlife Management 80: 1450-1460
- Botson, Bryan A., D. E. Gawlik, and J. C. Trexler. 2016. Mechanisms that generate resource pulses in a fluctuating wetland. PLoS ONE 11: e0158864.
- Calle, L., D. E. Gawlik, Z. Xie, L. Green, B. Lapointe, and A. Strong. 2016. Effects of tidal periodicities and diurnal foraging constraints on the density of foraging wading birds. Auk 133: 378-396.
- Beerens, J. M., P. C. Frederick, E. G. Noonburg, and D. E. Gawlik. 2015. Determining habitat quality for species that demonstrate dynamic habitat selection. Ecology and Evolution 5: 5685-5697.

Select professional development activities

- *Co-organized symposium,* System-wide science: translating a trophic hypothesis foundation for restoration. Greater Everglades Ecosystem Restoration Conference, Coral Springs, FL, 2015
- *Co-organized symposium*, Biology of the Great Egret. Waterbird Society Conference, La Paz, Mexico, 2015.
- *Panelist* for evaluation of Society of Ecological Restoration International Primer on Ecological Restoration. Conference on Ecological and Ecosystem Restoration, New Orleans, 2014.

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Godenschwege, Tanja Angela

eRA COMMONS USER NAME (credential, e.g., agency login): godenschwege

POSITION TITLE: Professor of Biological Sciences

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Universitaet Wuerzburg, Germany	M.S.	02/1995	Genetics and Neurobiology
Universitaet Wuerzburg, Germany	Ph.D.	05/1999	Genetics and Neurobiology
University of Massachusetts, USA	Postdoctoral	08/2006	Neurobiology

A. Personal Statement

The PI received excellent training in a broad spectrum of molecular, genetic and behavioral techniques during her graduate studies under my advisor Erich Buchner in the Department of Genetics and Neurobiology of Martin Heisenberg. As a postdoc with Rodney Murphey at the University of Massachusetts she expanded her skill set with hands on knowledge in electrophysiological and imaging approaches including confocal as well as transmission electron microscopy. The main focus of the lab is the understanding of the cellular basis of neurological diseases and the mechanisms involved in synapse formation and maintenance. A second focus of the lab is the discovery of novel drugs that affect the function of the nervous system and may be used as therapeutic agents for neurological disorders and conditions. For almost two decades the PI had characterized the distinct functions of well-known guidance molecules in synapse formation. More recently, the lab has shifted the focus on the distinctive roles of proteins in the cytoplasm and nucleus to maintain neuronal function and survival in the adult. The lab adapted and developed an array of methods, such as live imaging of proteins and organelle trafficking and cellular fractionations to characterize protein trafficking and distinguish between their non-nuclear and nuclear functions. The model system, the Drosophila Giant Fiber Circuit (GFC), provides a unique opportunity to dissect molecules and mechanisms at single cell resolution in the central nervous system (CNS). With the full range of anatomical, electrophysiological, molecular and genetic tools of Drosophila the PI's lab is well suited to characterize the roles of genes in nervous system development and degeneration at cellular and molecular levels to study gene function in neurodegenerative disorders, ageing and oxidative stress.

Since the establishment of the PI's lab at FAU, the PI has graduated five Ph.D. students and five master's students. In addition, over 30 undergraduates and 3 high school students have been engaged in research in the lab, with ten undergraduates being Honors thesis students, all of which have successfully graduated. The PI is only aware of the whereabouts of fourteen undergraduate students; twelve entered medical school or MPH programs, three graduate school and one the *Postbac* IRTA program. The PI's lab currently consists of one Ph.D. student, one postdoc and four Honors thesis undergraduate students. The PI has demonstrated commitment to engage undergraduate in research by securing additional funding from FAU, such as the SURF fellowships (Brittany Henry, Richelle Poulos, Brandon Lajeunesse), John Nambu Summer Research Scholarships (Stacy Cabral, Micael Idani, Veronica Nunez, Srigita Madiraju, Rameen K Walters, Ryan Sobel),

Harriet L. Wilkes Honors College Summer Research Scholarships (Anna Riso) and OURI Undergraduate Research grants (Brittany Henry, Richelle Poulos, Brandon Lajeunesse, Supriya Gudi, Sophia Khan). While the PI is responsible for the scientific oversight, undergraduates are usually also co-mentored by graduate student or postdoc. The co-mentored system does not only allow for more effective and balanced training of the undergraduates but also allows the graduate student and postdoc to gain mentoring experience, which is critical for their own academic career. Undergraduate students are usually trained in a broad spectrum of approaches, such as molecular techniques (e.g. western blots, cellular fraction), genetics, electrophysiology, behavioral assays (e.g. life span, oxidative stress assays), immunocytochemistry and live imaging using confocal microscopy. One-one meetings by the PI and co-mentor on an as needed basis, maintenance of a lab notebook and regular presentations in lab meetings allow guiding the undergraduates with respect to rigorous experimental design, analysis, interpretation and presentation of their results. Constructive feedback on presentation skills and guidance on the construction of research posters for the presentation at symposium and conferences have also honed the scientific skill of undergraduates in the past. Graduate and undergraduate students presented their work on regular basis at numerous local and national conferences (e.g. Society for Neuroscience meeting and the Drosophila Neurobiology meeting as well as the Axon guidance, synapse formation & regeneration meeting in Cold Spring Harbor, Annual South Florida Research Drosophila Consortium Meeting, Annual Undergraduate Research Symposium of OURI at FAU, Max Planck Sunposium, Wilkes Honors College Scholarly and Creative Symposium, or Scripps Research Institute's Undergraduate Summer Research symposium) and are authors and co-authors of numerous publications (undergraduates, highlighted in bold, and graduates, underlined, in the publications below are).

1. Priyanka P. Kakad, Tyrone Penserga, **Blake P. Davis, Brittany Henry**, Jana Boerner, **Anna Riso**, Jan Pielage, and Tanja A. Godenschwege. An ankyrin-binding motif regulates nuclear levels of L1-type neuroglian and expression of the oncogene *Myc* in Drosophila neurons (2018). Journal of Biological Chemistry, 9;293 (45). PMCID: PMC6231124.
2. Augustin H, McGourty K, Allen MJ, Madem SK, Adcott J, Kerr F, Wong CT, Vincent A, Godenschwege T, Boucrot E, Partridge L. Reduced insulin signaling maintains electrical transmission in a neural circuit in aging flies (2017). PLoS biology;15(9):e2001655. Epub 2017/09/14. doi: 10.1371/journal.pbio.2001655. PubMed PMID: 28902870. PMCID: PMC5597081.
3. Kudumala SR, Penserga T, Boerner J, Slipchuk O, Kakad P, Lee LH, **Qureshi A,** Pielage T and Godenschwege TA (2017). Lissencephaly-1 dependent axonal retrograde transport of L1-type CAM Neuroglian in the adult drosophila central nervous system. PlosOne, * equal contribution. PLoS ONE 12(8): e0183605. PMCID: PMC5570280
4. Maria E. Yurgel, Priyanka Kakad, Meet Zandawala , and Dick Nassel, Tanja A.Godenschwege, and Alex C. Keene: A single pair of leucokinin neurons are modulated by feeding state and regulate sleep-metabolism interactions (2019), Plos Biology, Feb 13;17(2):e2006409. doi: 10.1371/journal.pbio.2006409.
5. Storkebaum E, Leitao-Goncalves R, Godenschwege T, Nangle L, Mejia M, Bosmans I, et al. Dominant mutations in the tyrosyl-tRNA synthetase gene recapitulate in Drosophila features of human Charcot-Marie-Tooth neuropathy (2009). Proceedings of the National Academy of Sciences of the United States of America;106(28):11782-7. PMCID: PMC2702257.

B. Positions and Honors

Positions and Employment

2006-2011	Assistant Professor, Florida Atlantic University (FAU), Department of Biological Sciences Associate Director, FAU IB-Ph.D. program Member, Florida Bioinformatics Research Consortium Faculty, FAU Center for Molecular Biology and Biotechnology Affiliated Faculty, FAU Charles E Schmidt College of Biomedical Sciences
2011-2017	Associate Professor, FAU, Department of Biological Sciences
2017- Present	Professor, FAU, Department of Biological Sciences**,** Faculty of International Max Planck Research School (IMPRS) Brain and Behavior, Affiliate Faculty Harriet L. Wilkes Honors College

Other Experience and Professional Memberships

2000-2006, 2008	Course Instructor, "Neurobiology of Drosophila" summer course at Cold Spring Harbor Laboratories, NY
2002-	Member, Society for Neuroscience
2006-	Member, American Association for the Advancement of Science
2011-2012, 2015, 2017	NIH Peer Review Committee: Synapses, Cytoskeleton and Trafficking Study Section [SYN], ad hoc reviewer
2016, 2017	NIH Peer Review Committee: Special Emphasis panel, ZRG1 CB-T(81) study section
2005, 2011 & 2012	NSF Peer Review Committee: IOS - Animal Developmental Mechanisms, IOS – Modulation, MCB – Cellular Systems, IOB – Developmental Systems cluster, ad hoc reviewer
2013	Welcome Trust UK, ad hoc reviewer
2014	Parkinson's UK, ad hoc reviewer
Journal Reviewer:	Nature, Current Biology, FLY, Journal of Neurobiology, Biochimica et Biophysica Acta, Plos Genetics, Plos One, Developmental Neurobiology, Journal of Comparative Neurology, Journal of Neurogenetics, Journal of Visual Experiments, Oxford University Press

Honors

1995-1998	Fellowship, "Graduierten Kollegium Arthropodenverhalten" in Wuerzburg
1999-1999	Postdoctoral Fellowship, " Graduierten Kollegium Arthropodenverhalten" in Wuerzburg
2009	Graduate Student Mentor Award of the FAU Graduate Student Association
2011	Researcher of the Year Award 2010-2011, FAU
2011	Research Assistant Professor of the Year
2011	Warren Lloyd Holtzman seed grant, FAU Charles E Schmidt College of Science
2017	Exceptional Faculty Award nominee, Northern Campus Achievement Awards

C. Contributions to Science

1. A major research focus had been in unraveling the molecules and mechanisms in synapse formation. For numerous well-known guidance molecules, we were the first to describe that they also have disctinct roles in synaspe formation. In addition, we revealed that often the function of a protein is distinct in our central nervous system model neuron (the Drosophila Giant Fiber) when compared to its role in the peripheral nervous system (PNS, larval neuromuscular junction or photoreceptor neurons). In particular for Semaphrin 1a, we were the first to reveal in the nervous sytem that in addition to its well-known function as a ligand, it's also able to signal in reverse.
    a. Godenschwege TA, Hu H, Shan-Crofts X, Goodman CS, Murphey RK. Bi-directional signaling by Semaphorin 1a during central synapse formation in Drosophila. Nature Neuroscience. 2002;5(12):1294-301. PubMed PMID: 12436113.
    b. Godenschwege TA, Simpson JH, Shan X, Bashaw GJ, Goodman CS, Murphey RK. Ectopic expression in the giant fiber system of Drosophila reveals distinct roles for roundabout (Robo), Robo2, and Robo3 in dendritic guidance and synaptic connectivity. Journal of Neuroscience. 2002;22(8):3117-29. PubMed PMID: 11943815.
    c. Murphey RK, Froggett SJ, Caruccio P, Shan-Crofts X, Kitamoto T, Godenschwege TA. Targeted expression of shibire ts and semaphorin 1a reveals critical periods for synapse formation in the giant fiber of Drosophila. Development. 2003;130(16):3671-82. PubMed PMID: 12835384.
    d. Lee LH, Godenschwege TA. Structure-function analyses of tyrosine phosphatase PTP69D in giant fiber synapse formation of Drosophila. Molecular and Cellular Neurosciences. 2015;64C:24-31. PMCID: PMC4323884.

2. For L1-type CAM neuroglian (Nrg) we uncovered a novel synaptic role that is distinct from its function during guidance. We teamed up with the Jan Pielage lab for a thorough analysis in the PNS (larval NMJ, Pielage lab) and the CNS (GF, Godenschwege lab). We discovered that at the NMJ as well as in the GF the

ankyrin-binding motif found in Nrg has a synaptic role but not a guidance role and that the mechanisms involved and functions are distinct in both types of neurons. In addition, we were able to reveal that Nrg has a function in synaptic plasticity/stability and is able to signal transsynaptically.

a. Godenschwege TA, Kristiansen LV, Uthaman SB, Hortsch M, Murphey RK. A conserved role for Drosophila Neuroglian and human L1-CAM in central-synapse formation. Current Biology: 2006;16(1):12-23. PubMed PMID: 16401420.

b. Godenschwege TA, Murphey RK. Genetic interaction of Neuroglian and Semaphorin1a during guidance and synapse formation. Journal of Neurogenetics. 2009;23(1-2):147-55. PMCID: PMC2782640.

c. Enneking EM*, Kudumala SR*, Moreno E, Stephan R, Boerner J, Godenschwege TA[#], Pielage J[#]. Transsynaptic coordination of synaptic growth, function, and stability by the L1-type CAM Neuroglian. PLoS Biology. 2013;11(4):e1001537. PMCID: PMC3627646****equal contribution,** [#]**corresponding authors.***

d. Kudumala S, Freund J, Hortsch M, Godenschwege TA. Differential effects of human L1CAM mutations on complementing guidance and synaptic defects in Drosophila melanogaster. PloS One. 2013;8(10):e76974. PMCID: PMC3796554.

3. A distinct research focus of my lab is the discovery of novel compounds that affect the function of the nervous system to identify potential therapeutic agents for neurological disorders. We developed a novel assay that allows in vivo screening of compounds for biological activity using only small quantities. This assay is in particular useful to identify and characterize coumponds that bind to acetylcholine receptors. Interestingly, we recently published the description of a novel α-conotoxin, that selectively binds to insect acetylcholine receptors but not to vertebrate receptors. This suggests that this assay may also be useful to identify potential pesticides that are not harmful to human health. During these studies we also generated new genetic tools to disrupt synaptic transmission of cholinergic synapse, which are now used by numerous labs to study cholinergic contributions to circuit functions and behavior.

   a. Mejia M, Heghinian MD**, Busch A**, Armishaw CJ, Mari F, Godenschwege TA. A novel approach for in vivo screening of toxins using the Drosophila Giant Fiber circuit. Toxicon : official journal of the International Society on Toxinology. 2010;56(8):1398-407. PMCID: PMC2967628.

   b. Mejia M, Heghinian MD, **Busch A,** Mari F, Godenschwege TA. Paired nanoinjection and electrophysiology assay to screen for bioactivity of compounds using the Drosophila melanogaster giant fiber system. Journal of visualized experiments: JoVE. 2012(62). PMCID: PMC3466648.

   c. Mejia M, Heghinian MD, Mari F, Godenschwege TA. New tools for targeted disruption of cholinergic synaptic transmission in Drosophila melanogaster. PloS One. 2013;8(5):e64685. PMCID: PMC3667824.

   d. Heghinian MD, Mejia M, Adams DJ, Godenschwege TA, Mari F. Inhibition of cholinergic pathways in Drosophila melanogaster by alpha-conotoxins. FASEB Journal: Official publication of the Federation of American Societies for Experimental Biology. 2015. FASEB journal 29(3):1011-8. PMICD: PMC4422358

4. During my graduate studies I generated synapsin (and TIMP) mutants as well as monoclonal antibodies against synapsin, which are widley used throughout the research community. The mutagenesis of the synapsin locus also resulted in non-neuronal phenotypes. We demonstrated that the synapsin and the TIMP genes are encoded on opposing DNA strands but have overlapping exons. This nested structure is conserved from flies to humans.

   a. Klagges BR, Heimbeck G, Godenschwege TA, Hofbauer A, Pflugfelder GO, Reifegerste R, et al. Invertebrate synapsins: a single gene codes for several isoforms in Drosophila. The Journal of Neuroscience. 1996;16(10):3154-65. PubMed PMID: 8627354.

   b. Pohar N, Godenschwege TA, Buchner E. Invertebrate tissue inhibitor of metalloproteinase: structure and nested gene organization within the synapsin locus is conserved from Drosophila to human. Genomics. 1999;57(2):293-6. PubMed PMID: 10198170.

   c. Godenschwege TA, Pohar N, Buchner S, Buchner E. Inflated wings, tissue autolysis and early death in tissue inhibitor of metalloproteinases mutants of Drosophila. European Journal of Cell Biology. 2000;79(7):495-501. PubMed PMID: 10961449.

d. Godenschwege TA, Reisch D, Diegelmann S, Eberle K, Funk N, Heisenberg M, et al. Flies lacking all synapsins are unexpectedly healthy but are impaired in complex behaviour. The European Journal of Neuroscience. 2004;20(3):611-22. PubMed PMID: 15255973.

Complete List of Published Work in MyBibliography:
http://www.ncbi.nlm.nih.gov/sites/myncbi/tanja.godenschwege.1/bibliography/40466716/public/?sort=date&direction=ascending

D. Additional Information: Research Support and/or Scholastic Performance

Ongoing Research Support

R15 NS090043 Godenschwege (PI) 09/15/2015 – 09/14/2018 (1 yr no cost extension)
NIH/NINDS: Nuclear function of L1-type CAMs in the drosophila nervous system

Role: PI

Pending Research Support

R01NS113906 Godenschwege (PI) 09/15/2019 – 09/14/2024
NIH/NINDS. "Functional role of the Drosophila Attractin homolog in the central nervous system."
PI: Godenschwege

R15NS109813-01A1 Godenschwege (PI) 05/15/2019 – 05/14/2024
NIH/NINDS. "Characterization of mechanisms in spongiform degeneration using drosophila as a model'
Role: PI

Completed Research Support

R01 HD050725 Godenschwege (PI) 03/2008-11/2014
NIH/NICH: Functional Analyses of Neuroglian/L1 in Synaptogenesis.
The project was to characterize the temporal and spatial function of the ankyrin binding motif in synapse formation and the characterization of human pathological missense mutations in vivo at the cellular level.
Role: PI

R01 HD050725-02S1 Godenschwege (PI) 07/2009 – 02/2013
NIH/NICHD: Research Supplement to Promote Diversity in Health-Related Research.
The project was to characterize the role of PTP69D in GF synapse formation.
Role: PI

R21 NS066371 Mari (PI) 06/2009-05/2011
NIH/NINDS: Efficacious Screening of Peptidic Natural Products Using Drosophila.
The project was to develop an assay allowing to screen for biological activity of conopeptides in vivo using Drosophila and to screen the venom of Conus brunneus.
Role: Co-PI

CURRICULUM VITAE **Carl A. Hansen, Ph.D.**

EDUCATION:

1974-78	B.A. in Zoology	University of Vermont
1979	Duke University Marine Laboratory	Summer Program in Comparative and Evolutionary Biochemistry
1979-81	M.S. in Zoology	University of Maine at Orono (Bruce Sidell, Advisor)
	Masters Thesis:	Atlantic Hagfish Cardiac Muscle: Metabolic basis to tolerance of anoxia.
1981-85	Ph.D. in Physiology	Pennsylvania State University College of Medicine, (James R. Neely, Advisor)
	Ph.D. Dissertation:	Effects of Chronic Myocardial Infarction on Mechanical Performance and Energy Metabolism of the Rat Heart.

POSTGRADUATE TRAINING:

1985-88 Postdoctoral Researcher with Dr. John R. Williamson, University of Pennsylvania School of Medicine, Department of Biochemistry and Biophysics, Philadelphia, PA. Area of Research: Role of hormone-generated phosphoinositol metabolites in regulating cellular calcium signaling.

GRADUATE STUDY POSITIONS:

1979-81 Graduate Teaching Assistant, Department of Zoology, University of Maine, Orono, ME

1981-82 Graduate Teaching Assistant, Department of Physiology, Pennsylvania State University College of Medicine, Hershey, PA.

1982-85 Graduate Research Assistant, Department of Physiology, Pennsylvania State University College of Medicine, Hershey, PA.

HONORS AND AWARDS:

1980 University of Maine Migratory Fish Institute Research Award (Support for summer research at the Mount Desert Island Biological Laboratories).

1982-85 Predoctoral National Research Service Award, Department of Physiology, Hershey Medical Center, Pennsylvania State University College of Medicine, Hershey, PA.

1985 American Heart Association Postdoctoral Fellowship, Southeastern Pennsylvania Affiliate, not activated.

1985-88 Individual Postdoctoral National Research Service Award, Department of Biochemistry and Biophysics, University of Pennsylvania School of Medicine, Philadelphia, PA.

1988-89	American Heart Association Special Investigator Award, Southeastern Pennsylvania Affiliate.
6/91-8/91	US/USSR Exchange in Cardiopulmonary Area, Institute of Experimental Cardiology, Moscow.
10/98	Participant: Genetic Approaches to Complex Heart, Lung and Blood Diseases. October 5-16, 1998. The Jackson Laboratory, Bar Harbor, ME.
03/03	Faculty Recognition Award for contributions and service to the Department of Biological and Allied Health Sciences, Bloomsburg University, Bloomsburg, PA.
6/04-7/04	Participating Scientist, National Science Foundation sponsored ICEFISH 2004 Cruise aboard the RVIB Nathaniel B. Palmer. This was the first comprehensive international scientific survey of the fishes of the Sub-Antarctic marine environment.

FACULTY POSITIONS:

1988-90	Research Assistant Professor, Dept. Biochemistry and Biophysics, University of Pennsylvania School of Medicine, Philadelphia, PA 19104.
1990-96	Associate Scientist, Weis Center for Research, Geisinger Clinic, Danville, PA.
1996-97	Research Scientist II, Weis Center for Research, Geisinger Clinic, Danville, PA.
1997-98	Assistant Professor of Cellular and Molecular Physiology, Pennsylvania State University College of Medicine, Weis Center for Research, Danville, PA.
1997	Adjunct Instructor, Department of Biology, Bucknell University, Lewisburg, PA.
1998-00	Associate Professor of Cellular and Molecular Physiology, Pennsylvania State University College of Medicine, Weis Center for Research, Danville, PA.
2000-17	Senior Research Scientist, Weis Center for Research, Geisinger Clinic, Danville, PA.
2001-05	Assistant Professor of Biological and Allied Health Sciences, Bloomsburg University, Bloomsburg, PA.
2005-11	Associate Professor of Biological and Allied Health Sciences, Bloomsburg University, Bloomsburg, PA.
2011-	Professor of Biological and Allied Health Sciences, Bloomsburg University, Bloomsburg, PA.
2017-18	Visiting Professor (sabbatical), Department of Biomedical Sciences, College of Medicine, Florida Atlantic University, Boca Raton, Fl.

TEACHING EXPERIENCE:

1979-81 Graduate Teaching Assistant, Dept. of Zoology, University of Maine. Responsible for the laboratory component of the two-semester Freshman Biology Course.

1981-85 Graduate Research Assistant, Dept. of Physiology, Hershey Medical Center. Responsible for laboratory sections of the medical school Physiology Course.

1988-90 Lecturer for the signal transduction component of the University of Pennsylvania Medical School Biochemistry 561 course.
Organizer and tutor for Signal Transduction Journal Club for first year medical students.

1991- 98 Organizer and participant in Weis Center for Research *Works in Progress* Seminar Series. This was a biweekly forum designed to enhance knowledge and presentation skills for Postdoctoral Research Fellows.

1991-96 Participant in the Weis Center for Research Journal club series

1997 Lecturer for upper level undergraduate course, Vertebrate Endocrinology (BIOL 328), Department of Biology, Bucknell University. Responsible for developing and presenting both the lecture and laboratory components of this course.

1998- 00 Facilitator, Problem-Based Learning component of the Medical School Physiology Course, Pennsylvania State University College of Medicine, Hershey, PA

2001 - Large variety of undergraduate and graduate courses in the Department of Biology and Allied Health Sciences at Bloomsburg University.

Key Courses: (Developed and regularly taught by me)

Biol 101	Intro to Human Biology (non-majors) (last 4 yrs continuously)
Biol 208	Medical Terminology (last 12 years continuously)
Biol 233	Human Genetics (last 15 years continuously)
Biol 431/531	Developmental Biology (last 15 years on 2-3 yr cycle)
Biol 435/535	Bioinformatics and Genomic Analysis (last l0 yrs on 2 yr cycle)
Biol 474	Human Physiology (last 8 years continuously)
Biol 480/580	Comparative Animal Physiology (last 16 yrs on 2-3 yr cycle)

Team Taught Courses

Biol 173 & 174	Anatomy and Physiology Laboratory I & II (last 15 yrs continuously)
Biol 271	Cell Biology Laboratory (on and off as needed)
Biol 479	Integrated Physiology Laboratory (continuously for 10 yrs)

Courses taught on an irregular basis.

Biol 102	Cells, Genes and Molecules (non-majors)
Biol 114	Concepts in Biology I laboratory
Biol 481	Senior Seminar (current literature/presentations)

New course (collaborative) Biol 489/589 Medical Genetics (first taught fall 2018)
Developed as part of our new Genetic Counseling and Genomics Certificate co-developed by myself and Dr. Judith Kipe-Nolt.)

Students, Postdoctoral Trainees and Visiting Scientists directly under my supervision:

Jennifer Sterner	Summer Student Trainee, 1991
Sasha Antonov, PhD	Visiting Scientist 11/91- 3/92
Badri Ramaswami	Summer Student Trainee, 6/92 - 8/92
Stephanie Mah	PhD Dissertation Committee Member, University of Pennsylvania
Emil Nikolov, PhD	Postdoctoral Fellow 6/96-7/99.
Soniya Sinha	Master's Candidate (2001-2004) (Advisor and Chairperson)
Justin Reis	Master's Candidate (2002 -2005) (Advisor and Chairperson)
Angela Sabol	Internship Advisor (summer, 2002)
LeAnn Hess	Independent Undergraduate Research (Fall 2002)
Amy Risen	Independent Undergraduate Research (Spring 2003)
Brett Siegfried	Independent Undergraduate Research (Spring 2003)
Jen Bryant	Independent Undergraduate Research (Spring 2003)
Michael Kaminsky	Independent Undergraduate Research (Fall 2003)
Amy Mudry	Master's Candidate (2003 -2005) (Advisor and Chairperson)
Eric Horstick	Independent Undergraduate Research (Fall 2003, Fall 2004)
Robert Ray	Independent Undergraduate Research (Spring 2004)
Terrina Dolin	Independent Undergraduate Research (Spring 2004, Fall 2004)
Jonathan Shirvinski	Master's Candidate (2005-2006) (Advisor and Chairperson)
Usha Mandapati	Master's Candidate (2005-2007) (Advisor and Chairperson)
Jithender Gundewar	Master's Candidate (2005-2009) (Advisor and Chairperson)
Andrew Paluch	Master's Candidate (2006-2008) (Advisor and Chairperson)
Di Zhou	Master's Candidate (2007-2009) (Advisor and Chairperson)
Aaron Raski	Master's Candidate (2008-2010) (Advisor and Chairperson)
Benjamin Carlucci	Master's Candidate (2011-2014) (Advisor and Chairperson)
Josie Pervola	Genetic Counseling Internship 2015
Kira England	Genetic Counseling Internship 2016
John McDonnell	Genetic Counseling Internship 2016
Philip Mosolino	Genetic Counseling Internship 2016
Amanda Norcini	Genetic Counseling Internship 2016

MEMBERSHIP IN PROFESSIONAL SOCIETIES:

1989- 12	Member, American Society for Biochemistry and Molecular Biology.
1989- 12	Member, American Association for the Advancement of Science
1992- 01	Member, Basic and Atherosclerosis Scientific Councils of the American Heart Association.

EDITORIAL BOARDS, AD HOC REVIEWS AND EXTERNAL CONSULTING:

The Whitaker Foundation - ad hoc reviewer
Journal of Biological Chemistry - ad hoc reviewer
Cardiovascular Research - ad hoc reviewer
American Journal of Physiology - ad hoc reviewer
Circulation - ad hoc reviewer
American Heart Association Research Peer Review Committee, Pennsylvania Affiliate (1997-98)
Advisory Committee Member to the *Sowing Seeds of Science* Program, Geisinger Clinic, Danville, PA
PASSHE Faculty Professional Development Grant Reviewer

SERVICE ON BLOOMSBURG UNIVERSITY COMMITTEES:

BU Middle States Accreditation Renewal Working Group	2016-	
Bloomsburg University Wide Promotion Committee	2006-2010	Chair 2008-2010
Bloomsburg University Planning and Budget Committee	2004-2018	
Bloomsburg University Curriculum Committee	2011-2013	
BU Institutional Animal Use and Care Committee	2003-2011	Chair, 2005-2011
Bloomsburg University Graduate Council	2002- 2008,	Alt. Dept Rep 2008-
Biology Tale Representative	2004-2009	
Planning and Budget Subcommittee on Bylaws	2004-2005	
Search Committee for Graduate Dean	2007-2008	
COST Special Initiatives/ Research & Scholarship Review	2003-2006, 2007, 2009	
COST Credentialing Committee	2007-2009	
Biology Graduate Committee.	2002-present	Coordinator, 2002-2008
Dept. Equipment and Facilities	2002-2005, 2012-, Chair, 2003-2005, 2012-	
Dept. Planning: Five-Year Review	2004-present	
Dept. Search and Screen	2005-2007, 2008-present	
Biotechnology-Molecular Biology Initiative Group	2001-present	

HISTORY OF FUNDED PROJECTS AS PRINCIPAL INVESTIGATOR OR Co-PI:

03/88 -02/90 *Metabolism and function of higher inositol phosphates*. Pilot Project, NIH Program Project P30 DK19525 at the University of Pennsylvania Diabetes Research Center, $20,000/yr.

07/88-06/89 *Mechanism of alpha-adrenergic effects in the heart.* American Heart Association Special Investigator Award, Southeastern Pennsylvania Affiliate, $30,000

3/89-02/90 *Mechanisms of signal-response coupling: A single cell approach with videomicroscopy and image analysis*. Biomedical Research Support Grant Program SO7-RR-05415-28, Division of Research Resources, NIH, $7800.

07/89-06/92 *Role of inositol polyphosphates in cellular calcium signaling*. National American Heart Association Grant-in-aid, #891060, $33,000/yr.

07/91-06/93 *Secretory mechanisms in arterial endothelial cells*. American Heart Association Grant-in-aid, Pennsylvania Affiliate, $35,000/yr.

07/93 - 06/95 *Regulation of myocardial contraction by inositol 1,4,5-trisphosphate*. American Heart Association Grant-in-aid, Pennsylvania Affiliate, $35,000/yr.

07/95-06/97 *Dependence of G protein subunit structure on their localization in cardiac cells*. American Heart Association Grant-in-aid, Pennsylvania Affiliate. $35,000/year.

12/93-11/98 *Mechanisms Regulating Calcium Signaling.* National Institutes of Health, R29-DK45417. 12/93 - 11/98. Approximately $70,000/year direct.

02/98-02/03 *Diversity of α_1-adrenergic signaling pathways in the heart.* National Institutes of Health, R01-HL-49278, 02/98 - 02/03, Janet D Robishaw, Principal Investigator, Carl A. Hansen, Co-investigator, 185,000/yr direct.

05/02-4/03 *Molecular Signaling in Embryological Development,* Bloomsburg University Research and Disciplinary Projects Grant ($9820 direct).

07/04 - 06/06 *A Biotechnology Option at Bloomsburg University*. Carl A. Hansen, PI, George Davis (Co-PI), John Hranitz (Co-PI) and Kristen Brubaker (Co-PI). National Science Foundation CCLI A& I Grant # DUE-0410712, $178,000.

05/05 – 05/07 *Enhancing Genomics at an Undergraduate Institution*. Carl A. Hansen and John Hranitz, Co-PIs. Beckman Coulter Genomics Educational Grant. $62,000 direct, with equal match from Bloomsburg University.

01/07-12/08 *Central Susquehanna Science Consortium Project*. President's Fund for Academic Initiatives. $2000. Not activated, because other university failed to develop their portions.

8/09-06/15 *Ready and ABLE: An Academic Biology Learning Environment.* Clay Corbin, Carl Hansen Angela Hess, John Hranitz, Barry Nolt, Cynthia Surmacz, Gary Wassmer, and Marianna Wood, Co-PIs. Tale Teacher Scholar Award. $3000.00/yr, competitively renewed every two years.

RESEARCH PUBLICATIONS:

1. **Hansen**, C.A. and Sidell, B.D. Atlantic hagfish cardiac muscle: Metabolic basis to tolerance of anoxia. **Am. J. Physiol.** *244*: R356-R362, 1983.

2. Sidell, B.D., Stowe, D. and **Hansen**, C.A. Carbohydrate is the preferred metabolic fuel of the Hagfish heart. **Physiol. Zool.** *57*: 266-273, 1984.

3. Fellenius, E., **Hansen**, C.A., Mjos, O. and Neely, J.R. Chronic infarction decreases maximum cardiac work and sensitivity of heart to extracellular calcium. **Am. J. Physiol.** *249*: H80-H87, 1985.

4. Lopaschuk, G.D., **Hansen**, C.A. and Neely, J.R. Fatty acid metabolism in hearts containing high levels of CoA. **Am. J. Physiol.** *250*: H351-H359, 1986.

5. **Hansen**, C.A., Fellenius, E. and Neely, J.R. Metabolic rates in normal and infarcted myocardium. **Can. J. Card.** S*uppl.A.*: 1A-8A, 1986.

6. **Hansen**, C.A., Mah, S. and Williamson, J.R. Formation and metabolism of inositol 1,3,4,5-tetrakisphosphate in liver. **J. Biol. Chem.** *261*: 8100 -8103, 1986.

7. Cerdan, S., **Hansen**, C.A., Johanson, R., Inubushi, I. and Williamson, J.R. Nuclear magnetic resonance spectroscopic analysis of myo-inositol phosphates including inositol 1,3,4,5-tetrakisphosphate. **J. Biol. Chem.** *261*: 14676-14680, 1986.

8. Williamson, J.R. and **Hansen**, C.A. Signaling systems in stimulus response coupling. **Biochemical Actions of Hormones** *14*: 29-50, 1986.

9. Joseph, S.K., **Hansen**, C.A. and Williamson, J.R. Inositol 1,3,4,5-tetrakisphosphate increases the duration of the inositol 1,4,5-trisphosphate-mediated $Ca2^{+}$ transient. **FEBS Lett.** *219*: 125-129, 1987.

10. **Hansen**, C.A., Johanson, R.A., Williamson, M. and Williamson, J.R. Purification and characterization of two types of soluble inositol phosphate 5-phosphoesterases from rat brain. **J. Biol. Chem.** *262*: 17319-17326, 1987.

11. Williamson, J.R. and **Hansen**, C.A. Inositol lipid metabolism: Generation of second messengers. **In** *Membrane Receptors, Dynamics and Energetics*. (Wirtz, K.W.A., Ed.), pgs. 27-49, Plenum Press: New York, 1987.

12. Williamson, J.R., **Hansen**, C.A., Verhoeven, A., Coll, K.E., Johanson, R., Williamson, M.T. and Filburn, C. Mechanisms involved in receptor-mediated changes of intracellular $Ca2^{+}$ in liver. **In** *Cellular Calcium and the Control Membrane Transport* (Mandel, L. and Eaton, D.C., Eds.), pgs. 93-116, Rockefeller Press: New York, 1987.

13. Johanson, R.A., **Hansen**, C.A. and Williamson, J.R. Purification of D-myo-inositol 1,4,5-trisphosphate 3-kinase from rat brain. **J. Biol. Chem.** *263*: 7465-7471, 1988.

14. **Hansen**, C.A., vom Dahl, S., Huddell, B. and Williamson, J.R. Characterization of inositol 1,3,4-trisphosphate phosphorylation in rat liver. **FEBS Lett.** *236*: 53-56, 1988.

15. Williamson, J.R., **Hansen**, C.A. and Verhoeven, A. Mechanism of action of vasopressin as a calcium mobilizing hormone. **In** *Vasopressin: Cellular and integrative functions* (Cowley, A.W., Liard, J.F. and Ausiello, D.A., Eds.), Raven Press: New York, pp. 33-46, 1988.

16. Williamson, JR, **Hansen**, CA, Johanson, R, and Williamson, M. Formation and metabolism of inositol phosphates: The inositol tris/tetrakisphosphate pathway. **In** *Cellular $Ca2^{+}$ Regulation* (Pfeiffer, D, McMillin, J and Little, S., Eds.), Plenum Press, pp. 183-196, 1988.

17. **Hansen**, C.A., Huddell, B., Williamson, M and Williamson, JR. Partial purification of inositol polyphosphate 1-phosphomonoesterase with characterization of its substrates and products by nuclear magnetic resonance spectroscopy. **Biochem. Biophys. Acta** *1001*: 132-142, 1989.

18. Joseph, S.K., **Hansen**, C.A. and Williamson, J.R. Inositol tetrakisphosphate mobilizes calcium from cerebellum microsomes. **Molec. Pharm.** *36*: 391-397, 1989.

19. Williamson, JR, Johanson, R, **Hansen**, CA. and Monck, J. Receptor mediated $Ca2^{+}$ signaling: Role of inositol-1,3,4,5-tetrakisphosphate generation: **In** *Proceedings of the Symposium, Cell Calcium Metabolism* (Fiskum,G., Ed.), Plenum Publ., New York, pp 125-141, 1989

20. **Hansen**, C.A., Siemens, I.R. and Williamson, J.R. Calcium entry in rat hepatocytes: Stimulation by inositol 1,4,5-trisphosphorothioate. **Adv. Sec. Mess. Phosphoprot. Res.** *24*: 128-133, 1990.

21. **Hansen**, C.A., Monck, J.R. and Williamson, J.R. Measurement of intracellular free calcium to investigate receptor-mediated calcium signaling. **Methods Enzymol**. *191*: 691-706, 1990.

22. Kenderman, L., Tool, A.T.J., Hooybrink, B., Roos, D., **Hansen**, C.A., Williamson, J.R. and Verhoeven, A.J. Adherence of human neutrophils changes Ca^{2+} signaling during activation with opsinized particles. **FEBS. Lett.** *270*: 49-52, 1990.

23. **Hansen**, C.A., Yang, L. and Williamson, J.R. Mechanisms of receptor-mediated Ca^{2+} signaling in rat hepatocytes. **J. Biol. Chem.** *266*: 18573-18579, 1991.

24. Yang, L. Baffy, G., **Hansen**, C.A. Rhee, S.G. and Williamson, J.R. Pertussis toxin sensitive G_i-protein involvement in epidermal growth factor-induced phosphorylation of phospholipase C-γ in rat hepatocytes. **J. Biol. Chem.** *266*: 22451-22458, 1991.

25. Williamson, J.R. Yang, L.J. and **Hansen**, C.A. Receptor-mediated Ca^{2+} Entry in Hepatocytes. **In** *Regulation of Hepatic Function* (Munksgaardt Int. Publ.) 1991.

26. Brighton, C.T., Sennett, B.J., Farmer, J.C., Iannotti, J.P., **Hansen**, C.A., Williams, J.L. and Williamson, J. The inositol phosphate pathway as a mediator in the proliferative response of rat calvarial bone cells to cyclical biaxial mechanical strain. **J Orthop Res** *10*:385-393, 1992

27. Robishaw, J.D. and **Hansen**, C.A. Structure and function of G proteins mediating signal transduction pathways in the heart. **Alcoholism: Clin. Exp. Res.** *18*: 115-120, 1994

28. **Hansen**, C.A., Joseph, S.K. and Robishaw, J.R. Ins 1,4,5-P_3 and Ca^{2+} signaling in quiescent neonatal cardiac myocytes. **Biochem. Biophys. Acta** *1224:* 517-526, 1994.

29. **Hansen**, C.A., Schroering, AG., Carey, DJ. and Robishaw, JD. Localization of a heterotrimeric G protein γ subunit to regions of focal adhesion and associated stress fibers. **J. Cell Biol**. *126*: 811-819, 1994.

30. **Hansen**, C.A., Schroering, A.G. and Robishaw, J.D. Subunit expression of signal transducing G proteins in cardiac tissue: Implications for phospholipase C-β regulation. **J. Mol. Cell Card.** *27:* 471-484, 1995.

31. Ray, K., **Hansen**, C.A. and Robishaw, J.D. Cardiac-specific expression of the β and γ subunits of G proteins: Implication for receptor signaling. **Trends in Cardiology.** *6*: 115-121, 1996.

32. Miller, B.A., Bell, L., **Hansen**, C.A., Robishaw, J.D., Linder, M.E. and Cheung, J.Y. G-Protein α Subunit Giα2 mediates erythropoietin signal transduction human erythroid precursors. **J. Clin. Invest.** *98*: 1728-1736, 1996.

33. Wang, Q., Mullah, B., **Hansen**, C.A., Asundi, J. Robishaw, J.D. Ribozyme-mediated suppression of the G Protein γ_7 subunit suggests a role in hormone regulation of adenylylcyclase activity. **J. Biol Chem**. *272*: 26040-26048, 1997.

34. Wenham, D., Rahmatullah, R.J., Rahmatullah, M., **Hansen**, C.A. and Robishaw, J.D. Differential coupling of α_1-adrenergic receptor subtypes to phospholipase C and mitogen activated protein kinase in neonatal rat cardiac myocytes. **Eur. J. Pharm**. *339:* 77-86, 1997.

35. Ivanova-Nikolova, T.T., Nikolov, E., **Hansen, C.A.** and Robishaw, J.D. Muscarinic K+ Channels in the heart. Modal regulation by G protein βγ subunits. **J. Gen Physiol**. *112:* 199-210, 1998.

36. McWhinney, C.D., Wenham, D., Kanwal, S., Kalman, V., **Hansen, C.A.** and Robishaw, J.D. Constitutively active mutants of the α_{1a}- and α_{1b}-adrenergic receptor subtypes reveal coupling to different signaling pathways and physiological responses in rat cardiac myocytes. **J. Biol. Chem.** *275*:1-11, 2000.

37. McWhinney, C.D., **Hansen, C.A.** and Robishaw, J.D. Alpha-1 adrenergic signaling in cardiac murine atrial myocyte (HL-1) cell line. **Molec. Cell. Biochem.**. *214*:111-119, 2000.

38. Robishaw, J.D., Schwindinger, W and **Hansen, C.A.** Specificity of G protein βγ dimer signaling, **Handbook of Cell Signaling**, Volume II, Chapter 224, pages 623-229, Elsevier Science USA, 2003.

39. Leung, T., Chen, H., Stauffer, A.M., Giger, K., Sinha, S., Horstick, E., Humbert, J.E., **Hansen, C.A**. and Robishaw, J.D. Zebrafish G protein γ2 is required for VEGF signaling during angiogenesis. **Blood.** *108*:160-166, 2006.

40. Chen, H., Leung, T., Giger, K.E., Stauffer, A.M., Humbert, J.E., Sinha, S., Horstick, E.J., **Hansen, C.A**., and Robishaw, J.D**.** Expression of the G protein gammaT1 subunit during zebrafish development. **Gene Expression Patterns**, Vol: 7, 574-583, 2007.

41. **Hansen, C.A.,** Schwindinger, W. and Robishaw, J.D. Specificity of G protein βγ dimer signaling, **Handbook of Cell Signaling**, 2nd Edition, Bradshaw, R.A. and Dennis, E. A., Editors. Chapter 205, pages 1673-1682, Elsevier Science USA, 2010.

Manuscripts in preparation.

1. Chen, H., Leung, T.,Stauffer, A., **Hansen, C.A**., and Robishaw, J.D**.** *Role of the Heterotrimeric G* protein gamma GγT1 in Light Induced Suppression of Pineal Gland Melatonin Levels in Zebrafish.

2. Li, C., Minneman, K., **Hansen, C.A**. and Robishaw, J.D. Alpha-adrenergic mediated heart remodeling as a model system for human heart failure.

3. **Hansen**, **C.A**., and Robishaw, J.D. Expression of G protein βγ subunits enhances phospholipase C signaling in cardiac myocytes: Evidence for cross-talk between the G protein βγ subunits and the α_1-adrenergic receptor pathway.

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
James Hartmann, Ph.D.	Professor of Immunology
eRA COMMONS USER NAME (credential, e.g., agency login) jhartmann	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	MM/YY	FIELD OF STUDY
Aquinas College, Grand Rapids, MI	B.S.	1964	Zoology
Michigan State University, E. Lansing, MI	M.S.	1967	Microbiology Immunology
Michigan State University, E. Lansing, Mi	Ph.D.	1971	Virology

A. Personal Statement

The current focus of my laboratory is the immune monitoring of breast and ovarian cancer patients that have been vaccinated with folate receptor peptides using flow cytometry and Elispot technology. We are also studying various approaches to killing cancer cells via targeting the Warburg effect. My current doctoral student published on the effects of conotoxins on the nicotinic acetyl choline receptor in human macrophages. We also studied immune cells from asthma patients and their cytokine/transcription factor responses to vitamin D and synthetic steroids. Our paper regarding this study was published with a pulmonologist MD who gained his PhD under my guidance on this project. I co-authored a novel paper on insertion of human interleukin 2 into tobacco chloroplasts where my lab proved the existence of the cytokine from purified chloroplast extracts. Prior to this my research emphasis was with the autoimmune disease lupus, wherein we developed a novel means for purifying the anti-DNA antibodies that are the hallmark of the disorder, as well as isolating and studying the immune cells from these patients. With funding from NOAA we cloned a hybridoma producing a monoclonal antibody specifically recognizing an epitope on albumin from Atlantic sailfish for biomarker identification. Starkist Seaood corporation funded our production and testing of a monoclonal antibody that could differentiate histamine from histidine for use in testing for scombroid poisoning. I have enjoyed research within a wide range of topics that include productive work with a number of other collaborators. I have known Dr. Kumi-Diaka for over ten years and have been an active member on his students thesis projects. Thus, I am keenly interested to collaborate with Dr.. Kumi-Diaka in assisting and training his doctoral student Mr. Saheed Oseni. I have a wide range of well-characterized immune cell lines available for his project; and my colleague, Dr. Patricia Keating, my former doctoral student, is the resident campus expert in flow cytometry, immune cell cultivation and cytokine assays. Thus, I am confident we have the expertise for a successful joint exploration. I have had over two hundred undergraduate students conduct projects in my laboratory, directed sixteen MS and four PhD students. I currently have two doctoral and one master's degree student working on my lab and average 5-6 undergraduates in directed independent study and honors programs.

B. Positions and Honors

Positions and Employment:

Florida Atlantic University, Assistant Professor, Immunology/Virology1972-1977.

Florida Atlantic University, Associate Professor, Immunology, 1977-1982

Florida Atlantic University, Professor, Immunology, 1983-present.

Relevant Professional Experience and Memberships

Florida Atlantic University, Center for Molecular Biology and Biotechnology, Member, 1998-present.

Florida Atlantic University, Department of Biomedical Sciences, Associate Faculty and member of the Integrative Biology Ph.D. program, 1998-present

Awards and Honors:

Master Teacher Designation, Department of Biological Sciences, Florida Atlantic University 2005-2010

FAU Foundation Award. 1989

FAU Faculty Summer Research Fellowship Award. 1989.

Fellowship from Applied Biomaterials Technologies 1993

Fellowship from Innovative Technologies 1993

Matching Equipment Program from IBM, Boca Raton, FL 1993

Foundation Donation for Cancer Research on the Immunotherapy of Melanoma 1993.

The Fason Foundation Award 1994-1996.

C. Selected Peer-reviewed Publications

Keating P, **Hartmann JX**. Isolation and Purification of Th9 Cells for the Study of Inflammatory Diseases in Research and Clinical Settings. Methods Molecular Biology. 2017;1585:247-255.

Keating P, Munim A, **Hartmann JX**. Effect of Vitamin D on Th9 polarized human memory cells in chronic persistent asthma. Annals of Allergy, Asthma and Immunology. 2014 Feb;112(2):154-162 PMID: 2446825

Zhang XH, Keating P, Wang XW, Huang YH, Martin J, **Hartmann JX**, Liu A. Production of Functional Native Human Interleukin-2 in Tobacco Chloroplasts. Mol Biotechnol. 2013 Oct 22. PMID: 24146433

Cavallo MF, Kats AM, Chen R, **Hartmann JX**, Pavlovic M. 2012. A Novel Method for Real-Time, Continuous, Fluorescence-Based Analysis of Anti-DNA Abzyme Activity in Systemic Lupus.
Autoimmune Dis. 2012:814048. doi: 10.1155/2012/814048. Epub 2012 Dec 5.
PMID: 23251791

Pavlovic M, Kats A, Cavallo M, Chen R, Hartmann JX, Shoenfeld Y. Pathogenic and Epiphenomenal Anti-DNA Antibodies in SLE. Autoimmune Dis. 2010 Jul 20; 2011:462841. PMID: 21152217

Draughon LD, Scarpa J, Hartmann JX. Are filtration rates for the rough tunicate Styela plicata independent of weight or size? J Environ Sci Health A Tox Hazard Subst Environ Eng. 2010;45(2):168-76. doi: 10.1080/10934520903429816. PMID: 20390856

Draughon, L., J. Scarpa, **P.** Keating, & **J. Hartmann**. (2008). Potential estuarine water quality improvement via marine invertebrate bioremediation. In M. Theophanides & T. Theophanides (Eds.), *Environmental* Awareness and Management (pp. 97 - 112). Athens: ATINER.

Pavlovic M, Chen R, Kats A, Cavallo M, Saccoccio S, Keating P, **Hartmann JX** Highly Specific Novel Method for Isolation and Purification of Lupus Anti-DNA Antibody via Oligo-(dT) Magnetic Beads**.** 2007. Annals of the New York Academy of Sciences. 1108:203-217. PMID: 1789398

D. Research Support

Ongoing Research Support

Immune Monitoring for Study Protocol FRV002- FDA approved Clinical Trial of Breast Cancer Immunotherapy (funded) Agency: Tapimmune, Jacksonville, FLTotal Award Value: $219,896 PI

A randomized multicenter Phase II trial to evaluate the safety, efficacy and immunogenicity of vaccination with Folate Receptor Alpha peptides admixed with GM-CSF as a vaccine adjuvant versus GM-CSF alone in patients with Platinum Sensitive Ovarian Cancer and a response or stable disease to platinum therapy Agency: Tapimmune, Jacksonville, FL Total Award Value: $235,335 PI

In vitro Study of the Immune Response to Calcifying Nanoparticles. 2012- onging from FAU Foundation
The goals of the project are to co-cultivate human peripheral blood cells with calcifying nanoparticles from calcinosis in lupus patients. Using gene microarray, enzyme linked immunoassay and flow cytometry discover a means to activate dissolution of the particles. PI $600,000 total funding

Completed Research Support

Studies on the Use of Vitamin D in Asthma Patients 2006-2013 FAU Foundation $50,000
We achieved the goal of providing evidence that vitamin D down regulates an inflammatory T lymphocyte (Th9) cell that plays a key role in asthma. (see recent 2014 publication) PI

In Vitro Activation of Macrophage in Chronic Lymphocytic Leukemia 2010-2011 FAU Foundation $20,000
We sought the use of a macrophage activating factor called Gc-MAF in activating the tumoricidal properties of monocyte derived macrophages obtained from leukemia patients. PI

Lupus Research 2009-2011 FAU Foundation.
We developed a real time assay for the activity of specific anti-DNA abzyme activity present in the serum of lupus patients. PI

Generation of Monocyte Derived Dendritic Cells Specific for the Idiotype of a Systemic Lupus Erythematosus Anti-DNA Antibody. 2009-2012 FAU Foundation. PI
We sought to develop a vaccine that would selectively target the B cells producing anti-DNA antibodies in lupus patients by loading dendritic cells with the specific antibody idiotype.

ABBREVIATED FACULTY *CV*
Colin R. Hughes, Ph.D.

A. Professional Preparation

St. Johns College, Cambridge, B.A., 1979 Natural Sciences, Honors Degree.
Rice University, Ph.D., 1987. Major professor: Joan E. Strassmann.

B. Appointments

Research Associate with Drs J. Strassmann and D. Queller, Rice University, July 1986 to February 1992.
Lecturer during fall semester 1989.
Research Associate with Dr. E. Bryant, University of Houston, March 1992 to August 1992.
Assistant Professor, Biology Department, University of North Dakota, August 1992 to August 1997.
Associate Professor, Biology Department, University of North Dakota, August 1997 to August 1998.
Associate Professor, Department of Biology, University of Miami, August 1998 to 2004.
Associate Professor, Department of Biological Sciences, Florida Atlantic University, August 2004 to present.

C. Selected Peer-Reviewed Publications

Purcell, JFH; Cowen, RK; Hughes, CR, Williams DA. 2009 Population structure in a common Caribbean coral-reef fish: implications for larval dispersal and early life-history traits. Journal of Fish Biology 74: 403-417

Hughes CR, Miles S, Walbroehl JM. 2008 Support for the minimal MHC hypothesis: a parrot with a single, highly polymorphic, MHC class II *B* gene. Immunogenetics 60: 219-231.

Sachs JL, Hughes CR, Nuechterlein GL, Buitron, D 2007. Evolution of coloniality in birds: A test of hypotheses with the red-necked grebe (Podiceps grisegena) Auk 124: 628-642.

Purcell JFH, Cowen RK, Hughes CR, Williams, DA. 2006 Weak genetic structure indicates strong dispersal limits: a tale of two coral reef fish Proc. Royal Soc. Lond, Ser B.273 (1593): 1483-1490

Williams DA, Overholt WA, Cuda JP, Hughes CR. 2005. Chloroplast and microsatellite DNA diversities reveal the introduction history of Brazilian peppertree (*Schinus terebinthifolius*) in Florida Molecular Ecology 14 3643-3656

D. Selected Other Publications or Products/Grants

Szczys P, Hughes CR, Kesseli RV 2005 Novel microsatellite markers used to determine the population genetic structure of the endangered Roseate Tern, *Sterna dougallii*, in Northwest Atlantic and Western Australia Conservation Genetics 6: 461-466 2005

Sandercock BK, Beissinger SR, Stoleson SH, Melland RR, Hughes CR. 2000. Survival rates of a Neotropical parrot: implications for latitudinal comparisons of avian demography. Ecology, 81, 1351-1370.

Sachs JL, Hughes CR. 1999 Characterization of microsatellite loci for a colonially breeding population of red-necked grebes, *Podiceps grisegena*. Molecular Ecology 8, 687-688
Hughes CR, Moralez Deloach, D. 1997. Developing microsatellite loci when they are rare: trinucleotide repeat loci in the northern mockingbird *Mimus polyglottos*. Molecular Ecology 6, 1099-1102.
Strassmann JE, Gastreich KR, Queller DC, Hughes CR. 1992. Demographic and genetic evidence for cyclical changes in queen number in a neotropical wasp*Polybia emaciata*. American Naturalist 140, 363-372.
Strassmann JE, Queller DC, Solís CR, Hughes CR. 1991. Relatedness and queen number in the neo-tropical wasp *Parachartergus colobopterus*. Animal Behaviour 42, 461-470.
Queller DC, Hughes CR, Strassmann JE. 1990. Wasps fail to make distinctions. Nature 344, 388.
Strassmann JE, Hughes CR, Queller DC. 1990. Colony defense in the social wasp *Parachartergus colobopterus*. Biotropica 22,324-327.
Gastreich KR, Queller DC, Hughes CR, Strassmann JE. 1990. Kin descrimination in the tropical swarm-founding wasp, *Parachartergus colobopterus*. Animal Behaviour 40, 598-601.
Davis SK, Strassmann JE, Hughes CR, Pletscher LS, Templeton AR. 1990. Population structure and kinship in *Polistes* (Hymenoptera: Vespidae): an analysis using Ribosomal DNA. Evolution 44, 1242-1253.
Strassmann JE, Hughes CR, Queller DC, Turillazzi S, Cervo R, Davis SK, Goodnight KF. 1989. Genetic relatedness in primitively eusocial wasps. Nature 342, 268-269
Strassmann JE, Queller DC, Hughes CR. 1988. Predation and the evolution of sociality in the paper wasp, *Polistes bellicosus*. Ecology 69, 1497-1505.
Queller DC, Strassmann JE, Hughes CR. 1988. Genetic relatedness in colonies of tropical wasps with multiple queens. Science 242, 1155-1157

F. Synergistic Activities

Participant National Academies Summer Institute 2011

F. Collaborations and Other Affiliations

G. Courses Taught

Genetics, Evolution, Integrative Biology 1, Ornithology, Conservation Biology.

H. Community Engagement or Out-reach

Member Broward County Climate Change Task Force 2011-2013

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Jia, Kailiang

eRA COMMONS USER NAME (credential, e.g., agency login): KialiangJia

POSITION TITLE: Associate Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Qingdao University Medical College, Qingdao, Shandong, China	M.D.	1988-1993	Clinical Medicine
Chinese Academy of Medical Sciences, Beijing, China	M.S.	1993-1996	Medical Genetics
University of Missouri, Columbia, MO	Ph.D.	1996-2001	Genetics and Molecular Biology

A. Personal Statement

Autophagy is an evolutionarily conserved lysosomal degradation pathway that is present in all eukaryotic cells and conserved from yeast to humans. Autophagy has been linked to many human disease conditions including aging, cancer and neurodegeneration. In *C. elegans*, autophagy is required for various longevity signals in the regulation of *C. elegans* life span. We recently found that autophagy regulates *C. elegans* larval development, fat metabolism and adult longevity via a neuroendocrine mechanism. My long-term research goal is to understand the molecular mechanisms by which autophagy regulates development, fat metabolism and aging, which may contribute to the understanding of the role of autophagy in pathogenesis of human diseases.

B. Positions and Honors

Positions

1996 – 2001	Graduate Student, Genetics Area Program and Molecular Biology Program, Division of Biological Sciences, University of Missouri, Columbia, Missouri
2001 – 2004	Postdoctoral Associate, Genetics Area Program and Molecular Biology Program, Division of Biological Sciences, University of Missouri, Columbia, Missouri
2004 – 2007	Research Scientist, Department of Internal Medicine, UT Southwestern Medical Center, Dallas, Texas
2007 – 2009	Instructor, Department of Internal Medicine, UT Southwestern Medical Center, Dallas, Texas
2009 – 2015	Assistant Professor, Department of Biological Sciences, Florida Atlantic University, Boca Raton, Florida
2015 – present	Associate Professor with tenure, Department of Biological Sciences, Florida Atlantic University, Boca Raton, Florida
2013 – present	Visiting Investigator, Department of Neuroscience, The Scripps Research Institute, Jupiter, Florida

Honors

1999	Glenn Foundation /American Federation of Aging Research Scholar

2007 – 2011 Ellison Medical Foundation New Scholar in Aging Program
2014 – 2015 Researcher of Year Award, Florida Atlantic University

C. Contributions to Science

<u>*C. elegans* dauer formation and adult lifespan</u>

Animal development is a complex process that involves hierarchical gene regulatory networks and understanding these gene networks has implications for the treatment of human disease. *C. elegan*s enter a specialized third larval stage called dauer larva under starvation. Three functionally overlapping neural pathways, TGF-β, cyclic GMP, and IGF, control the developmental response to dauer-inducing environmental cues such as starvation. As the first author or the corresponding author, I have identified three genes that control dauer formation, fat metabolism and adult longevity. These work reveal: 1). the mechanism for coordination of diapause, reproductive development and adult longevity is steroid hormone regulation, 2). the TOR pathway interacts with the insulin signaling pathway to regulate *C. elegans* larval development, metabolism and life span, 3). the catalytic subunit of N alpha-acetyltransferase regulates *C. elegans* development, fat metabolism and adult lifespan. Since TGF-β, TOR and IGF signaling pathways are all involved in aging and the pathogenesis of age-related human diseases such as neurodegeneration, obesity, diabetes and cancer, the discovery of novel genes in these pathways will help to develop new therapeutic drugs to treat the age-related human diseases.

References

1. Di Chen, Jiuli Zhang, Justin Minnerly, Tiffnay Kaul, Donald Riddle and **Kailiang Jia** (2014). *daf-31* Encodes the Catalytic Subunit of N Alpha-Acetyltransferase that Regulates *Caenorhabditis elegans* Development, Metabolism and Adult Lifespan. PLoS Genet 10(10): e1004699. doi:10.1371/journal.pgen.1004699.
2. **Kailiang Jia**, Di Chen and Donald Riddle (2004). The TOR pathway interacts with the insulin signaling pathway to regulate *C. elegans* larval development, metabolism and life span. Development 131, 3897-3906.
3. **Kailiang Jia**, Patrice Albert and Donald Riddle (2002). DAF-9, a cytochrome P450 regulating *C.elegans* larval development and adult longevity. Development 129, 221-231.

<u>The role of autophagy in aging and neurodegeneration</u>

(1). Autophagy is required for various longevity signals to regulate life span in *C. elegans* and *Drosophila*. However, the mechanisms remain unclear. We recently showed that neuronal and intestinal ATG-18 acts in parallel and converges on unidentified neurons that secrete neuropeptides to regulate *C. elegans* lifespan through the transcription factor DAF-16/FOXO in response to reduced IGF signaling. (2). Collaborated with Drs. Shuji Kishi and Matt Gill at The Scripps Research Institute, we studied the function of Spinster homolog 1 (Spns1), a hypothetical lysosomal H^+-carbohydrate transporter that functions at a late stage of autophagy. We discovered that Spns1 is critically involved in lysosomal acidification and trafficking during autophagy, and differentially acts in a pathway with Beclin 1 (an essential autophagy protein for autophagy induction) and p53 in the regulation of senescence. (3). As the first author for two papers, I reported that autophagy is required for lifespan extension mediated by dietary restriction and autophagy plays a critical role in protection against disease caused by polyglutamine expansion proteins in *C. elegans*. Autophagy has been reported to prevent aging, tumorigenesis and neurodegeneration in higher eukaryotes. Thus, a better understanding of the role of autophagy in controlling *C. elegans* life span and protection against neurodegeneration may contribute to the understanding of these disease processes in humans.

References

1. Justin Minerly, Jiuli Zhang, Thomas Parker, Tiffnay Kaul and **Kailiang Jia** (2017). The cell non-autonomous function of ATG-18 is essential for neuroendocrine regulation of *Caenorhabditis elegans* lifespan. PLoS Genet. 13(5):e1006764. doi: 10.1371/journal.pgen.1006764.
2. Tomoyuki Sasaki, Shanshan Lian, Jie Qi, Peter Bayliss, Christopher Carr, Jennifer Johnson, Sujay Guha, Patrick Kobler, Sergio Catz, Matthew Gill, **Kailiang Jia**, Daniel J. Klionsky, and Shuji Kishi. (2014). Aberrant Autolysosomal Regulation Is Linked to The Induction of Embryonic Senescence:

Differential Roles of Beclin 1 and p53 in Vertebrate Spns1 Deficiency. PLoS Genet. 10(6): e1004409. doi:10.1371/journal.pgen.1004409.

3. **Kailiang Jia** and Beth Levine (2007). Autophagy is required for dietary restriction-mediated life span extension in *C. elegans*. Autophagy 3 (6), 597-9.

The role of autophagy in innate immunity

Infectious diseases are the second leading cause of death worldwide. To overcome these diseases, a better understanding of the mechanisms through which the pathogens act is needed. Using *C. elegans* as a model organism, I examined the role of autophagy in protection against *Salmonella typhimurium* infection. As the first author or the corresponding author, I have made three contributions to this field. Firstly, I develop a protocol to infect *C. elegans* with *Salmonella typhimurium* coupled with the double-strand RNAi interference technique to examine the role of host genes in defense against *Salmonella* infection. Since *C. elegans* whole genome RNAi libraries have been generated, this protocol makes it possible to screen for *C. elegans* genes protecting against *Salmonella* and other intestinal pathogens in large scales by performing genome-wide RNAi library screens. Secondly, I demonstrate that autophagy is a critical host defense mechanism that limits intracellular infection with bacterial pathogen *Salmonella typhimurium* in *C. elegans.* Moreover, autophagy plays an essential role in mediating insulin-like signaling-regulated pathogen resistance in long-lived mutant nematodes, suggesting human autophagy gene polymorphisms or age-related changes that reduce autophagy may contribute to impaired intestinal immunity to bacterial pathogens. At last, I show that autophagy acts cell autonomously in the intestine to defend against *Salmonella infection* in *C. elegans*. Together, these data demonstrate a critical role of autophagy in innate immunity. As autophagy is a cellular process that is pharmacologically regulated, a high-throughput screen of compounds and natural product extracts may help to identify new medicines to treat human infectious diseases by regulating autophagy.

References

1. Alexander Curt, Jiuli Zhang, Justin Minnerly and **Kailiang Jia** (2014). Intestinal autophagy activity is essential for host defense against *Salmonella typhimurium* infection in *Caenorhabditis elegans*. Developmental and Comparative Immunology. 45, 214 - 218.
2. Jiuli Zhang and **Kailiang Jia** (2014) A protocol to infect *Caenorhabditis elegans* with *Salmonella typhimurium*. Journal of Visualized Experiments. (88), e51703. doi: 10.3791/51703.
3. **Kailiang Jia**, Collin Thomas, Muhammad Akbar, Qihua Sun, Beverley Adams-Huet, Christopher Gilpin and Beth Levine (2009). Autophagy genes protect against *Salmonella typhimurium* infection and mediate insulin signaling-regulated pathogen resistance. Proc Natl Acad Sci U S A. 106 (34), 14564-14569.

The full-list of published work

http://www.ncbi.nlm.nih.gov/sites/myncbi/kailiang.jia.1/bibliography/46907354/public/?sort=date&direction=ascending

D. Additional Information: Research Support and/or Scholastic Performance

Pending Research Support

1. NIH R15, 07/01/18 - 06/30/21. The novel role of autophagy in controlling *C. elegans* dauer recovery. The goal of this project is to understand how autophagy controls dauer formation and dauer recovery in *C. elegans*. Dr. Jia is the PI for this grant.

Ongoing Research Support

1. NIH R21 (04/01/17 – 03/31/19), no-cost extension. The role of spin genes in autophagy and lifespan of *C. elegans*. The goal of this project is to characterize the function of spin genes in regulation of *C. elegans* lifespan. PI: Matt Gill. Co-PIs: Kailiang Jia and Jun-yong Choe. Dr. Jia is responsible for autophagy-related experiments in this proposal.

2. FAU Brain Institute Pilot Award (06/01/18 – 05/30/19). The goal of this proposal is to identify receptor proteins that act in ASI, AWA and ASG neurons to respond to food signals. Dr. Jia is the PI for this grant.

Completed Research Support

1. NIH R15, 1R15HD080497-01 (07/01/14 - 06/30/18). The novel role of autophagy in controlling *C. elegans* dauer recovery. The goal of this project is to understand how autophagy controls dauer formation and dauer recovery in *C. elegans*. Dr. Jia is the PI for this grant.

2. FAU College of Science Seed Grant (07/01/14 – 06/30/15). The goal of this project is to investigate the mechanisms by which autophagy controls fat metabolism in response to reduced insulin growth factor signaling in *C. elegans*. Dr. Jia is the PI for this grant

3. FAU College of Science Seed Grant (03/01/12 – 03/01/13). Characterize the function of *C. elegans* Arrest defective 1 (ARD1) and develop an assay for drug screening of ARD1 activators. The goal of this project is to develop a high-throughput screening method in order to look for activators of Arrest defective 1 protein, an enzyme reported to be a tumor suppressor in humans. Dr. Jia is the PI for this grant.

4. FAU Research Priority Fund (07/31/11 – 7/31/13). Role of methionine sulfoxide reductase (MSR) in protection against oxidative stress in *C.elegans*. The goal of this project is to examine the role of MSR in lifespan extension in *C. elegans* and to test the effect of a candidate MSR activator on *C. elegans* lifespan. Dr. Jia is the PI for this grant.

5. Ellison Medical Foundation New Aging Scholarship (08/01/07 – 07/31/12). Role of Autophagy in Regulation of *C. elegans* Life Span. The goal of this project is to investigate mechanisms by which autophagy regulates *C. elegans* lifespan. Dr. Jia is the PI for this grant.

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Stephen Kajiura

eRA COMMONS USER NAME (credential, e.g., agency login):n/a

POSITION TITLE: Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Start Date MM/YYYY	Completion Date MM/YYYY	FIELD OF STUDY
University of Guelph	BSc (Hons)	09/1986	05/1991	Marine Biology
Florida Institute of Technology	MS	09/1992	08/1994	Marine Biology
University of Hawaii	PhD	09/1994	12/2001	Zoology
University of California Irvine	Post-doc	01/2002	12/2003	Ecology & Evolution

A. Personal Statement

My area of expertise is the sensory biology of sharks and rays with an emphasis on the electrosensory system. I have worked extensively on the evolution of the hammerhead shark cephalofoil. In addition to my sensory physiology research, I study the massive seasonal aggregations of blacktip sharks in southeast Florida. I employ aerial surveys via airplane and drone, remote underwater cameras, and animal-borne data loggers to describe their movement and behavior as they overwinter in nearshore waters. I also incorporates acoustic and satellite telemetry to document the migration of these sharks along the US eastern seaboard. I maintain a strong public outreach service, primarily through television documentary appearances.

B. Positions and Honors

Assistant professor	Department of Biological Sciences, Florida Atlantic University	2003-2010
Associate professor	Department of Biological Sciences, Florida Atlantic University	2010-2015
Professor	Department of Biological Sciences, Florida Atlantic University	2015-present

C. Contributions to Science

1. Kajiura, SM & TC Tricas. 1996. Seasonal dynamics of dental sexual dimorphism in the Atlantic stingray, *Dasyatis sabina*. Journal of Experimental Biology 199(10): 2297-9306.

This paper was the first to describe a seasonal change in tooth shape for any vertebrate. Although sexually dimorphic dentition has been previously described, this study found that tooth shape can change dramatically within a sex over the course of a year. The ramifications extend to fossil specimens, which are often described from isolated teeth, and which may be simply males or females of the same species, or even a single sex sampled over different times of the year.

2. Kajiura, SM & KN Holland. 2002. Electroreception in juvenile scalloped hammerhead and sandbar sharks. Journal of Experimental Biology 205(23): 3609-3621.

This paper was the first to test whether the peculiar head shape of hammerhead sharks confers an electro sensory advantage compared to their more conventionally shaped sister taxa. All sharks utilize electroreception to detect cryptic prey and the laterally expanded head of hammerhead sharks allows their electroreceptors to be distributed over a greater area. This study found that hammerheads sample a broader swath of the seafloor with the same spatial resolution and the same sensitivity as their carcharhinid relatives. This suggests that the cephalofoil morphology does confer a sensory advantage.

3. McComb, DM, TC Tricas & SM Kajiura. 2009. Enhanced visual fields of hammerhead sharks. Journal of Experimental Biology 212: 4010-4018.

This paper was the first to test whether the widely spaced eyes located on the distal tips of the hammerhead shark cephalofoil conferred a visual advantage. The visual fields were measured, using an electroretinogram, for several shark species with different head shapes. This study found that hammerhead sharks have the largest monocular, binocular, and cyclopean visual fields compared to other taxa with less broadly spaced eyes. However, the large visual fields are also accompanied by a large blind area immediately anterior to the head. The swimming kinematics of the hammerheads appear to compensate for the blind area by demonstrating greater head yaw than their conventionally shaped carcharhinid relatives.

4. Meredith, TL & SM Kajiura. 2010. Olfactory morphology and physiology of elasmobranchs. Journal of Experimental Biology 213: 3449-3456.

This paper was the first to determine the olfactory thresholds of various elasmobranch species to amino acid prey odorants. Elasmobranchs are widely regarded as possessing extraordinary olfactory sensitivity but empirical data are largely lacking. This study found that some species are able to detect some odorants at a concentration of 1 part in 10 billion, which is very sensitive but within the detection thresholds for other fish species. In addition, the hammerhead sharks, which possess a large olfactory organ, do not demonstrate greater sensitivity to the tested odorants than their carcharhinid relatives.

5. Kajiura SM, Tellman SL. 2016. Quantification of massive seasonal aggregations of blacktip sharks (*Carcharhinus limbatus*) in southeast Florida. PLOS One, 10.1371/journal.pone.0150911

This paper was the first to describe the seasonal aggregations of blacktip sharks in southeast Florida. Each winter large numbers of sharks aggregate in nearshore water of southeast Florida and this phenomenon is known to local residents, but largely undocumented in the scientific literature. This study employed aerial surveys to quantify shark abundance over 4 years and correlate abundance with various environmental factors. There exists a strong inverse correlation between shark abundance and water temperature. The results suggest that warming oceans could result in a northward shift in shark distribution, with unknown cascading effects throughout the ecosystem.

D. Research Support
(past 3 years only)

Quantification of massive seasonal shark aggregations in Palm Beach county
Funded by the Colgan Foundation, the National Academies of Sciences, Engineering, and Medicine, and the Save our Seas Foundation
$213,835
This research addresses questions about the migratory movement of blacktip sharks that overwinter in southeast Florida and migrate northward to summer mating and birthing grounds along the central US seaboard. The project employs aerial surveys with airplane and drone, acoustic and satellite telemetry, and animal-borne data loggers. We have quantified spatial and temporal density of blacktips in southeast Florida and instrumented over 100 sharks with acoustic transmitters. We have also instrumented 14 sharks with satellite transmitters and several with data loggers. We also collect swimming kinematic data and observations on predator/prey relationships. Our data show that these sharks travel much farther than previously recognized and suggest that warming oceans may be shifting their distribution to higher latitudes. This project has grown significantly over the past 9 years and has received continuous funding since inception.

Collaborative elasmobranch research with University of Haifa

Funded by the Leon H. Charney Foundation
$117,501
This collaborative research project arose from my current project studying the seasonal aggregations of blacktip sharks in southeast Florida. A similar aggregation phenomenon started to occur in the eastern Mediterranean off the coast of Israel in the past few years with dusky and sandbar sharks. Colleagues at the University of Haifa are starting a study similar to mine which will employ aerial drones, and acoustic and satellite telemetry. This joint project will allow them to benefit from my expertise and experience. The project will allow students from the University of Haifa and from FAU to participate in an exchange program and I will teach a summer course on the Biology of Elasmobranch Fishes in Israel this summer. Future projects will allow students from the University of Haifa to conduct physiology experiments here at FAU that they would be unable to complete at their home institution.

FIO Ship time awards
Funded by the Florida Institute of Oceanography
$42,800 as PI; $82,500 as co-PI
Ship time grants are competitively awarded to allow PI's to take students on research cruises and gain experience with oceanographic vessels. I have received these grants regularly and use up to 4 days of ship time each year to expose students to fisheries techniques in the nearshore environment of the Gulf of Mexico. We use longline, hook and line, and trawling to collect specimens which the students learn to identify. When large sharks are caught it provides an opportunity for the students to learn safe handling and tagging procedures. These cruises are typically conducted in conjunction with a faculty colleague at USF and allow students from both institutions to work together and gain from the cross exchange.

Novel application of galvanic fields to reduce shark bycatch in various fisheries
Funded by Florida Sea Grant
$199,998
This study is testing a patent-pending technique to minimize incidental bycatch of sharks in various hook-based fisheries. The work grew from a MS thesis by Kieran Smith who discovered that combining zinc and graphite in seawater produces a strong galvanic electric field that is capable of deterring sharks from biting at bait. The results from coastal shark fishing showed a significant decrease in shark catch with zinc/graphite treated hooks compared to controls. In contrast, catch rates of piked dogfish on bottom set longlines were not significantly reduced with the zinc/graphite treatment. Upcoming work will test the efficacy of the treatment with pelagic fisheries. If these trials are also successful, a commercial supplier has expressed an interest in licensing the patent to produce shark deterrent treatments.

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Alex C. Keene

eRA COMMONS USER NAME (credential, e.g., agency login): KeeneA

POSITION TITLE: Associate Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
University of Massachusetts, Amherst	B.S.	05/02	Biology
University of Massachusetts Medical School	Ph.D.	09/06	Neurobiology
Institute of Molecular Pathology, Vienna, Austria	Postdoctoral	01/08	Behavioral Genetics
New York University, New York City	Postdoctoral	06/11	Behavioral Genetics

A. Personal Statement

My research program investigates diverse aspects of neural function and behavior with a focus on sensory processing, memory and sleep in fly and fish model systems. I have trained in three leading *Drosophila* behavioral genetics laboratories and my research group is uniquely positioned to investigate how tastants are processed within the brain. During my graduate studies at UMass Medical School I examined the genetic basis for motivated memory formation and the neural circuitry required for consolidation of appetitive and aversive olfactory memories. During my postdoctoral training at the Institute for Molecular Pathology I trained with Barry Dickson on projects examining courtship song and food-choice in *Drosophila*. I expanded on the study of motivated behaviors during my postdoctoral research at NYU by demonstrating that flies, like mammals, reduce sleep when starved. In mammals, the genes and neural systems controlling sleep and feeding are tightly interconnected: sleep deprivation promotes feeding, while starvation suppresses sleep. Dysregulation of these behaviors underlies obesity, diabetes and metabolic disorder, yet little is known about the genetic basis for interactions between sleep and feeding state. My current research program is primarily focused on understanding how sensory processing and sleep are regulated. Flies present a powerful model for genetic dissection of behavior and my lab has developed novel behavioral approaches to interrogate these interactions. For example, we have developed a novel taste memory assay, for the first time providing an ability to assess whether flies can qualitatively distinguish between tastants. Further, we have mapped central brain circuitry required for taste memory, and described fatty acid taste in *Drosophila*. Therefore, we are well positioned to carry out the proposed research investigating the neural mechanisms of fatty acid taste in fruit flies. In addition to our studies in *Drosophila*, we are developing the Mexican cavefish as a model for investigating behavioral changes associated with evolution in a nutrient-poor environment. We have implemented transgenesis and gene-editing technology in this system, allowing for investigation of genes and neural circuits that regulate behavior in this vertebrate model. Given the conservation of hunger induced behaviors and metabolic signaling, our studies in flies and fish have important biomedical significance. In general, our approach is unique because it looks beyond the mechanisms that control individual behaviors to examine how the brain integrates internal motivation states, or utilizes multi-sensory integration, to initiate the appropriate behavioral response in a complex setting. Understanding the neural basis for sensory and motivated behaviors will shed light on the more general question of how the brain prioritizes and controls expression of behaviors.

I am also heavily invested in training all levels of scientists. Since starting my lab, nearly all manuscripts published ncluded graduate trainees and 12 out of 40 have included undergraduates. I am actively involved in personally mentoring all undergraudates in my lab and meet with them weekly to go over progress. A number have won national awards including Kurtresha Worden who won the Poster Competition at the 2010 Genetics Society Meeting and is now an HHMI Hana Gray predoctoral fellow at UC-Berkeley, and Josue Regalado who was named a 2010 Barry Goldwater Fellow. Beyond the laboratory, I direct FAU's Neuroscience and Behavior B.S. Program and teach Animal Behavior to ~250 undergraduates annually. I have also served as organizer of the Cold Spring Harbor Neurobiology of Drosophila Course for the past three summers. Finally, as part of our NSF funded research, we are interested in extended science to underrepresented groups. I have collaborated with Forest Hill, a local title one school to bring cavefish research into their classrooms, and hosted their students in our labs. I have also assisted an undergradate in my lab start a podcast, The Research Diaries (www.TheResearchdiaries.com) that discusses her experience as an undergrad and URM engaging in research. Overall I am highly motivate to work with undergraduates in the laboratory, the classroom, and through mentoring.

Murakami K, Yurgel ME, Stahl BA, Masek P, Mehta A*, Heidker R, Bollinger W, Gingras RM, Kim YJ, Ja WW, Suter B, DiAngelo JR, Keene AC. *translin* is required for metabolic regulation of sleep (2016). *Current Biology*. 26(7):972-80. PMID: 27020744

Masek P, Worden K*, Aso Y, Rubin GM, and Keene AC**.** A dopamine-modulated neural circuit regulating aversive taste memory in *Drosophila* (2015) *Current Biology*. 25(11):1535-41. PMID: 25981787

Masek P, Keene AC. Drosophila fatty acid taste signals through the PLC pathway in sugar-sensing neurons. (2013) *Plos Genetics*. 9 (9):e1003710. PMID: 24068941

Keene AC, Stratmann M, Keller A, Perrat PN, Vosshall LB, and Waddell, S. A benzaldehyde odor memory in *Drosophila* requires uniquely timed Dorsal Paired Medial neuron output. (2004) *Neuron.* 44(3):521-33. PMID: 15504331

* denotes undergraduates

B. Positions and Honors

Positions

2011-2015	Assistant Professor, Department of Biology, University of Nevada Reno
2015-Present	Associate Professor, Department of Biology, Florida Atlantic University
2016-Present	Member, Florida Atlantic University Brain Institute
2016-Present	Co-Director, Neuroscience and Behavior Program. Florida Atlantic University

Honors

2001	*Magna cum laude* with Honors. University of Massachusetts, Amherst
2004-2006	NRSA Predoctoral Fellowship (F31) Recipient, UMass Medical School
2005	Dean's Award for Outstanding Research Achievement, UMass Medical School
2006	Dean's Award for Outstanding Doctoral Thesis, UMass Medical School
2006-2007	Human Frontiers Long-Term Fellowship Recipient, Institute of Molecular Pathology
2008-2011	NRSA Postdoctoral Fellowship (F32) Recipient, New York University
2014	Gordon Research Conference, Chronobiology, Junior Investigator Presentation Award
2015	Sleep Research Society Young Investigator NIDDK/NIH Travel Award
2016	International Behavioral and Neurogenetics Society (IBANGS) Young Investigator Award
2018	FAU College of Science Teaching Award, Northern Campuses
2019	FAU Researcher of the Year Award
2019	Kavli Fellow

Selected Service

2016-Present	Organizer, Cold Spring Harbor Neurobiology of Drosophila Corse
2015, 2019	Organizer, Astyanax International Meeting, Queretaro, Mexico
2013, 2014	NSF IOS Modulation, Study Section Reviewer

2017 Files on the Beach (South Florida Fly Meeting), Organizer
2018-Present NIH Molecular Neurogenetics Study Section, Standing Member

C. Contributions to Science (* denotes mentored undergraduate as PI)

1. **Neural circuitry underlying memory consolidation:** My early publications resulting from my graduate work in the laboratory of Scott Waddell focused on understanding how memories are consolidated within the brain. At the time, the mushroom bodies were known to be a center for olfactory memory in the fruit fly, but little was known about how neurons outside this structure encoded these memories. I characterized the role of Dorsal Paired Medial neurons, large modulatory neurons that ramify throughout the mushroom bodies, in consolidating the formation of memories. This work used genetic and functional imaging approaches to determine activity of these neurons between training and testing is required to stabilize memories. These studies provides a cellular model for memory formation that has implications for understanding associative memory in mammalian systems.

   Krashes MJ, Keene AC, Leung B, Armstrong JD, and Waddell S. Sequential use of mushroom body euron subsets during *Drosophila* odor memory processing. (2007) *Neuron.* 53;103-15. PMID:17453015

   Keene AC, Krashes MJ, Leung B, Bernard JA*, and Waddell S. *Drosophila* Dorsal Paired Medial neurons provide a general mechanism for memory consolidation. (2006) *Current Biology.* 16:1524-30 PMID: 16890528

   Yu D, Keene AC, Srivatsan A, Waddell S and Davis RL. *Drosophila* DPM neurons form a delayed and branch-specific memory trace after olfactory classical conditioning. (2005) *Cell.* 123: 945-57. PMID: 16325586

   Keene AC, Stratmann M, Keller A, Perrat PN, Vosshall LB, and Waddell, S. A benzaldehyde odor memory in *Drosophila* requires uniquely timed Dorsal Paired Medial neuron output. (2004) *Neuron.* 44: 521-33. PMID: 15504331

2. **Taste processing and memory formation:** My laboratory is focused on understanding how tastes are encoded and taste preferences are transformed by experience. We have developed a novel taste-memory assay and identified a dopamine-modulated circuit required for taste memory. In addition, we have generated a system to optogenetically activate defined classes of neurons and examine the effect on memory formation. As an extension of this work, we are also investigating how taste modalities are encoded and have identified attraction to fatty acids in *Drosophila.* This is important for human health because little is known about fat taste in mammalian systems, and the taste preferences for fat in mammals is linked to obesity.

   Tauber JM, Brown EB, Li Y, Yurgel ME, Masek P, and Keene AC. A subset of sweet sensing neurons identified by IR56d are necessary and sufficient for fatty acid taste. (2017) *Plos Genetics*. 3(11):e1007059. PMID: 29121639.

   Masek P, Worden K*, Aso Y, Rubin GM, and Keene AC. A dopamine-modulated neural circuit regulating aversive taste memory in *Drosophila*. (2015) *Current Biology*. 25(11) 1535-41. PMID: 25981787

   Masek P, Keene AC. Drosophila fatty acid taste signals through the PLC pathway in sugar-sensing neurons. (2013) *Plos Genetics*. 9 (9):e1003710. PMID: 24068941

   Keene AC and Masek P. Optogenetic induction of aversive taste memory. (2012) *Neuroscience*. 222:173-80. PMID: 22820051

3. **Genetic mechanisms of sleep loss in fish:** We are currently working in the Mexican cavefish, *Astyanax mexicanus* to identify novel genetic regulators of sleep. While nearly all animals sleep, we have identified a dramatic reduction in sleep cave populations of the tetra *A. mexicanus*. Remarkably, sleep loss occurs

in multiple, independently evolved populations without apparent consequence on health or longevity, providing a system to investigate genetic mechanisms that modulate sleep. Identifying novel genetic regulators of sleep will provide targets mechanistic insights into sleep regulation and targets for studies in mammalian systems.

Jaggard JB, Stahl BA, Lloyd E*, Prober DA, Duboue ER and Keene AC. Hypocretin underlies the evolution of sleep loss in the Mexican cavefish. (2018) *eLife,* 7, e32637. PMID: 29772227

Yoshizawa M, Robinson BG*, Duboue ER, Masek P, Jaggard JB*, O'Quin KE, Borowsky RL, Jeffery WR and Keene AC. Distinct genetic architecture underlies the emergence of foraging traits in the Mexican cavefish (2015) *BMC Biology.* 20 (13):15. PMID: 25761998

Duboue ER, Borowsky RB, and Keene AC**.** ß-adrenergic signaling regulates evolutionarily derived sleep loss in the Mexican Cavefish. (2012) *Brain, Behavior, Evolution*. 80:233-43. PMID: 22922609

Duboue ER, Keene AC, and Borowsky RB. Evolutionary convergence on sleep loss in cavefish populations. (2011) *Current Biology.* 8; 671-76. PMID: 21474315

4. **Metabolic Regulation of Sleep:** A primary focus of our laboratories is investigating the integration of sleep and metabolic state. Dysregulation of sleep is associated with many metabolic disorders including obesity, diabetes, and cardiac disease. We are using forward genetic screening, manipulation of neural function, and Ca^{2+} imaging in the fruit fly to elucidate interactions between metabolism and sleep. Identifying the genes and neural mechanisms underlying the integration of sleep and metabolism will provide novel insight into diseases related to these processes.

   Stahl BA, Peco E, Davla S, Murakami K, Caicedo Moreno NA*, van Meyel DJ and Keene AC. The taurine transpoter *Eaat2* functions in ensheathing glia to modulate sleep and metabolic rate. *Current Biology*. 28(22):3700-08. PMID: 30416062

   Stahl BA, Slocumb ME, Chaitin H, DiAngelo JR and Keene AC. Sleep-Dependent Modulation of Metabolic Rate in *Drosophila.* (2017) ***Sleep****.* 40(8) zsx084. PMID: 28541527

   Murakami K, Yurgel ME, Stahl BA, Masek P, Mehta A*, Heidker R, Bollinger W, Gingras RM, Kim YJ, Ja WW, Suter B, DiAngelo JR, Keene AC. *translin* is required for metabolic regulation of sleep. (2016) *Current Biology*. 26(7):972-80. PMID: 27020744

   Keene AC, Duboue ER, McDonald DM*, Dus, M, Suh GB, Waddell, S and Blau J. Clock and cycle limit starvation-induced sleep loss in *Drosophila*. (2010) *Current Biology*, 20: 1209-15. PMID: 20541409

Complete List of Published Work in My Bibliography
http://www.ncbi.nlm.nih.gov/myncbi/browse/collection/41044124/?sort=date&direction=ascending

D. Research Support

Active Research Support

R01 NS085252 06/2014-06/2020
NIH/NINDS. The role of neural *translin* in metabolic regulation of sleep.
This proposal examines neural mechanisms underlying the integration of sleep and metabolism.
Role: PI

IOS-125762 06/2013-05/2020
NSF/IOS. Neural mechanisms of sleep loss in the Mexican Cavefish.
This grant investigates the evolutionary and genetic basis for sleep loss in Mexican cavefish.
Role: PI

R21 NS085252 04/2018-03/2020
NIH/NINDS. Development of genetic tools for functional analysis of sleep in cavefish**.**

This proposal will develop genetic tools to examine sleep loss in cavefish.
Role: PI

R01 GM127872 06/2018-05/2022
NIH/NIGMS. Understanding complex trait architecture through populations genomics.
This proposal uses population genomics approaches to identify genes regulating sleep and feeding.
Role: MPI (with Suzanne McGaugh, MPI, Minnesota)

R01HL143790 08/2018-08/2022
NIH/NHLBI. Elucidation of Genetic Effects on Sleep and Circadian Traits
This proposal seeks to characterize the role of genetic variants implicated in insomnia and chronotype using *Drosophila* and cell culture models.
Role: MPI (with Struan Grant, CHOP; Phillip Gehrman, UPenn)

R01 DC017390 08/2018-08/2023
NIH/NIDCD. The Neural Basis of Fatty Acid Taste
This proposal seeks to identify the cellular and circuit basis for fatty acid taste using a Drosophila model.
Role: MPI (with Anupama Dahanukar, UC-Irvine)

NSF-DEB. 175*4231* 09/2018-08/2020
Contributions of albinism to fitness and the evolution of the Mexican cavefish. This proposal examines the relationship between albinism and sleep loss in cavefish.
Role: Co-PI (with Johanna Kowalko)

SP#2018-190 10/2018-9/2022
US-Israel BSF. Dissection the function and evolution of the hypothalamic NTS-MCH-HCRT circuit
This is a collaborative proposal that examines the role of hypothalamic circuitry in the zebrafish and Mexican cavefish.
Role: MPI (With Lior Appelbaum, Bar-Ilan University)

Completed Research Support (Past 3 years)

IOS-1426265 05/2015-01/2019
NSF/IOS. The Neural Circuitry Underlying Taste Memory.
This grant aims to localize taste memory by examining connectivity between dopamine neurons and the mushroom bodies.
Role: PI (with Pavel Masek, Co-PI, SUNY-Binghamton)

R15 NS080155 9/2017-08/2020
NIH/NINDS. Dietary and Endocrine regulation of Sleep.
NIH Area Grant. The grant seeks to determine the dietary factors that regulate sleep in *Drosophila*.
Role: PI

IOS-125762 06/2013-05/2016
NSF/IOS. Regulation of sleep in the Mexican Cavefish.
This grant investigates the evolutionary and genetic basis for sleep loss in Mexican cavefish.
Role: PI

CURRICULUM VITA MARGUERITE KOCH-ROSE

Florida Atlantic University; Department of Biological Sciences
Aquatic Plant Ecology Laboratory (APEL)
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https://www.facebook.com/FauAquaticPlantEcologyLab

I. EDUCATIONAL BACKGROUND

Ph. D., Marine Biology and Fisheries, 1996. Rosenstiel School of Marine and Atmospheric Sciences, University of Miami, Miami, Florida.

Graduate Exchange Scholar, 1988-1989. Geography Department, University of Exeter, Exeter, England.

M.S., Marine Sciences, 1988. Marine Sciences Department, Center for Wetland Resources, Louisiana State University, Baton Rouge, Louisiana.

Marine/Estuarine Ecology and Fisheries, 1985. University of Washington, Seattle, WA.

Coral reef ecology, 1983. West Indies Laboratory, Fairleigh Dickinson University, St. Croix, West Indies.

B.S., Biology, 1981. Biology Department, Tulane University, New Orleans, LA.

II. PROFESSIONAL BACKGROUND

2008-present	**Professor:** Biological Sciences Department, Florida Atlantic University, Boca Raton, FL.
2001-2008	**Associate Professor:** Biological Sciences Department, Florida Atlantic University, Boca Raton, FL.
1996-2000	**Assistant Professor:** Biological Sciences Department, Florida Atlantic University, Boca Raton, FL.
1993-1996	**Research Associate:** Rosenstiel School of Marine and Atmospheric Sciences (RSMAS), University of Miami, Miami, FL.
1989-1992	**Senior Research Scientist:** Everglades Systems Research Division, Research Department, South Florida Water Management District, West Palm Beach, FL.
1988-1989	**Research Associate:** University of Exeter, England.
1985-1988	**Research Assistant:** Center for Wetland Resources, Louisiana State University, Baton Rouge, LA.
1985	**Research Assistant:** University of Washington, Seattle, WA.
1984	**Biologist:** National Marine Fisheries Service, Bering Sea, AK.
1983	**Research Technician:** Mote Marine Laboratory, Sarasota, FL.

RESEARCH INTERESTS

Marine plant ecology and ecophysiology with particular interests in understanding landscape-level dynamics based on physiological and ecological responses of plant communities to resource, stress, and disturbance gradients. Nutrient cycling and primary production in tropical ecosystems. ***Current research*** focuses on biogeochemical changes in tropical marine ecosystems and ecophysiological responses of marine plants under climate change, including thermal stress and ocean acidification.

PUBLICATIONS (HIGHLIGHTED 2012-PRESENT) 3947 CITATIONS TO DATE (08/23/2019)

C. McNicholl, M. S. **Koch**, Hofmann, L.C. (2019) Photosynthesis and light-dependent proton pumps increase boundary layer pH in tropical macroalgae: A proposed mechanism to sustain calcification under ocean acidification. Journal Experimental Marine Biology and Ecology. doi.org/10.1016/j.jembe.2019.151208R.

Andersson, A.J, Venn, A.A., Pendleton, L., Brathwaite, A., Camp, E.F., Colley, S. Gledhill, D., **Koch**, M., Maliki, S., Manfrino, C. 2019. Ecological and socioeconomic strategies to sustain Caribbean coral reefs in a high-CO_2 world. Regional Studies in Marine Science. 29:1-13.

Johnson, M. S. **Koch**, O. Pedersen and C. J. Madden (2018) Hypersalinity as a trigger of seagrass (*Thalassia testudinum*) die-off events in Florida Bay: Evidence based on shoot meristem O_2 and H_2S dynamics. Journal Experimental Marine Biology and Ecology. 504:47-52. https://doi.org/10.1016/j.jembe.2018.03.007

Zweng, R.C., **Koch**, M.S., Bowes, G. (2018). The role of irradiance and C-use strategies in tropical macroalgae photosynthetic response to ocean acidification. *Scientific Reports*. DOI:10.1038/s41598-018-27333-0

Morey, S., **Koch**, M., Liu, Y., Lee, SK. (2017) Chapter 7 Florida's Oceans and Marine Habitats in a Changing Climate. In (eds. Chassignet, E., Jones, J., Misra, V., Mitchum, G., Obeysekera) Florida's Climate: Changes, Variations & Impacts. University Press of Florida, Gainesville, FL.

Peach, K.E., **Koch**, M.S., Blackwelder, P.L., Kamasawa, N., Guerrero-Given, D. (2017) Primary utricle structure of six *Halimeda* species and potential relevance for ocean acidification tolerance. Botanica Marina 60(1): DOI: 10.1515/bot-2016-0055

Peach, K.E., **Koch**, M.S., Blackwelder, P.L., Manfrino, C. J. (2016) Calcification and photophysiology responses to elevated pCO_2 in six *Halimeda* species from contrasting irradiance environments on Little Cayman Island reefs. Exp. Mar. Bio. Ecol. 486, 114-126, doi:10.1016/j.jembe.2016.09.008

Strazisar, T., **Koch**, M., Madden, C. (2016) The importance of recurrent reproductive events for *Ruppia maritima* seed bank viability in a highly variable estuary: the Everglades-Florida Bay ecotone. Journal of Aquatic Botany DOI: 10.1016/j.aquabot.2016.07.005

Hofmann, L.C., **Koch**, M.S., de Beer, D. (2016) Evidence for biotic control of diffusive boundary layer pH and active Ca^{2+} flux mechanisms in a tropical crustose coralline alga. PLOS ONE DOI: 10.1371/journal.pone.0159057

Bedwell, H., Joles, L., **Koch**, M.S., Peach, K., Dutra, E., Manfrino, C. (2016) The role of in hospite zooxanthellae photophysiology and reef chemistry on elevated pCO_2 effects in two branching Caribbean corals: *Acropora cervicornis* and *Porites divaricata*. ICES Journal of Marine Science DOI: 10.1093/icesjms/fsw026

Koch, M. S. (2016) The significance of warming seas for species and ecosystems: Impacts and effects on seagrasses. In (eds. Laffoley, D., Baxter, J.M.) Explaining Ocean Warming: Causes, scale, effects and consequences. IUCN-International Union for Conservation of Nature and Natural Resources Report. IUCN, Gland, Switzerland. 456 pp.

Peach, K.E., **Koch**, M.S., Blackwelder, P. (2016) Effects of elevated pCO_2 and irradiance on growth, photosynthesis and calcification in *Halimeda discoidea* Marine Ecology Progress Series 01/2016; DOI: 10.3354/meps11591.

Dutra, E., **Koch**, M., Peach, K., Manfrino, C. (2015) Tropical crustose coralline algal individual and community responses to elevated pCO_2 under high and low irradiance. ICES Journal of Marine Science; doi:10.1093/icesjms/fsv213.

Koch, M.S., C. Coronado, M.W. Miller, D.T. Rudnick, E. Stabenau, R.B. Halley, F.H. Sklar (2014) Climate Change Projected Effects on Coastal Foundation Communities of the Greater Everglades using a 2060 Scenario: Need for a New Management Paradigm. Journal of Environmental Management. DOI: 10.1007/s00267-014-0375-y

Strazisar, T., **Koch**, M., Madden, C. Seagrass (*Ruppia maritima* L.) (2014) Life history transitions in response to salinity dynamics along the Everglades-Florida Bay ecotone Estuaries and Coasts DOI 10.1007/s12237-014-9807-4.

Strazisar, T., **Koch**, M., Madden, C., Filina, J., Lara, Pedro, U. and Mattair, A. (2013) Salinity effects on *Ruppia maritima* L. seed germination and seedling survival at the Everglades-Florida Bay ecotone Journal of Experimental Marine Biology and Ecology 44: 5129–139.

Strazisar, T., **Koch**, M., Dutra, E., Madden, C.(2013) *Ruppia maritima* L. seed bank viability at the Everglades-Florida Bay ecotone Aquatic Botany 111 26–34.

Koch, M., Bowes, G., Ross, C., Zhang, Xing-Hai. (2013 electronic; 2014 print) Climate change and ocean acidification effects on seagrasses and marine macroalgae. Review: Global Change Biology 19, 103–132, doi: 10.1111/j.1365-2486.2012.02791.x

Iz, B.H., Berry, L., and **Koch** M. (2012) Modeling regional sea level rise using local tide gauge data. Geodetic Science DOI: 10.2478/v10156-011-0039-2.

Holmer, M., Pedersen, O., Krause-Jensen, D. Olesen, B. Petersen, M.H., Schopmeyer, S., **Koch**, M., Lomstein, B., Jensen, H.S. (2009) Sulfide intrusion in the tropical seagrasses *Thalassia testudinum* and *Syringodium filiforme*. Estuarine and Coastal Shelf Science. 85: 319–326.

Jensen, H.J., Nielsen, O.I., **Koch**, M.S. (2009) Phosphorus release with carbonate dissolution coupled to sulfide oxidation in Florida Bay seagrass sediments. *Limnology and Oceanography.* 54(5): 1753–1764.

Koch, M.S., Kletou, D.C., Tursi, R. (2009) Alkaline phosphatase activity of water column fractions and seagrass in a tropical carbonate estuary, Florida Bay. *Coastal Estuarine and Shelf Science*. 83: 403–413.

Rosch, K. and **Koch**, M.S. (2009) Seagrass (*Thalassia testudinum*) nutrient recycling along a trophic gradient in Florida Bay. *Bulletin of Marine Science* 84(1): 1–24.

Nielsen, O. I., M.S. **Koch**, C.J. Madden (2007) Inorganic phosphorus uptake in a carbonate-dominated seagrass ecosystem. *Estuaries and Coasts* 30(5):827-839.

Koch, M.S., Schopmeyer, S.A., Nielsen, O.I., Kyhn-Hansen, C., Madden, C.J (2007) Conceptual model of seagrass die-off in Florida Bay: Links to biogeochemical processes. 350:73-88. *Journal of Experimental Marine Biology and Ecology*.

Koch, M.S., Schopmeyer, S.A., Holmer, M. Madden, C.J., Kyhn-Hansen, C. (2007) *Thalassia testudinum* response to the interactive stressors hypersalinity, sulfide and hypoxia. *Aquatic Botany* 87:104-110.

Koch, M.S., Schopmeyer, S.A., Kyhn-Hansen, C., Madden, C.J. (2007) Synergistic effects of high temperature and sulfide on tropical seagrass. *Journal of Experimental Marine Biology and Ecology* 341:91-101.

Koch, M.S., Schopmeyer, S.A., Kyhn-Hansen, C., Madden, C.J., Peters, J.S. (2007) Tropical seagrass species tolerance to hypersalinity stress. *Aquatic Botany* 86:14-24.

Nielsen, O. I., M.S. **Koch**, H.S. Jensen, C.J. Madden (2006) *Thalassia testudinum* phosphate uptake kinetics at low in situ concentrations using a ^{33}P radioisotope technique. *Limnology and Oceanography 51: 208-217.*

Kieckbusch, D. and M.S. **Koch** (2004) Trophic linkages of primary producers and consumers in fringing mangroves of tropical lagoons. *Bulletin of Marine Science* 74(2):271-285.

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Koch, M. S. and J. M. Erskine (2001) Sulfide as a phytotoxin to the tropical seagrass, *Thalassia testudinum*: Interactions with high salinity and temperature. *Journal of Experimental Marine Biology and Ecology* 266:81-95.

Koch, M. S., and C. Madden (2001) Patterns of primary production and nutrient availability in a fringing mangrove tropical lagoon in the Bahamas. *Marine Ecology Progress Series* 219:109-119.

Koch, M. S., R. Benz, D. Rudnick (2001) Solid-phase phosphorus pools in highly organic carbonate sediments of northeastern Florida Bay. *Estuarine and Coastal Shelf Science* 52:279-291.

Erskine, J. M. and M. S. **Koch** (2000) Sulfide effects on *Thalassia testudinum* carbon balance and adenylate energy charge. *Aquatic Botany* 67:275-285.

Koch, M. S. (1997) *Rhizophora mangle* (red mangrove) seedling development into the sapling stage across resource and stress gradients in subtropical Florida. *Biotropica*. 29(4):427-439.

Koch, M. S. and S. C. Snedaker (1997) Factors influencing *Rhizophora mangle* (red mangrove) seedling development in Everglades carbonate soils. *Aquatic Botany* 59:87-98.

Jensen, J. R., K. Rutchey, M. S. **Koch**, and S. Narumalani. (1995) Inland wetland change detection in Everglades Water Conservation Area 2A using a time series of normalized remotely sensed data. *Photogrammetric Engineering & Remote Sensing* 61(2):199-209.

Koch, M. S., K. R. Reddy, and J. P. Chanton. (1994) Factors controlling seasonal nutrient profiles in a subtropical peatland of the Florida Everglades. *Journal of Environmental Quality* 23:526-533.

DeBusk, W. F., K. R. Reddy, M. S. **Koch**, and Y. Wang. (1994) Spatial distribution of soil nutrients in a northern Everglades marsh: Water Conservation Area 2A. *Soil Science Society of America Journal* 58:543-552.

Hester, M. W., K. L. McKee, D. M. Burdick, M. S. **Koch**, K. M. Flynn, S. Patterson, and I. A. Mendelssohn. (1994) Clonal integration in *Spartina patens* across a nitrogen and salinity gradient. *Canadian Journal of Botany* 72:767-770.

Koch, M. S., and P. S. Rawlik. (1993) Transpiration and stomatal conductance of two wetland macrophytes (*Cladium jamaicense* and *Typha domingensis*) in the subtropical Everglades. *American Journal of Botany* 80(10):1146-1154.

Reddy, K.R., R.D. DeLaune, W.F. DeBusk, and M **Koch**. (1993) Long-term nutrient accumulation rates in the Everglades. *Soil Science Society of America J.* 57:1147-1155.

Koch, M. S., and K. R. Reddy. (1993) Distribution of soil and plant nutrients along a trophic gradient in the Florida Everglades. *Soil Science Society of America J* 56:1492-1499.

Koch, M. S., E. Maltby, G. A. Oliver, and S. A. Bakker. (1992) Factors controlling denitrification rates of tidal mudflats and fringing salt marshes in Southwest England. *Estuarine and Coastal Shelf Science* 34: 471-485.

Gosselink, J. G., G. P. Shaffer, L. C. Lee, D. M. Burdick, D. L. Childers, N. C. Leibowitz, S.C. Hamilton, R. Boumans, D. Cushman, S. Fields, M. S. **Koch**, and J. M. Visser. (1990) Landscape conservation in a forested wetland watershed: Can we manage cumulative impacts? *Bioscience* 40:588-600.

Koch, M. S., I. A., Mendelssohn, and K. L. McKee. (1990). Mechanism for the hydrogen sulfide-induced growth limitation in wetland macrophytes. *Limnology and Oceanography* 35:399-408.

Koch, M. S. (1989). Sulfide as a soil phytotoxin: Differential responses in two marsh species. *Journal of Ecology* 77:565-578.

GRANTS: (HIGHLIGHTED 2012-PRESENT)

Development of Management Tools to Access Sea grass Vulnerability to Sulfide-induced Die-off and Meadow Recovery through Isotopic, Genetic, Morphometric and Physiological Approaches. Department of Interior (Everglades National Park) **coPI: $298,397**. 2018-2020.

Seagrass Florida Bay Microsensor Seasonal Dynamics. SFWMD **PI: $40,000**. 2018.

Field Study of Seagrass Die-Off Sites in Florida Bay using a Microsensor System and Isotope Analyses. Water Management Seagrass Model. SFWMD **PI: $40,000**. 2017.

Field Study of Seagrass Die-Off Sites in Florida Bay using a Microsensor System and Isotope Analyses. Water Management Seagrass Model. SFWMD **PI: $50,000**. 2016.

Synthesis and Modeling of Seagrass (*Ruppia maritima*) in Florida Bay transition zone applied to Water Management Seagrass Model. SFWMD **PI: $47,656**. 2015-2016.

Ocean acidification, temperature and light effects on carbon-use mechanisms, calcification, and growth of tropical macroalgae: Drivers of winners and losers. National Science Foundation (NSF**). PI: $423,000.** 2014-2018.

Ruppia maritima Seed Bank Reassessment Following Large Reproductive Events in the Mangrove Transition Zone and Florida Bay. SFWMD **PI: $20,000**. 2014.

Seagrass Studies in the Mangrove Transition Zone and Florida Bay in Support of Minimum Flows and Levels and Ecosystem Restoration. SFWMD. **PI:$140,000.** 2012-2014.

FAU Climate Change Initiative Priority Theme: Research, Engineering and Adaptation to a Changing Climate: FAU. **PI: $500,000**. 2009-2014.

Seagrass research in Florida Bay in support of ecosystem models and restoration: 2009. SFWMD. **PI: $300,000**.

Germination Response of *Ruppia* seeds in Florida Bay: 2007. SFWMD. **PI: $49,600**.

Salinity, temperature, and light effects on germination success of *Ruppia maritima* in Florida Bay: 2007. A mesocosm and field study. SFWMD. **PI: $49,000**.

Mesocosm studies to investigate the effects of fresh water on seagrasses in Florida Bay. 2006. SFWMD. **PI: $49,500**.

Phosphorus Kinetic and Biogeochemical Studies to Support a Seagrass Ecosystem Simulation Model for Florida Bay Management, January 2005. USGS-CESI: Everglades National Park. **PI: $213,348** (2 years).

Phosphorus cycling and nutrient limitation of seagrass on the Bahama Banks; July, 2004: Ship time 6 days; Florida Institute of Oceanography (FIO) **PI: $12,000**.

Nutrient cycling by seagrasses and epiphytes in Florida Bay, May 2002. NOAA-Coastal Ocean Program. **PI: $200,000** (2 years).

High salinity, nutrient and multiple stressor affects on seagrass communities of NE Florida Bay, April 2002. South Florida Water Management District. **PI: $375,000** (3 years).

Salinity effects on seagrass in NE Florida Bay; July, 2001. South Florida Water Management District (SFWMD); preliminary mesocosm experiments. **PI: $12,000.**

Macrophyte nutrient limitation in carbonate sediments of the Bahamas; May 1999: Ship time 10 days; Florida Institute of Oceanography (FIO) **PI: $20,000**.

Nutrient dynamics and primary production in seagrass communities of northeastern Florida Bay: 1998-2000; South Florida Water Management District (SFWMD) **PI: $50,000.**

Thalassia testudinum resilience to sulfide stress in Florida Bay: An experimental and field approach; 1998-1999; (USGS/ENP) **PI: $37,000.**

Linkages between seagrass and mangrove ecosystem function; 1998-1999; Research Initiation Award, FAU-DSR, **PI: $4,900**.

Macrophyte nutrient limitation in carbonate sediments of the Bahamas; May 1998: Ship time 10 days; Florida Institute of Oceanography (FIO) **PI: $20,000**.

The effects of sediment biogeochemistry on seagrass carbon and phosphorus cycling in Florida Bay; South Florida Water Management District (SFWMD) PI; 1996-1998: **PI: $64,000.**

The Significance of Nutrient Redistribution and Regeneration to the Recovery of Mangrove Ecosystems from Hurricane Andrew; 1994; Everglades National Park **Co-PI: $63,580.**

Sigma Xi Student Research Grant to study abroad; 1988; University of Exeter, England: **$1,000.**

Rockefeller Student Research Grant; Louisiana State University: **$2,000.**

OMB No. 0925-0001 and 0925-0002 (Rev. 09/17 Approved Through 03/31/2020)

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: James Kumi-Diaka

eRA COMMONS USER NAME (credential, e.g., agency login): KUMIDIAKA

POSITION TITLE: Associate Professor of Reproductive Oncopathology and Immunology

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
University of Guelph - Guelph, Ontario. Canada	BSc	1969	Biology-Biochemistry
University of Guelph - Guelph, Ontario, Canada	Pre-clinical.	1970-72	Veterinary Medicine
A.B. University - Zaria, Nigeria	DVM	1974	Veterinary Medicine
A.B. University - Zaria, Nigeria	MSc.	1976	Repro. Pathophysiology
A.B. University - Zaria, Nigeria	PhD.	1981	Repro. Pathophysiology
ABU-Zaria/Redding-England	Vee (Dipl.)	1983	Vet. Economics & Epidemiology
University of Guelph-Guelph Ont. Canada	Post-Doc	1987-90	Reproductive Pathology
Madison Area Technical College, Madison WI	Certificate	1994	Biotechnology

A. Personal Statement

- I have a longstanding interest and experience in cancer and reproductive pathophysiology experimental studies. During my graduate (MSc and PhD) and post-Doc training, the major focus was on the male genitalia and related anomalies, including cancer-related pathologies. In the course of my training I developed intense interest in cancer, and as a professor, I have concentrated my efforts in cancer research, principally in carcinogenesis and phytotherapeutics. We have been researching in related areas such as stem cells, biomarkers, signaling pathways and cancer genetics. Over the course of many years, I have trained/mentored and co-mentored many graduate and undergraduate research students who have continued to successful careers in various fields – as professors, health and health-related employees etc. At all times, I have played a leadership role as the principal investigator or co-investigator in many research projects; culminating in many scholarly publications in peer review scientific journals. I have a research collaborator (Dr Rathinaveli-Director of RG-Institute of Cancer Research, among others) whose extensive experience in cancer research; provide additional help to successful completion of many of our research projects. Moreover, as the primary mentor, I always assume the primary responsibility for proposed studies and I am involved in all aspects of the project. Currently I am mentoring three graduate (two PhD and one MS) students, and at least three undergraduate research students per semester at Florida Atlantic University; and I am on a graduate committee for two PhD students at Nova Southeastern University (a sister nearby institution).

B. Positions and Honors

Positions and Employment

1994 - Present	Associate Professor of Biology Florida Atlantic University, Davie. FL
2004 - 2011	Adjunct Professor, School Biomedical Sciences; Barry University, Miami
1990 -1994	Visiting Associate Professor of Theriogenology. Department of Medical Sciences, School of Veterinary Medicine, University of Wisconsin, Madison, WI. USA
1988-1990	Pharmaceutical Consultant, Intervet Canada Inc. Toronto Canada
1983-1987	Associate Professor -Theriogenology. Sch. Veterinary Medicine A.B. University, Zaria

1978-1983	Assistant Professor of Theriogenology. Sch. Veterinary Medicine. A. B. U. Zaria
1976-1978	Graduate Faculty. School of Veterinary, Medicine. A.B. University, Zaria

Other Experience and Professional Membership

1983-1987	Reviewer for Trop. Anim. Science (journal).
1983 -1995	Member, Society for Theriogenology
1986-1987	Evaluator, Scientific Research proposals for Federal & State Govt. of Nigeria.
1987-1990	Post-doctorate Research: Ontario Veterinary College, University of Guelph, Canada
1990 -1994	Chair, Theriogenology (reproductive pathophysiology) unit, Department of Medical Sciences, College of Veterinary Science, University of Wisconsin, Madison WI
1992	Reviewer of Theriogenology manuscripts for AJVR.
1992-1995	Member, Wisconsin Veterinary Medical Association.
1995-2011	Member, American Association for the Advancement of Science.

Honors

2019	Nominee - FAU Broward Achievement Awards
2018	Nominee - FAU Broward Achievement Awards
2013	Nominee - FAU Broward Achievement Awards.
2013*	***Awarded DSC. (Honoris Causa) degree*** - College of Medicine, University of Science, Arts and Technology, Montserrat, British WI
2011	Nominee - FAU Broward President's Faculty Excellence Award
2009	FAU Broward Achievement Awards - Faculty Member of the Year
2002	Certificate of Achievement: Broward Excellence and Achievement Award
2001	EXCELLENCE, Broward, Excellence in Professional Achievement Award
1999	Distinguished Service Award: FAU-IMPAC Awards, FAU
1999	Nominee for Teaching Incentive Program Award, CLA
1998	Certificate of Recognition, Undergraduate Teaching Award, CLA

C. Contribution to Science

Reviewer for Journals (+27 journal between 2006 and 2019) including:

a) Reviewer Journal of Medicinal Food
British Journal of Nutrition
International Journal of Urology
Functional Foods in Health and Disease
Journal of Cell and Molecular medicine,
International Journal of Toxicology,
. J. Molecular Nutrition & Food Research
Journal of Pharmacology and Clinical Toxicology
Acta Oncologica
Molecular Biology Reports
Journal of Bioengineering (MDPI Switzerland)
International Journal of Molecular Sciences (MDPI Switzerland)

b) Editor/Editorial member of Journals:
Editor - Edorium Journal of Cell Biology
Editor – Biomedical Journal of Scientific & Technical Research (BJSTR)

Reviewer for Grant Agents:
USAMRMC (USA Medical Research and Material Command) 2005
Susan Komen Breast Cancer Research Foundation 2006

Reviewer for Books:

2018	New Immunology textbook for Oxford University Press, USA
2005	Immunology Text - by Nieto and Nieles– review for new text
2005	Immunology Text - by Peter Parham –review for 3rd edition
2004	Immunology Text - by Tizard

Book Chapter:

I have written a chapter in a book "**Pharmacognosy**" ISBN: 978-0-12-802104-0 Academic Press publication

D. Additional Scholastic Performance

Internship Training:

Student	*Institution*	*Training*	*Year/duration*
Danyella Fox	Biotech -Kaiser University	Internship	2010 for six months
Steve Kiu	Biomed -Barry University	Internship	2010 for nine months
Dalia Daggag	Biomed -Barry Univ	Internship	2011 OPR-optional

Bibliography: (Selected)

80. Rida Altaf, James Kwasi Kumi-Diaka, Rolando M Branly. Irradiation augmentation of genistein-induced apoptosis in androgen-independent DU-145 prostate cancer cells *in vitro Cancer Prev Curr Res.* 10(1):4–11. DOI: 10.15406/jcpcr.2019.10.00381 **2019**

79. Kumi-Diaka, JK Genistein isoflavone and male fertility: The saga of genistein. *Journal of Translational Science, ISSN: 2059-268X, January 18, **2019***

78. Toluleke Oloruntobi Famuyiwa, Joubin Jebelli, **James Kwasi Kumi Diaka**, Waseem Asghar. Interaction between 3-Bromopyruvate and SC-514 in prostate cancer treatment. Journal of Cancer Prevention & Current Research. 9(6):270-280, **2018**

77. Toluleke O F, **James Kumi-Diaka**. Nanoparticle (NP) Delivery of Chemotherapy Drugs to Prostate Cancer Patients. Int J Conf Proc. 1(1):1-4. ICP.000502.**2018**

76. Saheed Oluwasina Oseni and **Kumi-Diaka, James**. Emerging Role of Cancer Stemness in Prostate Cancer Recurrence and Management. Acta Scientific Cancer Biology Volume 2 Issue 5 July **2018**

75. **Kumi-Diaka, James.** Male Fertility. Short Communication. Austin Andrology **2018**; 3(1): 1021. ISSN: 2578-093X www.austinpublishinggroup.com

74. Harris Goldsmith**, Gintare Kazdailyte**, **James Kumi-Diaka**. 3-Bromopyruvate and Genistein combination inhibits glycolysis and induces cell death in DU-145 and LNCaP Prostate cancer cells. The Chemist – Journal of American Institute of Chemists 90 (1):20-21, 2017

73. Toluleke Oloruntobi Famuyiwa**, Joubin Jebelli*, **Kwasi Kumi-Diaka**. Prostate Cancer Cells Produce Exosomes Modulating Metastasis to the Bones. Mini Review: Journal of Cancer Prevention & Current Research/MedCrave. Volume 8 Issue 2, **2017**

72. Harris Goldsmith**, Gintare Kazdailyte**, **James Kwasi Kumi-Diaka**. 3-Bromopyruvate and Genistein Combination Inhibits Glycolysis and Induces Cell Death in DU-145 and LNCaP Prostate Cancer Cells. The Chemist, Volume 90 | Number 1. ISSN 1945-0702, **2017** *Journal of the American Institute of Chemists.*

71. Oseni Saheed**, Quiroz Elsa**, **Kumi-Diaka James**. Chemopreventive Effects of Magnesium Chloride Supplementation in Hormone Independent Prostate Cancer Cells. *Journal of Functional Foods for Health and Diseases. 6(1): 1-15, 2016*

70. **Kumi-Diaka James**, Saheed Oseni**, Rolando Branly+. Therapeutic impact of vitamin C on the cancer activities of genistein isoflavone in radio sensitized LNCaP prostate cancer. *Journal of Cancer Prevention and Current Research 15-RA-166, 2015*

69. Oseni Saheed**, **James Kumi-Diaka**, Rolando Branly+, Joubin Jebelli*, Jane Warrick*, Harris Goldsmith**. Pyroelectrically Generated Very Low Dose Ionizing Radiation Enhances Chemopreventive and Chemo-therapeutic Effects of Genistein Isoflavone in Human Prostate Cancer Cells. *Journal of Cancer Prevention and Current Research;1(2): 2014*

68. Shreyasee Chakraborty**, Bibiana Sandoval-Bernal*, **James Kumi-Diaka**. Therapeutic Efficacy of Genistein-Topotecan Combination Compared to Vitamin D3-Topotecan Combination in LNCaP Prostate Cancer Cells. *Cell Biology 2:97-104, 2013*. [http://dx.doi.org/10.4236/cellbio.2013.23011]. (http://www.scirp.org/journal/cellbio)

67. Horman, Vanessa**, Dhandayuthapani Sivanesan*, **Kumi-Diaka James**, Rathinavelu Apu+. Activation of the intrinsic pathway in LNCaP prostate cancer cells by genistein-topotecan combination treatment. *Functional Foods in Health and Disease (FFHD) 3(3), **2013** http://mc.manuscriptcentral.com/medicinalfood;*

66. Dhandayuthapani Sivanesan**, Marimuthu Palanisamy**, Hormann Vanessa**; **Kumi-Diaka J,**

Rathinavelu Appu[+]. Induction of Apoptosis in HeLa cells via Caspase activation by Resveratrol and Genistein. *Journal of Medicinal Food, 16(2) 139-146,* ***2013***

65. Johnson Michelle**, **Kumi-Diaka J**, Zoeller Robert[+], Graves Susan[+], Merchant Kendra**, Hormann, Vanessa**, Hassanhi Mansur[+]. Therapeutic efficacy of genistein-cytoreg combination in breast cancer cells. Journal of *Functional Foods in Health and Disease (*J. FFHD), 2 (5): 137-150, **2012.**
64. Vanessa Horman**, **Kumi-Diaka J**, Durity M[+], Rathinavelu Appu[+]. Anti-cancer activities of Genistein-topotecan combination in prostate cancer cells. *Journal of Cell and Molecular Medicine (J. Cell Mol. Med), 16(11) 2631-2636,* ***2012.***
63. Kendra. Merchant**, **J. Kumi-Diaka**, A. Rathinavelu[+], N. Esiobu[+], R. Zoeller[+] and V. Hormann* Genistein Modulation of Immune-Associated Genes in LNCaP Prostate Cancer Cell line, *The Open Prostate Cancer Journal*, *4:* 6-13, **2011**
62. Merchant Kendra**, **Kumi-Diaka J**, Rathinavelu A[+], Esiobu N[+], Zoeller R[+], Hartmann James[+], Johnson Michelle*. Molecular basis of the anti-cancer effects of genistein isoflavone in LNCaP prostate cancer cells. *Functional Foods in Health and Disease,* 3:91-105, **2011.**
61**. Kumi-Diaka J**, [K] Merchant[**], R Haces[+], [V] Hormann[**], [M] Johnson[*]. Genistein-Selenium combination induces growth arrest in prostate cancer cell. *Journal of Medicinal Food 13 (4):1-9,* ***2010***
60. **Kumi-Diaka James**. Health benefits of pomegranate (punica granatum). Comments In: Life *Extension Magazine, March* ***2008****.*
59. **Kumi-Diaka J**, Mansur Hassanhi[+], K Merchant**, Vanessa Hörmann[**]. Influence of Genistein isoflavone on MMP-2 expression in Prostate cancer cells. *Journal of Medicinal Food,* 9 (4):491-497, **2006**.

D. Research Support

Ongoing Research Support

Extramural support = none

PhD Grads Mentored Department Degree Program Year Enrolled/Graduated

Mohammed Algou Chemistry Department **PhD** **2007**
Thesis: Proteome Analysis of Melanoma Progression
Merchant, Kendra Biological Sciences **PhD** **2009**
Thesis: Novel Molecular Targets for Genistein in Prostate Cancer Cells
Vanessa Hormann Biological Sciences **PhD** **2012**
Thesis: Anticancer Activities of Topotecan-Genistein combination in Prostate cancer cells.
Saheed Oseni Biological Sciences **PhD** enrolled in **2016**
Thesis: Chemotherapeutic efficacy of combination treatment with genistein and Pyroelectrically generated low dose ionizing radiation of prostate cancer: The molecular targets and signaling pathways
[1]**Toluleke Famuyiwa** Biological Sciences **PhD** enrolled in **2016**
Olumide Ademosun Biological Sciences **PhD** enrolled in **2018**
Ali Mohammed Alaseem College of Pharmacy-NSU **PhD** **2018**
Thesis: MDM2 Overexpression promotes angiogenesis and metastasis through dysregulation of MMP-9/TIMP-1
[Assistant Professor at Al-Imam Muhammad Ibn Saud Islamic University Saudi Arabia]

Research Interest*:*

a) Reproductive pathophysiology (Fertility-Infertility)
b) Oncopathology: Phytotherapeutics in Prostate, Breast & Testicular cancers

Graduate Training:

Carcinogenesis and Phytotherapeutics
PhD and MS students.

H. Jay Lyons

Department of Biological Sciences
Charles E. Schmidt College of Science
Florida Atlantic University
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Davie, Florida 33314
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e-mail - hlyons@fau.edu

A. Professional Preparation

Ph.D., Medical Science, Aug, 1973. University of New Mexico, Albuquerque, NM
M.S., Zoology, Aug, 1968. Brigham Young University, Provo, UT
B.S., Zoology, June,1966. Brigham Young University, Provo, UT

B. Appointments Since 1984:

2002 - Associate Chair, Department of Biological Sciences, Charles E. Schmidt College of Science, Florida Atlantic University, Boca Raton, FL
2000 - Associate Professor, Department of Biological Sciences, Charles E. Schmidt College of Science, Florida Atlantic University, Boca Raton, Fl
1998-00 Biology Program Coordinator - College of Liberal Arts, Florida Atlantic University, Davie, Fl.
1994-97 Biology Program Coordinator - College of Liberal Arts, Florida Atlantic University, Davie, Fl.
1994-20 Associate Professor, College of Liberal Arts, Florida Atlantic University, Davie, FL
1984-94 Professor and Chairman, Department of Physiology, Southeastern University of the Health Sciences, North Miami Beach, FL
1992-93 Adjunct Faculty, Florida International University, Bay Vista Campus, College of Liberal Arts, N. Miami Beach, FL
1981-84 Associate Professor and Chairman, Department of Physiology and Pharmacology, Southeastern College of Osteopathic Medicine, North Miami Beach, FL

C. Selected Peer Reviewed Publications

Churchill, P.C., H.J. Lyons, G. Murano and F.D. McDonald. Lack of inhibition of hog renin by heparin. Nephron 22:113-116, 1978.

Lyons, H.J. and P.C. Churchill. The effect of papaverine on in vitro renin secretion. Proc. Soc. Exper. Biol. Med. 160:237-240, 1979.

Lyons, H.J. Studies on the mechanism of renin release from rat kidney slices: calcium, sodium and metabolic inhibition. J. Physiol.(London) 304:99-108, 1980.

Lyons, H.J. and H.E. Laubach. Seminal vesicle and coagulating gland growth induced by intraperitoneal inoculation of fungi in mice. Am. J. Vet. Research 50(1):32-33, 1989.

Lyons, H.J., L. Lyons, P. S. Taraskevich. Potassium-induced secretion of melanotrophs of the neurointermediate lobe of the lizard, *Anolis carolinenesis*. Journal of General and Comparative Endocrinology 116: 396 - 402, 1999

E. Synergistic Activities

University

Environmental Initiative - 1995
Broward Senate - Ad Hoc "teaching delivery" committee - 1995

Broward Faculty Senate - Steering committee 1996 - 1999
University Promotion and Tenure Committee , 2000 - 1
University Faculty Council, 2000

Charles E. Schmidt College of Science
Deans Advisory Committee - 2004 - 2008
TIP committee, 2001 – 2002
College Tenure and Promotion Committee, 2009 -

College of Liberal Arts
Interdisciplinary Studies Committee - 1994 - 1997
M.S. in Liberal Studies - 1995 -1999
Search Committee, microbiology position (chair), 1995
Search Committee, botany, 1995
Search Committee, microbiology (chair), 1996
Search Committee, visiting professor, genetics, 1996
Search Committee, genetics, 1997
Search Committee, molecular biologist, 1998
Division of Science, personnel committee (chair), 1996 -97, 1999 -2000 (chair)
CLA Web Page Committee, 1996 - 2004
CLA promotion and tenure committee, 1995 - 98, 1999 - 2001
CLA promotion and tenure committee, chair, 2001
CLA Steering Committee, 1997 - 2001
CLA Steering Committee, Chair, 1999 - 2000

Department of Biological Sciences
Departmental Personnel Committee (Co-Chair) 2006 -
Search Committee, Biology Instructor (chair) 2001
Advisor, FAU-Broward Premedical Association, 2000 -
Departmental Computer Committee - 2003 - 2008

G. Courses Taught

2006 – 2019 (1X/YR)
PCB 3703 – Human Morphology and Function I
PCB 3703L – Human Morphology and Function I Laboratory
PCB 3704 – Human Morphology and Function II
PCB 3704L – Human Morphology and Function II Laboratory

1998 – 2007 (2X/YR)
PCB 4023 – Molecular and Cellular Biology

1997 – 2005 (1X/YR)
PCB 4702 – Human Physiology

1994 – 2002 (1X/YR)
PCB 4723 – Comparative Vertebrate Physiology
PCB 4723L - Comparative Vertebrate Physiology Laboratory

1994 – 2000
ZOO 2203 – Invertebrate Zoology
ZOO 2203L - Invertebrate Zoology Laboratory

2006 – 2019
BSC 5933 – Advanced Renal Physiology
BSC 5933 - Advanced Cardiovascular Physiology

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Sarah L. Milton

eRA COMMONS USER NAME (credential, e.g., agency login):

POSITION TITLE: Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Cornell University	B.A. (magna)	1988	Anatomy and Physiology
Univ. of Miami (RSMAS)	Ph.D.	1994	Marine Physiology
Florida Atlantic University	Post-doc	1995-1996	Neurobiology

A. Personal Statement

My research is broadly described as Environmental Physiology, investigating the effects of environmental stressors on animal physiology and adaptive mechanisms of survival. I currently have two main branches of research: (1) survival of the brain in the absence of oxygen, using whole animal and cell cultures to examine the physiological, cellular, and molecular adaptations that allow anoxia-tolerant organisms to survive without oxygen, using the model organisms *Trachemys scripta* (turtle) and *Drosophila melanogaster* (fruit fly) to look for new therapeutic targets for stroke, aging, and other diseases of ischemia, anoxia, and oxidative stress, and (2) Sea turtle physiology and conservation, with a variety of projects ranging from the energetics of hatchling disorientation, the impacts of climate change on turtles (nest success, hatchling physiology, erosion and flooding) to developing therapeutic treatments for sea turtles exposed to toxic red tides. Over the course of this research at FAU I have mentored 18 Master's students to degree completion (with 4 more currently in my lab), with these students going on primarily to teach, work for environmental consulting firms, or go into professional or doctoral programs. I have also directed the doctoral dissertations of 8 PhD candidates, with those students continuing on to work in drug discovery or medical research, at universities, or for private foundations; I have also supervised on Fullbright post-doctoral fellow. These students have been first or co-authors* on 22 of my 40 peer-reviewed publications. I also have a strong undergraduate research program in my lab; since 2004 I have mentored over 150 Directed Independent Study, Undergraduate Research Mentor (URM) students, Honor's students, and high school students looking for laboratory experience. Many of these students have gone on to medical or veterinary school, or to earn graduate degrees. Two of the four undergraduate students I currently have in my lab will be co-authors on an upcoming publication, with one having recently presented at the 2019 International Sea Turtle Symposium.

B. Positions and Honors

Positions and Employment

2019- Full Professor, Biological Sciences, Tenured, Florida Atlantic University
2016- Associate Director of the Integrative Biology PhD Program

2015 - Co-director: Program for Master of Science in Marine Science and Oceanography
2011- Associate Professor, Biological Sciences, Tenured, Florida Atlantic University
2006- 2011 Assistant Professor, Biological Sciences, Florida Atlantic University
2005- 2011 Joint appointment, Assistant Professor, Dept of Biomedical Science, Florida Atlantic University
2005-2006 Visiting Assistant Professor, Biological Sciences, Florida Atlantic University
1996-2005 Research Assistant Professor and Adjunct Lecturer, Florida Atlantic University
1996-1997 Adjunct Lecturer, Palm Beach Community College
1995-1996 Postdoctoral Fellow, Florida Atlantic University
1994-1995 Senior Biologist, Evans Environmental and Geological Science and Management, Inc, Miami FL
1992 – 1996 Adjunct Lecturer, Florida Atlantic University

Other Experience and Professional Memberships

2016-2018 President: Southeast Regional Sea Turtle Network
2018-2020 Vice President: Southeast Regional Sea Turtle Network
2016 – present Member, FAU Brain Institute
2016 – present Member, FAU pillar: Healthy Aging
2016 – present Member, FAU pillar: Marine and Environmental Science (Harbor Branch)
2008 – present Member, FAU Center for Molecular Biology and Biotechnology (CMBB)
2015 - present Faculty Advisor: Association of Biological and Biomedical Students at FAU (ABBS)

2013, 2014, 2015: Symposium Chair: Anatomy, Physiology, and Health. 33rd, 34th, 35th Annual *Symposium* on Sea Turtle Biology.
2006 – 2015 FAU Institutional Animal Care and Use Committee

Ad hoc Reviewer: National Oceanographic and Atmospheric Association; Austrian Science Fund; the Biotechnology and Biological Sciences Research Council (BBSRC, United Kingdom); National Science Foundation; Florida Fish and Wildlife Commission, Society for the Study of Amphibians and Reptiles' Roger Conant Grants in Herpetology; National Institute of Health, NSF pre-proposal review panel: Integrative Ecological Physiology, 2016
numerous journals and textbooks

2006 – 2013 Meeting Abstract Reviewer: International Symposium on Cerebral Blood Flow, Metabolism, and Function

2003 – 2009 **Contributing Writer**: Journal of Experimental Biology

Honors

2017/2018 Sea turtle work featured in **~150 media outlets: TV, national, and international press, popular science magazine websites and blogs, and social media (December 2017 and January 2018**). TV stations that aired segment on the evening news included ABC news in San Francisco, Fox news in Washington DC, NY, Atlanta, Chicago, Orlando, Dallas, Miami, Houston, Austin, Phoenix, Palm Beach, Boca Raton, and Charlotte; news outlets included Newsweek, the Miami Herald, USA Today; International press included sites in the UK, Australia, South Africa, and Germany; Science magazine outlets (online) included National Geographic, Smithsonian, print commentary in National Geographic and Nat Geo Kids.

2012 Research Associate Professor of the Year, CES College of Science, FAU

2008-2009 National Academies Education Fellow in the Life Sciences

C. Contributions to Science

As a graduate student, my contributions to science were in the field of sea turtle physiology and conservation, reflecting my personal interests in the impact of environmental stressors on animal physiology, a theme that I have continued to follow in various forms throughout my scientific career. A three year study demonstrated the impacts of different sand types on sea turtle nest and hatchling physiology, which overlapped with the strike by Hurricane Andrew on South Florida. Two papers and a technical report resulted from this work, including:

Milton, Sarah; Schulman, Alexa; and Peter L. Lutz. 1997. The effects of aragonite sand on the nesting and hatching success of loggerhead sea turtles. Journal of Coastal Research. 13:904-913.

Milton, Sarah; Schulman, Alexis; and Lutz, Peter. 1994. The effects of Hurricane Andrew on sea turtle nesting beaches of South Florida. Bulletin of Marine Science. 54: 974-981.

My interest in sea turtle physiology led to additional studies on diving and thus, anoxia tolerance, with studies focusing on the anoxia tolerant freshwater turtle *Trachemys scripta* as a model for sea turtles. *T. scripta* proved to be a highly anoxia tolerant organism, and thus my post-doctoral work and early position on the research faculty at Florida Atlantic University focused on brain survival without oxygen, establishing *T. scripta* as a model in which we discovered the ion channel and neurotransmitter adaptations that permit entrance into and survival of a hypometabolic state. We demonstrated that both ion leak channels and neurotransmitter release are strongly suppressed in the anoxic brain, reducing energy demand to match the reduced energy supply of anaerobic glycolysis. Over the years prior to becoming an Assistant Professor, this led to eight additional publications, among them:

Milton, Sarah and Lutz Peter. 2005. Adenosine and ATP sensitive potassium channels modulate dopamine release in the anoxic turtle (*Trachemys scripta*) striatum. American Journal of Physiology. 289: R77-R83.

Prentice, Howard; **Milton, Sarah;** Scheurle, Danielle; and Lutz, Peter. The upregulation of cognate and inducible heat shock proteins in the anoxic turtle brain. Journal of Cerebral Blood Flow and Metabolism. 24(7): 826-828, 2004.

Prentice, Howard; **Milton, Sarah;** Scheurle, Danielle; and Lutz, Peter. Gene transcription of brain voltage-gated potassium channels is reversibly regulated by oxygen supply. American Journal of Physiology: Regulatory Integrative and Comparative Physiology. 285(6): R1317-R1321, 2003

Milton, Sarah; John W. Thompson*; and Peter L. Lutz. 2002. Mechanisms for maintaining extracellular glutamate in the anoxic turtle striatum. American Journal of Physiology 282: R1317 – R1323.

Milton, Sarah and Peter Lutz. 1998. Low extracellular dopamine levels are maintained in the anoxic turtle brain. Journal of Cerebral Blood Flow and Metabolism 18: 803-807.

As an Assistant and Associate Professor at FAU, I have continued to contribute in both the fields of stroke research (anoxia tolerance) and sea turtle physiology, keeping funding and students in both areas of research. My laboratory was the first to (1) generate and use primary neuronal cultures from the turtle brain for use in molecular studies, (2) demonstrate that not only are *T. scripta* anoxia resistant, but are also able to suppress the formation of reactive oxygen species when oxygen is restored to the brain, a process which results in significant morbidity and mortality in the mammalian brain, (3) demonstrate neuronal regeneration following ischemia in the turtle cortex, and (4) show the existence and oxygen-regulated nature in the turtle of the newly discovered globin protein neuroglobin. Together this work suggests pathways of investigation to devise new therapeutic targets for stroke research. Representative papers include:

Milton, Sarah; Nayak*, Gaurie; Lutz, Peter, and Prentice Howard. 2006. Gene transcription of neuroglobin is upregulated by hypoxia and anoxia in the brain of the anoxia-tolerant turtle *Trachemys scripta*. Journal of Biomedical Science. Jul;13(4):509-514

Kesaraju*, Shailaja and **Milton, Sarah.** Preliminary evidence of neuronal regeneration in the anoxia tolerant vertebrate brain. Experimental Neurology. 2009 215(2):401-403.

Kesaraju, Shailaja*, Nayak Gauri*; Prentice, Howard M; **Milton, Sarah L**. 2014. Upregulation of Hsp72 mediates anoxia/reoxygenation neuroprotection in the freshwater turtle via modulation of ROS. Brain Research 1582:247-256.

I have also continued to maintain an active research program in sea turtle physiology and conservation, demonstrating that sea turtle eggs can be safely moved over a greater part of the incubation period than has been previously described, as may be necessary for e.g. emergency beach renourishment, and with a recent publication attracting the attention of over 150 media outlets (television, radio, online, newspaper, blogs):

Pankaew, Karen* and **Milton, Sarah**. 2018. The Effects of Extended Crawling on the Physiology and Swim Performance of Loggerhead and Green Sea Turtle Hatchlings. Journal of Experimental Biology. 221(1): 1-10.

My work has also combined the *T. scripta* model of anoxia tolerance with sea turtle conservation in that we utilized the freshwater turtle as a model of red tide impacts in a NOAA-funded study to devise a novel treatment plan for sea turtles exposed to the algal toxin brevetoxin. Harmful algal blooms are increasing in size and frequency worldwide, but as sea turtle species are all threatened or endangered, it was impossible to devise appropriate treatments for morbid animals. Utilizing *T. scripta*, we showed the mechanisms of action of the toxin on neurons, its distribution and clearance in the body, and tested a high-lipid mechanism that rapidly reduced symptoms of brevetoxicosis; this treatment was instituted around Florida in the summer of 2018 when the state was struck by a massive red tide event:

Courtney C. Cocilova*, Leanne J. Flewelling, April A. Granholm, Charles A. Manire, and **Sarah L. Milton**. 2019. Intravenous lipid emulsion treatment reduces symptoms of brevetoxicosis in turtles (*Trachemys scripta*). Journal of Zoo and Wildlife Medicine 50(1): 33-44.

Cocilova, Courtney*; Bossart, Gregory; Flewelling, Leanne; Granholm, April; and **Milton, Sarah**. 2017. Tissue uptake, distribution and excretion of brevetoxin-3 in the freshwater turtle *Trachemys scripta* and the diamondback terrapin *Malaclemys terrapin*. Aquatic Toxicology Mar 7;187:29-37.

Cocilova, Courtney* and **Milton, Sarah**. 2016. Characterization of brevetoxin (PbTx-3) exposure in neurons of the anoxia-tolerant freshwater turtle (*Trachemys scripta*). Aquatic Toxicology 180:115-122.

D. Research Support

<u>Ongoing</u>

DOR Research Mentoring Award (for 2019, mentee Dr. Marianne Porter)

FAU Undergraduate Research (OURI) award: Evaluating Morphodynamic Influences on Sea Turtle Nest Inundation. For undergraduate Kaitlin Grell, Spring 2019, $600.00 Ps: Sarah Milton, Tiffany Briggs

Friends of Gumbo Limbo: Looking for clues in human lymphatic failure to help explain fibropapillomatosis in sea turtles: a preliminary comparative pathology study. Heather Hettrick, Associate Professor, Department of Physical Therapy, Nova Southeastern University (PI). Co-PIs:Derek Burkholder, Nova Southeastern University; Sarah Milton, Associate Professor, Department of Biological Sciences, Florida Atlantic University ($6250, funded to NSU)

Friends of Gumbo Limbo: Boosting immune function in GTFP turtles in rehabilitation through light therapy. Sarah L. Milton, Ph.D. (PI) Funded. $10,472

FAU McGinty Scholar Award in Marine Biology. 7-1-18 – 6-30-20. $30K/year to support marine research.

Completed

FAU Summer Undergraduate Research Fellowship summer 2018
For support of undergraduate Kaitlin Grell, 5K

Caribbean Conservation Corp Milton (PI) 6/1/17 – 11/30/18
Incubation temperature effects on sea turtle hatchling fitness
$14,931
Role: PI

National Save The Sea Turtle Foundation: Beach dynamics, human use, and climate change: interactions that impact sea turtle nesting beaches.
$4500
Role: PI

National Oceanic and Atmospheric Administration Milton (PI) 9/1/11 – 8-31/16
ECOHAB: Brevetoxin metabolism and physiology - a freshwater model of morbidity in endangered sea turtles.
$643,000
Role: PI

American Federation of Aging Research Milton (PI) 7/1/08 – 12/31/10
Methionine sulfoxide reductase A and resistance to oxidative damage in an animal model of aging without senescence
$60,000
Role: PI

NIH – NIA **Milton (PI) 8/01/09-7/31/11**
Project No. 1R15AG033374 - 01
Molecular mechanisms of oxidative stress resistance in an animal model of aging without senescence
$213,413

Caribbean Conservation Corp Milton (PI) 6/1/10 – 5/31/11
Project No. 10-007R
Quantifying the energetic cost of disorientation in loggerhead (*Caretta caretta*) and green (*Chelonia mydas*) hatchlings
$15,957

Morris Animal Foundation Milton (PI) 12/1/10 – 11/30/12
Determination of Innate Immune Function in the Loggerhead (*Caretta caretta*) and Green (*Chelonia mydas*) Sea Turtle by Flow Cytometry
$25,202

Caribbean Conservation Corp Milton (PI) 7/1/06 – 8/31/07
Stress Protein Expression as a Marker of Physiological Stress: Associations with Green Turtle Fibropapillomatosis
Role: PI
$21,519

NIH AREA Grant **Milton (PI) 7/1/04 – 8/30/06**
ROS defense mechanisms in brain reoxygenation.
$139,000
Role: PI

American Heart Association Grant-in-Aid Milton (PI) 7/01/04 – 12/31/06
Role of adenosine pathways in brain anoxic tolerance and reoxygenation survival.
$120,000
Role: PI

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Rodney K. Murphey

eRA COMMONS USER NAME (credential, e.g., agency login): RMURPHEY

POSITION TITLE: Chairman and Professor, Biological Sciences

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
University of Minnesota	B.S.	1965	Zoology
University of Minnesota	M.S.	1967	Zoology
University of Oregon	Ph.D.	1970	Biology
University of California	Postdoctoral	1970-71	Zoology

A. Personal Statement

The primary focus of my lab is the development and degeneration of synapses in the central nervous system. Our primary goal is to understand synaptic plasticity and we combine molecular genetics, cellular neurophysiology and confocal microscopy to study these issues in model genetic systems. The tools we use include, lasers to ablate single neurons in living animals, genetics to manipulate neuronal circuits and a variety of electrophysiological methods to test synaptic function. Our primary focus in recent years has been to look at the function of axon guidance molecules and their new-found roles as synaptogenic molecules in Drosophila. One on-going project looks at netrin and its receptor frazzled and their roles in synaptogenesis. A second project examines the role of synaptic competition in the formation of neural circuits and the role of netrin in this process. In my research lab, I have personally mentored dozens of undergraduates, 20 PhD students, and 10 Postdoctoral trainees many of whom are highly successful PIs.

I have extensive experience as an administrator. I am Chairman of the Department of Biological Sciences with approximately 3000 undergraduate majors, and Director of the Integrative Biology PhD Program serving approximately 100 PhD students. I served as PI on two successive HHMI Undergraduate Initiative grants at the University of Massachusetts, as well as multiple NSF REU grants, and NSF curriculum grants. At FAU I established, with Evelyn Frazier (FAU) as co-PI, an Undergraduate Mentoring and Research Program to serve underrepresented students funded by the NSF (NSF# 0829250; “URM: Integrative Biology for Future Researchers” 2008-2013; total cost $700,570). I Founded the neuroscience group on the FAU Jupiter campus in order to develop collaborative program with Scripps Institute (TSRI) and Max Planck Florida Institute (MPFI). The MPFI collaboration has grown into a complete educational collaboration ranging from high school to postdoctoral programs. I was Program Director for Developmental Neuroscience at NSF (1987-1989) and served on numerous Federal grant advisory panels for NSF and NIH. Finally, I have Organized/Chaired a variety of symposia and conferences for the Society for Neuroscience, Gordon Conferences and numerous smaller venues.

B. Positions and Honors

2013-present Director Life Science Initiative, FAU Jupiter, FL
2008-present Director of the Integrative Biology PhD Program
2006-present Chairman, Department of Biological Sciences, Florida Atlantic University, Boca Raton FL
1996 Faculty Fellowship for Outstanding Research, UMass

1994-2005 Director, Molecular and Cellular Biology Program, University of Massachusetts, Amherst, Mass
1989-1994 Director, Neuroscience and Behavior Program University of Massachusetts, Amherst Mass
1987-1989 Program Director, Developmental Neuroscience National Science Foundation, Washington, D.C
1987 The President's Award for Excellence in Research, SUNY at Albany
1986-1993 NIH Javits Neuroscience Investigator
1986 Grass Traveling Scientist
1985-1989 Director, Neurobiology Research Center, State University of New York Albany, New York
1983-1987 Professor Department of Biology, State University of New York Albany, New York
1975-1983 Associate Professor, Department of Biology State University of New York Albany, New York
1971-1974 Assistant Professor, Department of, Zoology University of Iowa, Iowa City, Iowa
1968-1970 NIH Predoctoral Fellow

C. Contributions to Science

The general focus of my work has been on plasticity of synaptic assembly and function. I have worked primarily on simple systems and have recently focused on a combined genetic, physiological and anatomical approach to the question of how synapses are assembled at the molecular level.

1) The most recent work is focused on **guidance molecules and their role in synapse assembly**. We demonstrated that the well-known guidance molecules netrin and frazzled (DCC) are critical for assembly of gap junctions at an identified synapse in Drosophila.

a) Orr, BO, Borgen, MA, Caruccio, P, Murphey, RK. (2014) Netrin and frazzled regulate presynaptic gap junctions at a Drosophila giant synapse. J Neurosci 34(16):5416-5430. Selected by the editors as a highlight of "this week in the journal".
b) Godenschwege TA, Murphey RK. Genetic interaction of neuroglian and Semaphorin1a during guidance and synapse formation. (2009) J Neurogenet. 23:147-155
c) Godenschwege, TA, Kristiansen, LV, Uthaman SB, Hortsch M and Murphey, RK. (2006) A conserved role for Drosophila Neuroglian and human L1-CAM in central synapse formation. Curr Biol 16(1):12-23.
d) Murphey, RK, Froggett, SJ, Caruccio, P, Shan-Crofts, X, Kitamoto, T and Godenschwege, TA. (2003) Targeted expression of shibirets and semaphorin1a reveals critical periods for synapse formation in the giant fiber of Drosophila. Development 130:3671-3682.

2) A second series of projects was focused on the **role of ubiquitin in synapse assembly**. We showed how the ubiquitin pathway regulated assembly of synapses.

a) Borgen MA, KD Rowland, BN Lloyd, A Khan* and RK Murphey (2017) "Axon termination, pruning, and synaptogenesis in the giant fiber system of Drosophila melanogaster is promoted by Highwire." Genetics (on line January 18, 2017). *Selected for cover photo.
b) Grill B, Murphey RK, Borgen MA. The PHR proteins: intracellular signaling hubs in neuronal development and axon degeneration. Neural Dev. 2016 Mar 23,11:8
c) Uthaman, SB, Godenschwege, TA, Murphey, RK. (2008) The Drosophila ubiquitin conjugase Bendless: a developmental switch required for synaptic growth and maturation. J Neurosci 28:8615-8623.
d) Murphey, R.K. and T.A. Godenschwege (2002). New roles for ubiquitin in the assembly and function of neuronal circuits. Neuron, 36: 5-8.

3) A third focal point has been exploring the **role of competition in synapse assembly**. A series of experiments in the mid- to late '80s demonstrated competitive interactions between presynaptic neurons for space on postsynaptic dendrites. This series continues in Drosophila using laser ablation and various genetic manipulations to identify the molecular underpinnings of competitive interactions.

a) Chiba, D. Shepherd and R.K. Murphey. (1988) Synaptic rearrangement during postembryonic development in the cricket. Science 240, 901-905.
b) R.K. Murphey (1986) The myth of the inflexible invertebrate: Competition and synaptic remodelling in the development of invertebrate nervous systems. J. Neurobiol. 17, 585-591.
c) D.S. Shepherd and R.K. Murphey. (1986) Competition regulates the efficacy of an identified synapse in crickets. J. Neurosci. 6, 3152-3160.
d) R.K. Murphey and C.A. Lemere. (1984) Competition controls the growth of an identified axonal arborization. Science 224, 1352-1355.

Complete List of Published Work in My Bibliography
https://scholar.google.com/citations?hl=en&user=KHoFKOEAAAAJ&view_op=list_works&sortby=pubdate

D. Additional Information: Research Support and/or Scholastic Performance

Research Support none

Timothy Charles Theisen, Ph.D.
3200 College Avenue • Davie, Florida 33314
954-648-4989 • ttheisen@fau.edu
http://www.science.fau.edu/biology/faculty_staff/Theisen.htm

Education:

- Florida Atlantic University, Davie, Florida
  Ph.D., Integrative Biology (fisheries and marine science) 2007
  Dissertation: Population genetic structure, movement patterns, and environmental preferences of the wahoo, *Acanthocybium solandri*
- Florida Atlantic University, Davie, Florida
  B.S., Biology (marine), 2000 (*magna cum laude*)

Research Focus:

- Movement patterns and habitat utilization of marine and freshwater animals
- Relationships between physiology, species distributions, and population structure
- Effects of anthropogenic influences on population structure and species distributions

Employment:

- **2007 - Present:** Senior Instructor, Florida Atlantic University, Department of Biological Sciences:
- **2003 - 2007:** Research Assistant, Florida Atlantic University:

Research Experience:

- Collected and analyzed genetic data to describe the population genetic structure and phylogeograph of wahoo (*Acanthocybium solandri)* on a global scale
- Developed a protocol for the deployment of pop-up satellite archival tags (PSAT's) onto wahoo, and implemented a program utilizing PSAT's to investigate movement patterns and prepare temperature and depth profiles for wahoo
- Supervised graduate and undergraduate students assisting with these projects
- Recruited volunteers from within the recreational fishing community to assist in wahoo tissue collections and PSAT deployments via a website, www.wahooproject.org
- Investigated post-hurricane distribution of diamondback terrapins (*Malaclemys terrapin)* within Florida Bay
- Tagged and released terrapins, collected and analyzed genetic data and tag data
- Studied factors affecting growth rates in culture of the coral *Acropora cervicornis*, to be used for regeneration of damaged natural coral reefs
- Investigated regulation of calcium-gated channels by studying release of melanocyte stimulating hormone (MSH) via calcium-gated channels from cells of the intermediate pituitary lobe of the green anole, *Anolis carolinensis*

Publications:

- Theisen *et al* (2008) High connectivity on a global scale in the pelagic wahoo, *Acanthocybium solandri* (tuna family Scombridae). Molecular Ecology **17**, 4233-4247.
- Theisen (2008) Pacific cod, *Gadus macrocephalus*. Seafood Watch seafood report, Monterey Bay Aquarium, San Francisco.
- Theisen and Baldwin (2007) Movement patterns and environmental preferences of the wahoo, *Acanthocybium solandri*. Proceedings of the 59th Annual Gulf and Caribbean Fisheries Institute.
- Theisen (in prep.) Movements and temperature/depth profiles of wahoo, *Acanthocybium solandri*, in the western North Atlantic ocean.
- Theisen (2009) Report on the status of walleye pollock (*Theragra chalcogramma*) and its fisheries in the eastern Bering Sea and Gulf of Alaska. Seafood Watch seafood report, Monterey Bay Aquarium, San Francisco.
- Theisen (2008) Report on the status of Pacific cod (*Gadus macrocephalus*) and its fisheries. Seafood Watch seafood report, Monterey Bay Aquarium, San Francisco.

Scientific Presentations:

- Pelagic Fisheries Research Program Principal Investigators Workshop, Waikiki, Hawaii: Global population structure of the wahoo, November 2008.
- 59th Annual Meeting, Gulf and Caribbean Fisheries Institute, Belize City, Belize: Movement patterns and environmental preferences of wahoo, *Acanthocybium solandri*, November 2006. Presenter.
- Florida Atlantic University Research Symposium: Movement patterns and environmental preferences of wahoo, *Acanthocybium solandri*, March, 2006.
- American Fisheries Society Annual Meeting, Anchorage, Alaska: Global population genetic structure of wahoo, *Acanthocybium solandri*, September 2005.
- 56th Annual Meeting, Gulf and Caribbean Fisheries Institute, Tortola, British Virgin Islands: Population genetic structure of wahoo, *Acanthocybium solandri*, in the western North Atlantic Ocean, November 2003.
- Palm Beach Fishing Club Annual Fall Symposium, West Palm Beach, Florida: Ecology of wahoo and current research topics, Fall 2003.

Scientific Reviews:

- Journal Reviews:
  - ♦ Molecular Ecology
  - ♦ Bulletin of Marine Science
  - ♦ Transactions of the American Fisheries Society
  - ♦ Marine and Freshwater Research
- Grant Proposal Reviews:
  - ♦ National Marine Fisheries Service

Grants and Awards:

- Institute of Wildlife Science Foundation Grant Award: $15,000.00
- FAU Research Enhancement Grant Award: "Optimization of a satellite tagging protocol to describe movement patterns and habitat utilization of wahoo, *Acanthocybium solandri*", $15,000.00
- FAU Graduate Scholarship in Marine Science Award: $5,000.00
- FAU Graduate Scholarship in Conservation Biology Award: $3,000.00
- Palm Beach County Fishing Foundation Award: $3,000.00
- FAU Travel Grants: $1,950.00
- FAU Award for Outstanding Research Achievement

Memberships:

- American Fisheries Society
- Gulf and Caribbean Fisheries Institute
- Jupiter Inlet Offshore Fishing Club (honorary)

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Wyneken, Jeanette

eRA COMMONS USER NAME (credential, e.g., agency login):

POSITION TITLE: Professor, Director of FAU Marine Laboratory at Gumbo Limbo Environmental Complex

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Illinois Wesleyan University	B.A.	05/1974	Biology
University of Illinois	Ph.D.	05/1988	Biology

A. Personal Statement

My qualifications for my roles in biological research are multidisciplinary with particular interests in developmental and functional morphology and applications of these studies to lower vertebrate ecology, ethology, and conservation.

1. Erb, V, A Lolavar, J Wyneken. 2018. The Role of Sand Moisture in Shaping Loggerhead Sea Turtle (*Caretta caretta*) Neonate Growth in Southeast Florida. Chelonian Conservation and Biology, 17(2):245-251. https://doi.org/10.2744/CCB-1301.1
2. Lasala J, C Hughes, J. Wyneken. Breeding Sex Ratio and Population Size of Loggerhead Turtles from Southwestern Florida. PLOS One. 2018.
3. Lolavar A, J Wyneken. 2017. Experimental assessment of the effects of moisture on loggerhead sea turtle hatchling sex ratios. Zoology. 123:64-70. 10.1016/j.zool.2017.06.007
4. Sifuentes-Romero I, BM Tezak, SL Milton, J Wyneken. 2017. Hydric environmental effects on turtle development and sex ratio. Zoology. doi.org/10.1016/j.zool.2017.11.009

B. Positions and Honors

Positions and Employment

2014-present Professor, Dept. of Biological Sciences, Florida Atlantic University, Boca Raton, Florida
2018-present Director, Director of FAU Marine Laboratory at Gumbo Limbo Environmental Complex, Boca Raton, Florida

Other Experience and Professional Memberships

2018-present Member, NOAA Protected Species Climate Vulnerability Assessments: Marine Mammals and Sea Turtles
2017-present Member, FAU Diving and Boating Safety Committee
2017 Invited Member, Global Marine Turtle Nesting Environment Summit, Raine Island Recovery Project, Queensland Parks & Wildlife Service, Australia
2001-present Member, International Congress for Vertebrate Morphologists
1985-present Member, Past-president, Board of Directors Member, International Sea Turtle Society
1987-present Member, Society for Integrative and Comparative Biology
1999-present Member, Association of Reptilian and Amphibian Veterinarians

Honors

- 2019 Sea Turtle Champions Award, International Sea Turtle Society
- 2017 Presidential Awards for Outstanding Faculty-Led Community Engagement
- 2016 Dean's Award for Excellence, CES College of Science, Florida Atlantic University
- 2014 Eleanor Fletcher Lifetime Achievement Award, Loggerhead Marinelife Center, Juno Beach, Florida

C. Contributions to Science

Taken as a whole, my contributions reflect my training to ask questions that spans scale from cells and developmental processes to ecology and behavior and organismal evolution. My initial contributions to science focused upon addressing long-standing data gaps in the biology of turtles, particularly of marine turtles. My functional morphological studies contributed to fundamental understanding of how and why marine turtles are able to be long-distance migrants (a distinct characteristic of all extant species) while similar behavior is lacking in most non-marine turtle species. That work lead to in 12 peer-reviewed publications, a book published in two languages, a book chapter, and lead editorial responsibilities for a book. Below, an incomplete list illustrates the scope of this aspect of my work.

- Wyneken, J & M Salmon. 1992. Frenzy and Postfrenzy Swimming Activity in Loggerhead, Leatherback, and Green Sea Turtles. Copeia 1992(2):478-484.
- Wyneken J, SV Madrak, M Salmon, J Foote. 2008. Migratory activity by hatchling loggerhead sea turtles (*Caretta caretta* L.): evidence for divergence between nesting groups. Marine Biology 156:171–178
- Book: Wyneken. J. 2001. *Guide to the Anatomy of Sea Turtles*. NMFS Tech. Publication. NOAA Technical Memorandum NMFS-SEFSC-470 172 pp.
- Edited Book: Wyneken, J., M. Godfrey, & V. Bels, eds. 2008. *The Biology of Turtles*. CRC Press/Taylor and Frances Group. 389 pp.

The next phase of my science reflected two lines of research that developed during a lengthy period of "soft money" funding, although most of the publications were developed after I gain an academic appointment. One line of research focused on understanding and describing normal reptilian morphology and physiology, particularly to aid and educate animal health professionals and wildlife biologists. I continue to work in this field, often as a collaborator with veterinarians. Thirteen peer-reviewed paper and 21 peer- or editorial-board-reviewed book chapters in 4 books came from this research line and established key baselines, tested new methods, provided reference intervals, and identified fundamental data gaps in the field.

- Wyneken J. 2007. Reptilian Neurology: Anatomy and Function. Veterinary Clinics of North America: Exotic Animal Practice, 10(3): 837 – 853
- Epperly, SP, Wyneken, J, Flanagan, JP, Harms, CA. Higgins, B. 2007. Attachment of popup archival transmitting tags to loggerhead sea turtles (*Caretta caretta*). Herpetological Review 38(4): 419-425
- Book chapter: Wyneken J. 2008. The Structure of Cardiopulmonary Systems of Turtles. Pp. 213-224. In, *The Biology of Turtles.* Wyneken, J., M. Godfrey, and V. Bels, eds. CRC Press/Taylor and Frances Grp. 389 pp.
- Book chapter: Wyneken J, D.R. Mader, S Weber, & C Merigo. 2006. Medical Care of Seaturtles. pp. 972–1007. *In: Reptile Medicine and Surgery*. D.R. Mader, ed. Elsevier Press, St. Louis.

The other line of research arising during "soft money" period focused on measuring predation risk for hatchling marine turtles (an offshoot of my earlier studies migratory swimming). I focused upon nearshore risk to hatchling sea turtles. This line of inquiry allowed me to involve and mentor Masters students and has periodically given rise to further studies on nesting beaches (one paper in press), offshore movements of sea turtles and predation risk (6 peer-reviewed publications) and understanding of morphological and behavioral adaptations (collaborative work). This work establishes empirical measures losses to hatchling production such that maternal output could be adjusted in demographic assessments.

- Salmon M, J Wyneken, M Hamann, S Whiting. 2016. Early growth and development of morphological defenses in post-hatchling flatbacks (*Natator depressus*) and green turtles (*Chelonia mydas*). Marine and Freshwater Behaviour and Physiology 49(6): 421-435
- Welicky, R, J Wyneken, E Noonburg. 2011. A Retrospective Analysis of Sea Turtle Nest Depredation Patterns. The Journal of Wildlife Management; DOI: 10.1002/jwmg.255
- Whelan, CI, J Wyneken. 2007. Estimating Predation Levels and Site-specific Survival of Hatchling Loggerhead Seaturtles (*Caretta caretta*) from South Florida Beaches. Copeia, 2007(3):745–754
- Stewart, KR, J Wyneken. 2004. Predation Risk to Loggerhead Hatchlings at a High-Density Nesting Beach in Southeast Florida. Bulletin of Marine Sciences 74(2): 325–335

Over the last 15 years, my research has become increasingly focused upon environmental effects on development, particularly sex determination and early growth, as well as novel methods development. This work has become increasingly important in documenting effects of climate changes and particularly local warming along the coast. Five Ph.D. students, two postdoctoral associates, and two Masters students have been involved in this research line. Eight peer-reviewed papers address several aspects of this body of work.

- Lolavar A, J Wyneken. 2017. Experimental assessment of the effects of moisture on loggerhead sea turtle hatchling sex ratios. Zoology. 123:64-70. 10.1016/j.zool.2017.06.007
- Sifuentes-Romero I, BM Tezak, SL Milton, J Wyneken. 2017. Hydric environmental effects on turtle development and sex ratio. Zoology. doi.org/10.1016/j.zool.2017.11.009
- Zimm R, BP Bentley, J Wyneken, JE Moustakas-Verho. 2017 Environmental Causation of Turtle Scute Anomalies *in ovo* and *in silico*, *Integrative and Comparative Biology*, 57(6) 1 December 2017: 1303–1311 https://doi.org/10.1093/icb/icx066
- Wyneken J, Lolavar A. 2015. Loggerhead sea turtle environmental sex determination: Implications of moisture and temperature for climate change based predictions for species survival. J. Exp. Zool. (Mol. Dev. Evol.) 324B:295–314.

D. Additional Information: Research Support and/or Scholastic Performance

Ongoing Research Support

Title: *Stewarding Our Seas*.
Donor Organization: Royal Caribbean Cruised, LTD. Corporate
Total Award Value: $125,000
Term: 1 year
Role: PI, wrote scientific components of proposal
This donation is for support of my long-term sea turtle research on primary sex ratios and particularly to allow expansion of leatherback turtle sex ratio data and neonate leatherback dispersal studies. This funding provides for small infrastructure improvements to our marine lab to support the research and outreach missions.

Title: *REU Site: Removing barriers to ocean current based electricity production through undergraduate research*
Agency: NSF
Total Award Value: $360,000
Term: 3 years
Role: Co-PI with James VanZwieten, Assist. Res. Prof. FAU, SNMREC
This grant supports Research Experience for Undergraduates who have interests in ocean energy technology and associated fields ranging from engineering to organismal interactions.

Completed Research Support

Title: *Nest to sea mortality of loggerhead sea turtles East and West coasts*
Agency: UF Foundation/Disney Conservation. Reverse the Decline.
Term: 2017-2019
Amount: $31,000
Role: PI; designed study and wrote proposal
Co-organizations/Other External: This funding is part of a large conservation program by Disney called the *Reverse the Decline Initiative*. The sea turtle projects are funded through a partnership with the University of Florida Foundation.

Title: *Promiscuity in marine turtles: Evolutionary push for Population Stability*
Agency: Sea Turtle Grants Program via Loggerhead Marinelife Center
Term: 2017-2018
Amount: $ 7,773
Your role: I edited the proposal and reports. I supervise Co-PI Jake Lasala. This work is in support of his Ph.D. dissertation research
Co-PI: Jacob Lasala, Ph.D. candidate, FAU
Co-organizations/Other External Participants/Agencies: Funding was awarded to Jake through the Loggerhead Marinelife Center while he was assisting them with complimentary research. This is a limited grant submission opportunity so this funding route enabled him to apply and complete essential dissertation work. The study was completed and showed that leatherback turtles have a nearly 1:1 sex ratio unlike other species.

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Xing-Hai Zhang

eRA COMMONS USER NAME (credential, e.g., agency login):

POSITION TITLE: Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Start Date MM/YYYY	Completion Date MM/YYYY	FIELD OF STUDY
University of Calgary, Calgary, Canada	PhD	09/1989	01/1994	Plant molecular biology
Michigan Technological University	Postdoctoral	04/1994	12/1996	Plant molecular biology

A. **Personal Statement**

My research Interests focus on plant molecular biology and biotechnology. Broadly, we attempt to understand regulatory and genetic mechanisms involving photosynthesis, plants' response to environmental stresses, invasive plants, and citrus greening disease. Specifically, we actively pursue (1) investigation of Rubisco biogenesis and functionality to genetically engineer for more active Rubisco in crops and trees to sequester more carbon dioxide into biomass; (2) application of genomic tools such as CRISPR for precise gene editing and targeted metabolic engineering to create value-added plants that produce medicines and more nutrients, or become more tolerate to environmental stresses; (3) exploration of new tools such as nanotechnology for more efficient delivery of DNA, RNA or proteins to plant cells to facilitate genetic engineering; (4) molecular ecology study of genetic variation and mechanisms for invasive plants and habitat shift in the Florida Everglades wetland; and (5) detection and treatment of citrus green disease.

B. Positions and Honors

2016-present Professor, Department of Biological Sciences, Florida Atlantic University, FL
2009-2016 Associate professor, Department of Biological Sciences, Florida Atlantic University, FL.
2003-2009 Assistant professor, Department of Biological Sciences, Florida Atlantic University, FL.
1997-2003 Research associate, USDA, Photosynthesis Unit/University of Illinois, Department of Crop Sciences, Urbana, IL.

C. Contributions to Science

1. Discovery and characterization of tissue-specific promoters for study of metabolic pathways.

Related publications:

Kirke J, Kaplan N, Velez S, Jin X-L, Vichyavichien P, **Zhang X-H**. (2018) Tissue-preferential activity and induction of the pepper capsaicin synthase *PUN1* promoter by wounding, heat and

metabolic pathway precursor in tobacco and tomato plants. **Molecular Biotechnology**, 60: 194–202.

Zernova O., Zhong W., **Zhang X.-H.,** Widholm J.M. (2008) Tissue culture specificity of the tobacco ASA2 promoter driving hpt as a selectable marker for soybean transformation selection. **Plant Cell Reports**, 27: 1705–1711.

2. Illustration of genetic mechanisms of plants' response to environmental signals such as nutrient elements and stress.

Related publications:

Ibrahim A, Jin X-L, Zhang Y-B, Cruz J, Vichyavichien P, Esiobu N, **Zhang X-H**. (2017) Tobacco plants expressing the maize nitrate transporter ZmNrt2.1 exhibit altered responses of growth and gene expression to nitrate and calcium. **Botanical Studies**, 58: 51.

Koch M., Bowes G., Ross C., **Zhang X.-H.** (2013) Climate change and ocean acidification effects on seagrasses and marine macroalgae. **Global Change Biology**, 19: 103–132.

Hill W., Jin X.-L., **Zhang X.-H.** (2016) Expression of an arctic chickweed dehydrin, CarDHN, enhances tolerance to abiotic stress in tobacco plants. **Plant Growth Regulation**, 80: 323–334.

Zhang X.-H., Weissbach H. (2008) Origin and evolution of the protein-repairing enzymes methionine sulphoxide reductases. **Biological Reviews**, 83: 249–257.

Ding D., Sagher D., Laugier E., Rey P., Weissbach H., **Zhang X.-H**. (2007) Studies on the reducing systems for plant and animal thioredoxin-independent methionine sulfoxide reductases B. **Biochemical and Biophysical Research Communications**, 361: 629–633.

3. Discovery of genetic factors controlling vascular system development in plants

Related publications:

Li Q., Lin Y.-C., Sun Y.-H., Song J., Chen H., **Zhang X.-H.**, Sederoff R.R., Chiang V.L. (2012) Splice variant of the SND1 transcription factor is a dominant negative of SND1 members and their regulation in *Populus trichocarpa*. **Proceedings of the National Academy of Sciences, USA**. 109: 14699–14704.

*Sun Y.-H., *Shi R., ***Zhang X.-H.**, Chiang V.L., Sederoff R. (2012) MicroRNAs in trees. **Plant Molecular Biology**, 80: 37–53. (*equal contribution)

Shi R., Sun Y.-H., **Zhang X.-H**., Chiang V.L. (2012) Poly(T) adaptor RT-PCR. In *Next-Generation MicroRNA Expression Profiling Technology: Methods and Protocols* (Fan J.-B., ed). Methods in Molecular Biology, vol. 822, Humana Press, New York, pp 53–66.

Li L., Popko J.L., **Zhang X.-H.**, Osakabe K., Tsai C.-J., Joshi C.P., Chiang V.L. (1997) A novel multifunctional *O*-methyltransferase implicated in a dual methylation pathway associated with lignin biosynthesis in loblolly pine. **Proceedings of the National Academy of Sciences, USA**. 94: 5461–5466.

Zhang X.-H., Chiang V.L. (1997) Molecular cloning of 4-coumarate:coenzyme A ligase in loblolly pine and the roles of this enzyme in the biosynthesis of lignin in compression wood. **Plant Physiology**, 113: 65–74.

4. Development and application of new technologies to create and study plants with new traits

Related publications:

Zhang X.-H., Brotherton J.E., Widholm J.M. (2015) Co-expression of the tobacco anthranilate synthase β subunit with its feedback-insensitive α subunit as a selectable marker that also markedly increases the free tryptophan content. **In Vitro Cellular & Developmental Biology – Plant**, 51: 564–570.

Zhang X.-H., Keating P., Wang X.-W., Huang Y.-H., Martin J., Hartmann J.X., Liu A. (2014) Production of functional native human interleukin-2 in tobacco chloroplasts. **Molecular Biotechnology**, 56: 369–379.

Barone P., **Zhang X.-H.**, Widholm J.M. (2014) Tryptophan and Indole Analog Mediated Plastid Transformation. In *Chloroplast Biotechnology: Methods and Protocols* (Maliga P., ed). Methods in Molecular Biology, vol. 1132, Springer Science+Business Media New York, pp 187–203.

Zhang X.-H., Webb J., Huang Y.-H., Lin L., Tang R.-S., Liu A. (2011) Hybrid Rubisco of tomato large subunits and tobacco small subunits is functional in tobacco plants. **Plant Science**, 180: 480–488.

Tsai F.-Y., **Zhang X.-H**., Ulanov A., Widholm J.M. (2010) The application of the yeast N-acetyltransferase *MPR*1 gene and the proline analog L-1 azetidine-2-carboxylic acid as a selectable marker system for plant transformation. **Journal of Experimental Botany**, 61: 2561–2573.

Widholm J.M., Barone P., **Zhang X.-H.** (December 7, 2010) Use of Tryptophan Indole and Anthranilate Analogs as Plant Transformation Selection Agents, US Patent number 7,847,152 B2. (equal inventors; FAU is a partner.)

Barone P., **Zhang X.-H**., Widholm J.M. (2009) Tobacco plastid transformation using the feedback-insensitive anthranilate synthase [α]-subunit of tobacco (ASA2) as a new selectable marker. **Journal of Experimental Botany**, 60: 3195–3202.

Zhang X.-H., Zhong W.Q., Widholm J.M. (2005) Expression of a fungal cyanamide hydratase in transgenic soybean detoxifies cyanamide in tissue culture and *in planta* to provide cyanamide resistance. **Journal of Plant Physiology**, 162: 1064–1073.

Zhang X.-H., Takagi H., Widholm J.M. (2004) Expression of a novel yeast gene that detoxifies the proline analog azetidine-2-carboxylate confers resistance during tobacco seed germination, callus and shoot formation. **Plant Cell Reports**, 22: 615–622.

Ibdah M., **Zhang X.-H.**, Schmidt J., Vogt T. (2003) A novel Mg^{++}-dependent *O*- methyltransferase in the phenylpropanoid metabolism of *Mesembryanthemum crystallinum*. **The Journal of Biological Chemistry**, 278: 43961–43972.

Zhang X.-H., Ewy R.G., Widholm J.M., Portis A.R. Jr. (2002) Complementation of the nuclear antisense *rbcS*-induced photosynthesis deficiency by introducing an *rbcS* gene into the tobacco plastid genome. **Plant & Cell Physiology**, 43: 1302–1313.

Zhang X.-H., Brotherton J.E., Widholm J.M., Portis A.R. Jr. (2001) Targeting a nuclear anthranilate synthase α-subunit gene (ASA2) to the tobacco plastid genome results in enhanced tryptophan biosynthesis. Return of a gene to its pre-endosymbiotic origin. **Plant Physiology**, 127: 131–141.

Zhang X.-H., Widholm J.M., Portis A.R. Jr. (2001) Photosynthetic properties of two different soybean suspension cultures. **Journal of Plant Physiology**, 158: 357–365.

Zhang X.-H., Portis A.R. Jr., Widholm J.M. (2001) Plastid transformation of soybean suspension cultures. **Journal of Plant Biotechnology**, 3: 39–44.

5. Genetic dissection of invasive plant growth in Florida Everglades wetland

Related publications:

Webb J., **Zhang X.-H**. (2013) Organ disparate allocation of plasticity in phosphorus response as an underlying mechanism for the sawgrass-to-cattail habitat shift in Florida Everglades wetlands. **International Journal of Plant Sciences**, 174: 779–790.

Miao S., Li Y., Guo Q., Yu H., Ding J., Yu F., Liu J., **Zhang X.-H**., Dong M. (2012) Potential alternatives to classical biocontrol: Using native agents in invaded habitats and genetically engineered sterile cultivars for invasive plant management. **Tree and Forestry Science and Biotechnology**, 6: 17–21.

Lin L., Webb J., **Zhang X.-H.** (2011) Involvement of arbuscular mycorrhizal symbiosis in the distribution of sawgrass and cattail in Florida Everglades. **Wetlands**, 31: 263–272.

Webb J., Miao S., **Zhang X.-H**. (2009) Factors and mechanisms influencing seed germination in a wetland plant sawgrass. **Plant Growth Regulation**, 57: 243–250.

Zhang X.-H., Tapia M., Webb J.B., Huang Y.-H., Miao S. (2008) Molecular signatures of two cattail species, *Typha domingensis* and *T. latifolia* (Typhaceae), in South Florida. **Molecular Phylogenetics and Evolution**, 49: 368–376.

D. Additional Information: Research Support and/or Scholastic Performance

Current External Research Funding

1. Aquaponic growth of human protein-producing tobacco plants, a research project at FAU A.D. Henderson High School. Power Panel, Inc., $6,000.
2. Genetic analysis of plants' response to biotic and abiotic stresses. Miami Dade College STEM Undergraduate Research Program. US Department of Education, $4,000.
3. Extensive assessment of the injection treatment of citrus greening disease. Penta 5 USA, Inc., $51,060.

Recent Completed Research Funding (past two years)

1. Ocean acidification, temperature and light effects on carbon-use mechanisms, calcification, and growth of tropical macroalgae: Drivers of winners and losers. Co-PI, US National Science Foundation, $422,788.
2. Functional analysis of CRISPR-edited and genetically transformed plants in response to stresses. Miami Dade College STEM Undergraduate Research Program. US Department of Education, $4,000.
3. Assessment of the treatment and prevention of citrus greening disease. Penta 5 USA, Inc., $6,950.

YEAR	COURSE TITLE	GRADE

Appendix H. 2014-15 Biology Program Review

Florida Atlantic University
Academic Program Review
Department of Biological Sciences
Self-Study Report (1-6-15)

Program:	Biological Sciences
Program Director/ Coordinator Name:	Dr. Rod Murphey
Program Self-Study Contact:	Dr. Diane Baronas-Lowell
Self-Study Contact Email:	dlowell@fau.edu
Self-Study Contact Phone Number:	561 799-8073

Table of Contents Page

A. Mission and Purpose of the Program

The 21st Century brings new career opportunities in the area of life sciences, ranging from biomedical research to environmental sciences. Many of these new jobs require a non-traditional education that crosses disciplinary boundaries. The mission and challenge for the Department of Biological Sciences is to train students for traditional careers such as medicine as well as the emerging careers in a global economy. The Department of Biological Sciences offers both B.S. and B.A. degree programs in biological sciences. These programs are designed to prepare students for careers in life sciences and advanced education in graduate and professional schools. We also provide graduate education leading to M.S. degrees in biological sciences and environmental sciences; Masters in Teaching degrees (M.S.T.); Professional Science Masters in Business Biotechnology (P.S.M.); as well as Ph.D. degrees in Integrative Biology (IB). Our IB Ph.D. degrees will soon offer the options to focus on neuroscience or environmental sciences (currently pending review by the University Faculty Senate).

Overview of the Department

The Department of Biological Sciences is now the largest department in the University and a leader in three areas of effort; teaching, research and service. The number of undergraduate majors has been growing steadily; we now have over 2500 declared majors and 300 students graduate per year with Bachelors degrees in Biology. The number of student hours of instruction for majors and non-majors is the largest in the Charles E. Schmidt College of Science (CESCOS). In spite of the large size and consequent workload of faculty, the Department is an innovator in education and has obtained NSF education grants, developed an Honors program that was the blueprint for the University wide Honors program and has engaged greater than 10% of the undergraduate majors (>250 students) in some form of research. A significant number of the honors students have worked on capstone thesis projects and many published papers with their mentors.

The Department has three primary geographic sites with roughly equal faculty distribution: Davie, Boca Raton and Jupiter as well as one faculty member at Fort Pierce. The Department's teaching load is dominated by teaching in Boca and we accommodate this by faculty commuting to Boca as well as with tele-conferencing. We are also shifting commuter students to the two satellite campuses to re-distribute the teaching load and to maximize the use of space. We have done this very successfully with the Davie campus where we increased the number of seats filled in classes from less than 100 in 2007 to more than 400 in 2013.

In research, we have focused on the local resources at each geographic site and developed Neuroscience in Jupiter, Environmental Science in Davie, Organismal Biology in Boca and Marine Biology in Fort Pierce. The neuroscience group has begun to mature since moving to Jupiter (18 months ago) and we have published more papers than our famous neighbor the Max Planck Florida Institute with similar number of faculty. There is considerable on-going funding and in the last few months our faculty have received new grants from federal agencies: Dr. Marguerite Koch based on the Boca campus with the collaboration of Dr. Xing-Hai Zhang has received $422,788 from

NSF for their work on climate change and Dr. Kailang Jia based in Jupiter received $356,678 from NIH for his work on molecular aspects of aging.

B. Previous External Reviews
Findings and Recommendations
Our last Program Review was in 2009 and the strengths in research at the time were: 1) A new Director of Environmental Sciences who was developing strong connections to the National Park Service and the South Florida Water Management District and 2) The recent establishment of The Scripps Research Institute in Florida (2004) and the Max Planck Florida Institute (2009) on the MacArthur campus in Jupiter, Florida.

The major weaknesses were listed as the relatively small size of the faculty in comparison to the ever-growing undergraduate population. Additionally, the lack of resolution in the Marine Science Program within the Department as it connects to the Harbor Branch Oceanographic Institution (HBOI) was criticized.

The major research recommendation was to enhance our collaborations with local institutes, state agencies and the biotechnology industry. In particular, it was suggested that we foster research alliances with The Scripps Research Institute and the Max Planck Florida Institute, both located on our Jupiter campus, and continue to develop our connections to the National Park Service and South Florida Water Management District and enhance our connections with HBOI.

Major Changes Since Last Review
Since the last Program Review in 2009, several new faculty members have joined the department and established their own research programs; Drs. Kailiang Jia in 2009; Brian Benscoter in 2010; Greg Macleod in 2013; and Marianne Porter and Rindy Anderson in 2014. Dr. Macleod is the first joint faculty member between the CESCOS and the Honors College. All of these investigators, except those hired this year, have obtained external funding and are engaging in competitive research. In addition, two former administrators, Drs. M.J. Saunders and Brenda Claiborne joined the department in August, 2013. Unfortunately, we have also lost two faculty members during this period (Drs. Ayanathan in 2011 and Nambu in 2014).

<u>The Davie Environmental Science Initiative</u>
At the time of the last review a new building, called Davie West, was being built on the Davie campus. The building is finished and now houses nine FAU Biology faculty members with research specialization in Environmental Science. The building is shared with scientists engaged in environmental research and Everglades restoration efforts from the University of Florida, the Institute for Food and Agriculture (IFAS) and the US Geological Survey (USGS). The most recent Biology faculty member is a behavioral ecologist who will be based in Davie. A separate administrative unit, The Florida Center for Environmental Studies has recently (2014) moved to Davie and this will add cohesion and focus to the Davie effort. In brief, although it is a multi-departmental endeavor, biologists have led the way in establishing Davie as a focal point for

Environmental Science. At the graduate level, we are establishing a track within our Ph.D. program called Integrative Biology and Environmental Science (IB-ES).

The Jupiter Life Science Initiative

One of the recommendations of the last review was to develop connections to the large research institutes being built in Jupiter, Florida. The state invested nearly $1 billion dollars to bring the Scripps Research Institute in Florida and the Max Planck Florida Institute to the MacArthur campus. In order to enhance our interaction with these two large research institutes in Jupiter, first, the Center for Molecular Biology and Biotechnology (CMBB), led by Dr. Herb Weissbach, moved to the Jupiter campus in 2010 and began collaborating with the Scripps, Florida Institute. In 2011, we transferred a group of seven neuroscience faculty members from Boca to the MacArthur campus in Jupiter (1). We renovated a building adjacent to Scripps and Max Planck on the Jupiter campus to our specifications and it now houses the neuroscience group consisting of six Biology faculty members, and one Psychology faculty member and 40 staff and students, with two more biologists being recruited. At the graduate level, in collaboration with Max Planck and Scripps Florida we are establishing a track within our Ph.D. program called Integrative Biology and Neuroscience (IB-N) and this is attracting attention and beginning to grow.

Undergraduate Initiatives

The number of majors in Biology has continued to increase at the rate of 5-10% per year and now stands at over 2500 majors. This stresses our resources and we have had to adjust our methods of program delivery to accommodate the growth while continuing to bring innovative pedagogies to the classroom.

At the undergraduate level a joint Neuroscience and Behavior program between the Biology and Psychology departments, resulting in a certificate for students, has suddenly gathered momentum on the Boca campus and has grown to 300 majors in three years.

We used an NSF Undergraduate Research and Mentoring grant (NSF# 0829250, $700,570, entitled “Undergraduate Research and Mentoring: Integrative Biology for Future Researchers”, 2008-2013, herein referred to as NSF-URM) to design research experiences for undergraduates placing students in research labs, mentoring them toward research careers and helping place them after graduation. Based on the results of this NSF-funded program, we established a research intensive Honors Program (2). Although the NSF grant has ended, the Biology Honors program continues to operate and has become the model for the entire University in the form of the Quality Enhancement Plan (QEP) program (3).

Using a grant from the FAU Technology Fee program, we have established two computer teaching labs in the department that are being used for a growing number of courses. We are using simulation studies as a proxy for research projects. For example, a new neuroscience course uses simulation software to teach neuronal function as well as teaching students to think critically and creatively about brain function as they

develop projects of their own creation. This facility has allowed us to expand bioinformatics beyond a select graduate population to the undergraduate level.

Finally, we are reorganizing the curriculum as we try to enhance the student experience to introduce critical thinking and move research-like experiences into the lower level of the curriculum. For instance, we are now offering *Life of a Scientist* to sophomores to expose students early-on to research, why we do it and to encourage them to become actively involved. Recently we have written two educational grants focused on moving research experience to the sophomore year since studies have shown that this enhances retention in the STEM fields (4). These grants are focused on using simulation and *in silico* experiments to introduce large numbers of students to the research enterprise.

C. Instruction

Establishment of Student Learning Outcomes (SLOs)

Our NSF-URM Program is being sustained as FAU's Biology Honors Program and received a high rating from the Southern Association of Colleges and Schools Commission on Colleges (SACS). Both NSF-URM and the Biology Honors Programs, served as models of institutional best practices for FAU's QEP (as mentioned above). The goals for the Department of Biological Sciences undergraduate programs are consistent with FAU's definitions of: 1) content knowledge, 2) critical thinking skills and 3) communication skills, within our discipline. Our program is designed to educate and evaluate our students in biological sciences in each of these student learning outcomes (SLOs):

1. Content Knowledge

Declarative knowledge: Students will demonstrate knowledge of the vocabulary, history, theories or concepts. Declarative knowledge is usually assessed via in-class or standardized tests, typically in an objective (multiple-choice; short answer) format.

Procedural knowledge of research skills: Students will demonstrate knowledge of the procedures involved in research (e.g., process of scientific inquiry, idea generation, literature review, data collection, reporting). These skills are usually measured via the evaluation of a research project, thesis or dissertation.

Procedural knowledge of technical skills: Student will demonstrate technical skills (e.g., microscopy, staining, dissections, cell culture, electrophoresis). This type of procedural knowledge is assessed by both written and practical laboratory examinations.

2) Critical Thinking

Analytical skills: Students will analyze, evaluate, compare/contrast or judge discipline-specific theories, issues, events, or other content. This is usually assessed through examining the quality of argument in a student essay, oral presentation or formal report.

Practical skills: Students will put into practice their knowledge and skills within the laboratory.

Creative skills and ability to formulate questions: Students will create a product by synthesizing knowledge from a discipline.

3) Communication

Written communication: Students will produce writing that is grammatically correct, well organized, and properly formatted for the purpose of the assignment and the discipline. This is usually assessed via individual paper assignments where instructors assess the quality of written expression.

Oral communication: Students will prepare and deliver informative and/or persuasive oral presentations that attend to the audience and are well organized. This is usually assessed via individual oral presentations in a classroom setting.

Team/collaborative communication: Students will demonstrate team-oriented, collaborative skills in which they contribute to group products. This is usually assessed via group laboratory exercises.

4) Ethical Conduct

Ethical conduct is monitored during all academic components including working with live animals. Some of the ethical issues discussed directly during the lectures include responsibilities while: working in a laboratory, collecting and recording data, writing and discussing results and working with live animals.

All individuals working in a lab setting are required to take three Environmental Health and Safety (EH&S) courses: 1) Lab Safety, 2) Biosafety and 3) Hazardous Waste Handling and Awareness. Additional trainings are offered by EH&S and depend on the nature of the research being carried out. For example: individuals working with cells in culture will be required to complete Blood-Borne Pathogens Training.

Throughout the curriculum, faculty members are encouraged to model ethical behavior when mentoring at both academic and research levels. Academic integrity is emphasized and practiced during data collection in the lab and during classroom activities. Scientific dishonesty is not tolerated.

Assessment of SLOs and Program Improvement

The Department, with help from the Environmental Science Program, routinely assesses its two undergraduate programs, three certificates and seven graduate programs through overlapping courses. The B.A. and B.S. degrees are assessed together, using the same criteria. These four criteria listed above are aligned with the University's overarching goals of having students learn content, and develop their skills in critical thinking and communication. The three certificates that are offered in the department are: 1) Biotechnology, 2) Neuroscience and Behavior and 3) Environmental Science.

SLO Outcome #1 is assessed in four classes with broad coverage, taken by all, or nearly all Biology majors. These are Biological Principles, Biodiversity, Microbiology, and Genetics. During summative assessments in these classes, a suite of anchor questions are used, that test the broad range of knowledge. Anchor questions range from simple to complicated so that poor, acceptable, and good performance can be determined.

SLO Outcome #2 is also assessed with anchor questions, in which critical thinking is required.

SLO Outcome #3 is assessed from the written and oral communication of students in labs. Currently the average student scores for these outcomes exceed the criteria set for success.

SLO Outcome #4 is partially assessed by EH&S on exams. Monitoring for plagiarism is conducted by individual professors using the SafeAssign or Turnitin programs (available on FAU's BlackBoard site). A more formal assessment of plagiarism is needed and under discussion.

The Academic Learning Compacts (ALCs) for both the Bachelors of Science and the Bachelors of Arts are included in Appendix A. Assessment of graduate programs is described below in the "Graduate Programs" section.

Baccalaureate Programs

i. State-approved prerequisites –

The Department of Biological Sciences has four Intellectual Foundations Program (IFP) core curriculum courses; see also Appendix A. These are:

BSC 1005 & BSC 1005L: Life Science and Life Science Lab (three credits including lab)
BSC 1010 & BSC 1010L and BSC 1010D: Biological Principles (four credits including lab and discussion)
BSC 1011 & BSC 1011L and BSC 1011D: Biodiversity (four credits including lab and discussion)
BSC 2085 & BSC 2085L: Anatomy & Physiology (four credits including lab).

The University's Core Curriculum Committee has thoroughly reviewed these courses for compliance with Florida State University System (SUS) requirements per regulation 6.017. The University Undergraduate Programs Committee (UUPC) recommended these courses for approval to the faculty senate and they were all approved.

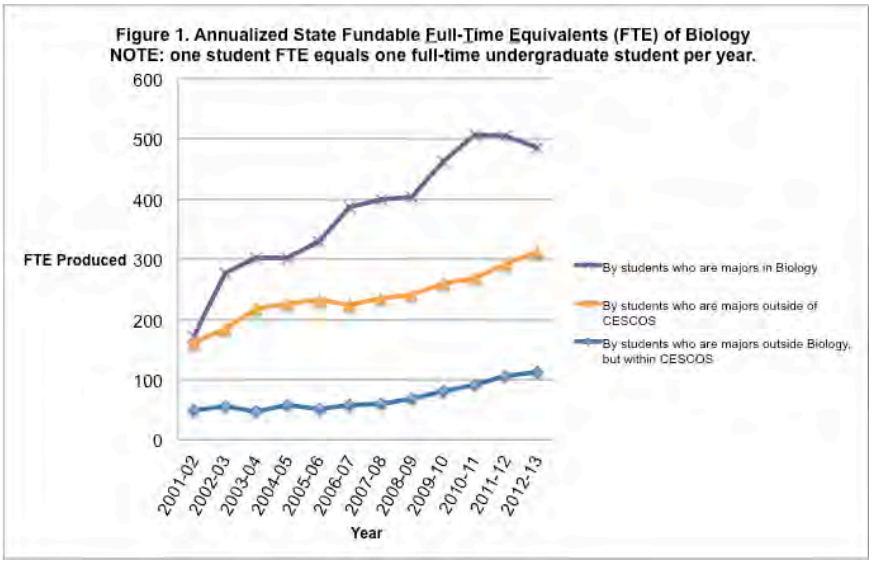
ii. Limited access – Not applicable.

iii. Admissions criteria –

Incoming Biology majors must meet admissions criteria established by the University as described in the University catalogue:
http://www.fau.edu/academic/registrar/FAUcatalog/admissions.php

iv. Undergraduate enrollment information –

As Figure 1 [full-time equivalents (FTE) by major or not] and Figure 2 (FTE across the CESCOS) and Table 1 demonstrate, the number of undergraduate majors in Biology represents approximately 45% of the total CESCOS and 10% of the entire university. Placed in the context of the student credit hours, the department generates approximately 30% of the teaching in the CESCOS and 5% of the entire institution. The graphs also show that these numbers have been growing steadily for the last decade and growth has been especially strong since the last program review in 2009. See Tables A and B in Appendix B for raw data.



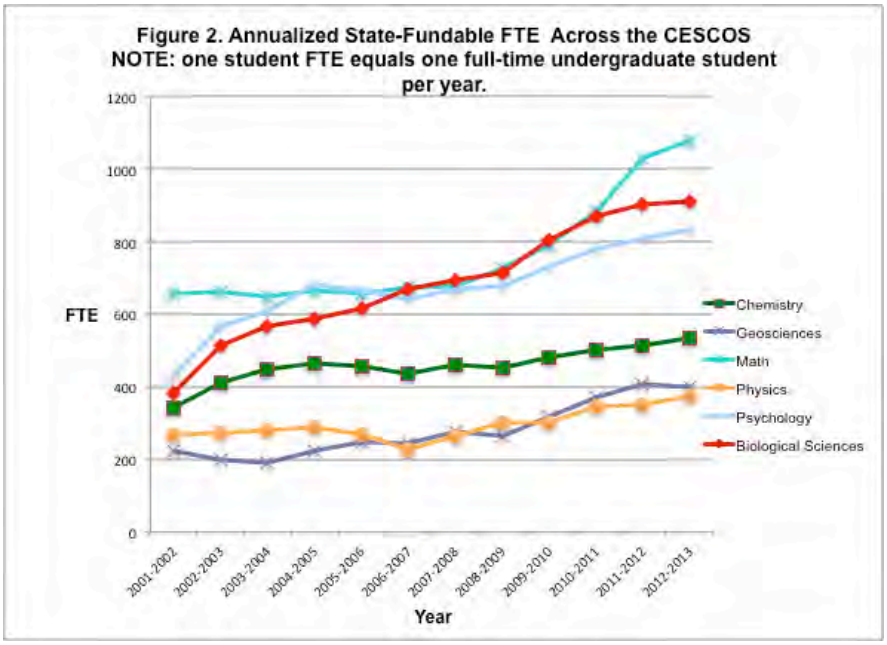
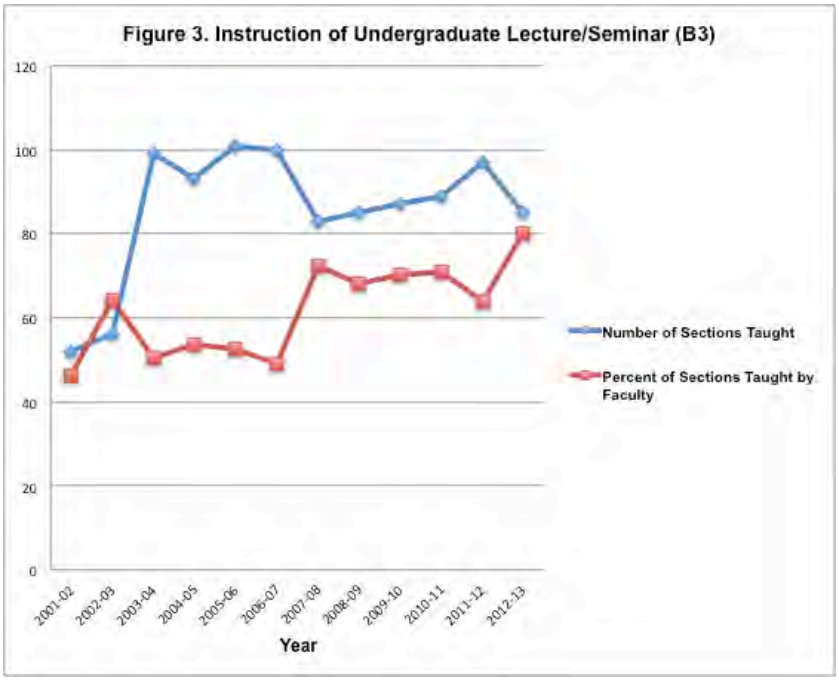


Table 1: Undergraduate Annual Headcount
And Annualized State-Fundable FTE In Biology (2011-2013).
NOTE: one student FTE equals one full-time undergraduate student per year.

Annual Headcount (Program CIP: 260101)	Biological Sciences		College Total	University Total
	2011-2012	2012-2013	2012-2013	2012-2013
Bachelors	2,486	2,582	5,617	28,523
Annualized State-Fundable FTE	Biological Sciences		College Total	University Total
	2011-2012	2012-2013	2012-2013	2012-2013
	828.1	846.4	3,948.6	15,335.0

v. Undergraduate average class size and faculty/student ratio
The faculty/student ratio has increased from 1:67 to 1:96 over the past five years. **Eighty percent** of our undergraduate lectures and seminars were taught by faculty members in 2012-2013, regardless of the huge student population, (shown in Figure 3 below and Table B in Appendix B).



vi. Curriculum –
The curricula for both Bachelors of Science and Bachelors of Arts in Biology are attached in Appendix A and are available on-line at:
http://www.fau.edu/uas/curriculum.php

vii. Internships, practicum, study abroad, field experiences –
The Department now places undergraduate research students in a variety of institutions and programs to enhance their education and career prospects. We used an NSF-URM grant (mentioned previously) to design research experiences for undergraduates placing students in research labs, mentoring them toward research careers and helping place them after graduation. Approximately 90% of the students were placed in graduate school or professional school or employed in life science-oriented careers after the program. We have built on this experience to create an Honors Thesis program to accomplish the same thing and have maintained the same number of students in research labs even after the end of the NSF grant (NSF did not allow renewal of these grants as they cancelled the program). With our expansion in Environmental Science and Neuroscience we have expanded the number of slots available in a number of institutions. At the Jupiter campus both Scripps and Max Planck investigators are willing to take undergraduates into their labs. In Environmental Science numerous faculty take undergraduates into their labs and provide environmental field experiences and the National Park Service funds fellowships to work in the Parks.

viii. Pedagogy/pedagogical innovations –
Biology regularly supports faculty to attend the HHMI/National Academies of Science (NAS) Summer Institute. In order to take advantage of educational trends and advances around the country we have sent eight of our faculty to the HHMI/NAS summer institute. Most recently, Dr. Tim Theisen (an Instructor) and Dr. Brian Benscoter (an advanced Assistant Professor) attended the summer institute in 2014. These faculty members then returned to the department and have taken over various curriculum improvements. Dr. Evelyn Frazier, helped develop and now runs the Honors Programs in Biology, including mentoring of undergraduate researchers. Dr. Colin Hughes, has taken over departmental curriculum and assessment oversight. Dr. Joe Caruso is implementing the California Critical Thinking Test for assessment purposes. Other faculty members have developed new interactive pedagogies for large enrollment courses in human ecology and genetics, “flipped” their classes, use iClickers in their large courses and implement inquiry-based teaching.

Dr. Jay Lyons uses computer simulations in his undergraduate courses: PCB 3703 and PCB 3704 Human Morphology and Function 1 and 2. He uses both iWorx stations (5) to simulate human physiology and Neurons in Action (6, 7) to simulate neuronal responses. Although these are primarily upper division undergraduate course, the iWorx stations are being used on the Davie campus to assist in teaching BSC 2085 & BSC 2085L Anatomy and Physiology at the sophomore level. Dr. Sarah Milton also uses iWorx (5) for PCB 4723 Comparative Animal Physiology, doing cardiac responses and the EKG lab, a pulmonary lab and a reflex/neuronal response lab. These are not simulations; however, they are computer recordings of experiments the students do on themselves (basically, a chart recorder). She also implements PhysioEx (8) to look at nerve function, which is an actual simulation.

In the Introductory courses, LifeLine discussions (a required component of both freshmen Biology courses: BSC 1010 Biological Principles and BSC 1011 Biodiversity and described in more detail later) a number of new pedagogies have been implemented:

- With the help of Honors students, we have developed an inquiry based activity used in BSC 1010 Biological Principles now as one of the Experimental Design labs, where students make observations, draw conclusions from historical data and present day observations about the FAU Preserve, gopher tortoise habitat and invasive plant species.
- We have developed a “Best Practices” activity where TAs and LifeLine leaders are filmed teaching in the Spring, and shortly after the Fall semester begins, we do mandatory Teaching Effectiveness training for TAs. This activity evolved after faculty members went to the Summer Institute in Madison. Our TAs love to see themselves in video, so we have their undivided attention, and they learn something, too. We do peer evaluations of each TA and LifeLine leader every semester, giving faculty members some feedback early in the semester.
- We have implemented a bioethics unit for both BSC 1010 Biological Principles and BSC 1005 Life Sciences labs having to do with stem cell use that has students thinking critically about the viewpoints of others as well as other types of people as stakeholders versus their opponents. This was adopted and edited from a Northwest Association for Biomedical Research activity where students assume the role of one of a variety of stakeholders (e.g., a Catholic priest, a parent of a child with juvenile diabetes, a family member of someone with a severed spinal cord, a Muslim clergyman, a conservative congressman, a biotech CEO) so that students, after learning about the sources and variety of stem cells, argue for or against their use, not as individuals, influenced by their own beliefs, but as whatever person they pull out of a hat, causing them to see things from another point of view. We also have a pre-lab activity where we give a quiz about their prior knowledge on this subject.

In BSC 2085, BSC 2085L, BSC 2086 and BSC 2086L Anatomy and Physiology 1 and 2 and labs, with the help of our TAs, we have created and are using the Practical Anatomy Review (PAR) on-line quiz tool. Created to provide the Anatomy and Physiology lab students weekly “practical-like” timed questions to enable readiness for their lab practicals, as well as opportunities to earn quiz credit and extra credit points to improve the passing rates. PAR has significantly lessened the withdrawal rate prior to the midterm and definitely reduced the number of D’s and F’s in these labs.

We are farther reorganizing the curriculum as we try to enhance the student experience to introduce critical thinking and move research-like experiences into the lower levels. We have written two educational grants focused on moving research experience to the sophomore year since studies have shown that this enhances retention in STEM majors (4). Our primary goal is to use simulations in order to introduce large numbers of students to research. For example, Dr. Dawson-Scully has begun teaching Neuroscience Simulations in small classes using the Neurons in Action software (6, 7). About two thirds of the course is devoted to knowledge acquisition of the simulation

software and the examination of the basic cellular function of neurons and synapses. The other one third of the course is devoted to students inventing their own approaches to their own questions using this flexible software. Many variations were presented as past students used the software for projects as diverse as heat stroke in bulldogs, Alzheimer's disease effects on neuronal function and climate change effects on neuronal function.

Our tri-institutional [FAU, Scripps Florida and Max Planck Florida Institute (MPFI)] neuroscience program is exceptional in providing outstanding equipment and facilities to our students, from molecular biology to highly technical imaging and electrophysiology methods. MPFI has started an MPFI-scholars program for FAU undergraduates that lasts from 1-2 years and has engaged more than twenty students. Earlier this year TSRI was awarded a three-year NSF-REU grant "SURFing the Interface between Chemistry and Biology" to support undergraduate students in their programs. Our tri-institutional (FAU, TSRI and MPFI) neuroscience program not only expands FAU's ability for research mentoring by increasing the faculty number, but also offers more state-of-the-art prospects for scientific meetings, discourse and dissemination.

Upon completion of their research projects, students disseminate their research findings at the undergraduate research symposium sponsored by OURI, as well as, at numerous scientific meetings and symposia ranging from regional meetings for neuroscience at the University of Miami (UM) to a local Drosophila neuroscience meeting (organized jointly by FAU, TSRI and UM). This was the second year for the Life Sciences South Florida STEM Research Symposium. Our students earned first place in each of the two oral presentation categories. Students also report their findings at major national and international meetings (e.g., the Society for Neuroscience).

Though data on scholarly activity is not officially available for undergraduate students, an internal poll of the departmental faculty demonstrates that in 2012-2013 (including the summer of 2012) **224** undergraduate students engaged in scientific research in the Department of Biological Sciences. Our undergraduate researcher population reflects FAU's overall undergraduate population with 47% underrepresented minorities (see Table C in Appendix B). The undergraduate directed independent research reflects the diversity of the department with studies including bacterial metagenomics, turtle environmental stress, sea turtle research, Everglades ecotone seagrass, Sphyrna swimming kinematics, cancer, drug discovery, seizure characterization and plant biotechnology. Undergraduate students performing directed independent research publish in peer-reviewed international journals, as well as FAU's Undergraduate Research Journal (URJ).

The Department of Biological Sciences offers paid full-time summer research experiences for undergraduates in Jupiter. These are exciting and once-in-a-lifetime chances for undergraduates to perform research in sophisticated neuroscience labs while expanding their scientific expertise, networking, critical thinking skills, reasoning and troubleshooting abilities. Undergraduates are competitively chosen, work full-time in the lab and spend at least one hour per week with the fellow undergraduates in the

program and a faculty mentor delving deeper into the scientific experience. At the end of the summer, each student presents his/her research findings in a mini-symposium open to the public. Our experience has been that all of the summer students continue working in the same labs during the next academic year.

ix. Scope of institutional contributions –
The Department of Biological Sciences is the largest contributor to FAU's Institutional Honors Program. Our NSF-URM program is being sustained as FAU's Biology Honors Program (2) and received high rating from the Southern Association of Colleges and Schools Commission on Colleges (SACS). Both NSF-URM program and the Biology Honors Program, served as models of institutional best practices for FAU's QEP. FAU's university-wide QEP has and continues to expand undergraduate research and inquiry opportunities as part of our accreditation's reaffirmation by SACS. The QEP provides curricular and co-curricular opportunities for students and faculty across all disciplines and colleges to be engaged in research using a framework of developmental scaffolding (i.e. exposure, followed by suitable prospects for facilitated skill-building, and culminating in intensive, more independent research projects). The previously mentioned SLOs comprising the research cycle were articulated as part of FAU's QEP. FAU has established the Office of Undergraduate Reach and Inquiry (OURI) that offers a clearinghouse for information for both curricular and co-curricular research and inquiry opportunities within FAU to support the QEP.

The Department of Biological Sciences has a long-standing commitment to improving educational outcomes in STEM fields. We have programs in place for over ten years to enhance student success in introductory biology courses, typically the first STEM courses taken by undergraduates Our peer-led sessions, known as LifeLine, include conceptually oriented lectures, interactive classroom strategies, lab experiments and learning activities. These required sessions consist of 24 students and provide a more intimate context than the lecture (which consists of 300 to 400 students). During these LifeLine sessions, activities reinforce key concepts using various instructional approaches, including construction of physical models and concept mapping. These programs have reduced the failure and drop out rates of the targeted courses significantly and have been continually supported by consecutive Deans of the CESCOS.

The department presents very large service courses for the benefit of non-major undergraduate students including BSC 1005 Life Science (1600 students per semester) and BSC 2085 Human Anatomy and Physiology (1000 students per semester).

A joint Neuroscience and Behavior undergraduate cross-disciplinary program between the Biology and Psychology departments offering students a certificate has gathered momentum on the Boca campus and has grown to 300 majors in just three years.

The Environmental Science Program is another cross-disciplinary program and involves faculty members from many participating colleges and departments, including Biological Sciences, Geosciences, Chemistry, Philosophy, Economics, Urban and Regional

Planning, HBOI and the Center for Environmental Studies. Biology faculty and staff members comprise over 40% of this program.

The Department of Biological Sciences has hired a joint faculty member with the Honors College and has brought an array of CESCOS courses to the Jupiter campus, strengthening cross-college ties.

x. Undergraduate student profile –
Undergraduate and graduate students with a Biological Sciences Major have the ethnic composition of 43% white, 19% black, and 24% Hispanic and 3% non-resident aliens. Indeed, of the 30,429 students enrolled at FAU (all colleges) in fall 2013 whose ethnicity was known, 16,810 were white and 13,619 were underrepresented minorities. Over the last five years, black and Hispanic enrollments have increased more than that of any other groups; FAU's student body will soon be a "majority minority" mirroring the predicted demographic composition of the USA in the near future. In 2012-2013, undergraduate students with a Biological Sciences Major were 63% female and 37% male, representative of the CESCOS (66% and 34% repspectively). The data on the undergraduate student profile is included in Table D in Appendix B.

Undergraduate Pell eligible students in the Department of Biological Sciences averaged 44.7% since fall 2010. The OURI has awarded Biology undergraduates $7,700 in research funds (2013-2014). Biology undergraduates have published four articles in FAU's URJ (since its inception in 2012) as well as, peer-reviewed international journals. Finally, Biology undergraduates had 25 presentations (four talks and 21 posters) and 21 presentations (two talks and 19 posters) at the OURI symposia in 2013 and 2014, respectively.

A wide variety of scholarships are available to incoming freshmen and transfer students from FAU's Office of Undergraduate Admissions and are listed in Appendix A. Additional scholarships are available through FAU's Office of Financial Aid.

xi. Advising procedures –
Advising of undergraduate science majors in centralized in the CESCOS Student Services Office. The advisors assigned to biological sciences work closely with administration of the department to ensure students are given correct guidance.

Advising begins at orientation and continues through the first 45 credits in the University Advising Services Office and includes:

- Evaluation of IFP/General Education and Language Requirements.
- Initial advising for foundational coursework in the major including: Biological Principles, Biodiversity, General Chemistry I and II with laboratory, Organic Chemistry I and Mathematics through Algebra, Trigonometry and Methods of Calculus.
- Guidance in minors and certificates appropriate to vocational career objectives.

Ongoing advising occurs in the CESCOS Student Services Office for the remainder of the program and includes:

- Follow up on IFP/General Education and Language Requirements.
- Recommendations for required core courses.
- Continued guidance in minors and certificates appropriate to vocational career objectives.
- Students are directed to seek individual faculty advising regarding research experiences.

In our Honors Program, undergraduates are advised one-on-one by the faculty member in-charge, Dr. Evelyn Frazier.

xii. Licensure rates – Not applicable.

xiii. Placement rates/employment profile –
Though it is true that no official effective procedure/system is in place to track what students do career-wise post-graduation, internal recruiting suggests that ~27% of IB Ph.D. enrollees have completed a B.S. at FAU, 22% have completed a M.S. at FAU and 9% have completed both B.S. and M.S. degrees at FAU prior to entering the IB Ph.D. Program.

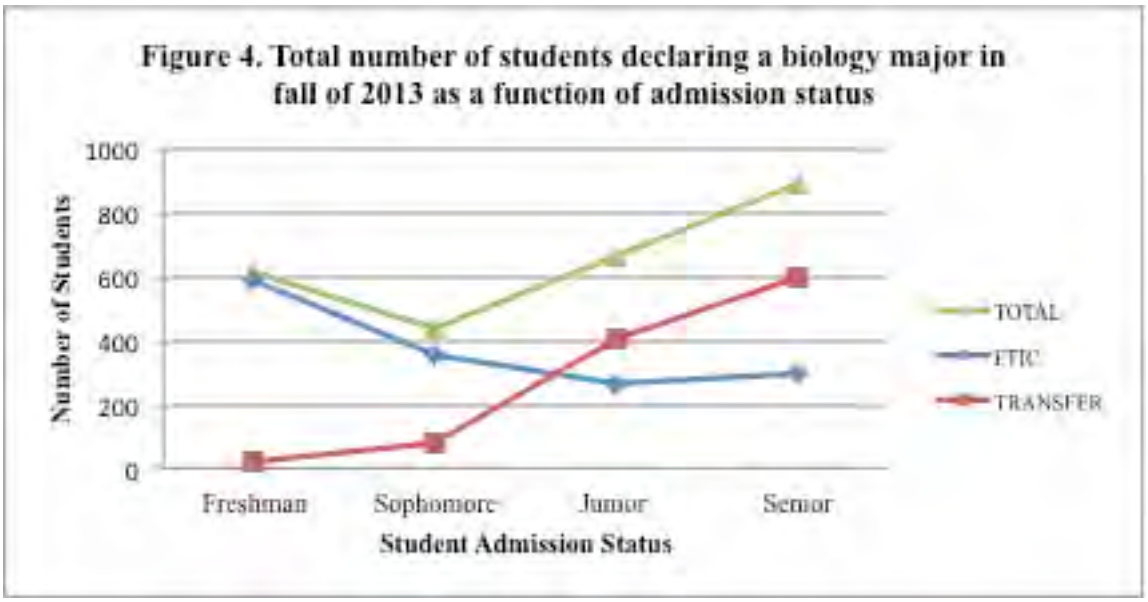
In our NSF-URM Program (previously described), 77% of the students were placed in graduate school or professional school after graduation. Another 10% were employed in life science-oriented careers and 10% were unknown.

Table E shows IEA data obtained through Biology graduating senior surveys. Although an average of only 25% of graduating seniors with Bachelors degrees in Biology responded, over 73% of graduates reported that they will pursue graduate or professional education, and are very satisfied or satisfied with FAU's preparation for graduate or professional school and will reside in South Florida. This data demonstrates the motivation from the Department of Biological Sciences towards the pursuit of education, as well as our ability to fuel the local economy.

xiv. Retention rates –
The 2012 PCAST report (9) suggests there is an emerging problem for the future national scientific work force because college students drop out of the STEM disciplines at very high rates. It has been demonstrated in a variety of contexts that large numbers of students (60% in most studies) exit the STEM curriculum in the first two years of college, never to return. For minorities, the numbers are even worse. Numerous studies have demonstrated that 80% of minorities exit the sciences by the end of the sophomore year. Students switch to non-STEM degree programs, they fail to demonstrate adequate academic progress (e.g. doing poorly in STEM courses), or they become bored (10). As a result, many leave the university.

Recent analysis of Biology student data shows an interesting caveat to the typical "STEM death march". An examination of enrollments in life science degree programs

indicates an interesting “turnover effect” in our undergraduate majors. As shown in Figure 4, the number of first time in college (FTIC) students in the Biology major drops precipitously by the end of the sophomore year, just as shown in national studies of persistence in STEM programs. However, at FAU these students are replaced by an equivalent or greater number of incoming transfer students. So, although our Biology degree programs appear to sustain some net persistence, many individual students are not persevering. This is why it is important to consider measures of retention and success in STEM at the student level, per se. If we can intervene during sophomore year and the transition to the junior year, we can increase the retention rate for life science majors. Thus, we have written two educational grants to pursue funds for reorganizing our curriculum (as discussed above).



xv. Graduation rates –

The University and the Board of Governors (BOG) have established three performance matrices to specifically evaluate retention and graduation data for institutions in the Florida State University System (SUS). These metrics are being used to rank the institutions in the SUS. These are: BOG Metric 4: six-year graduation rate for full- and part-time FTIC students (46% see Table F in Appendix B); 2. BOG Metric 5: academic progress rate, which is measured by the second year retention of students with a Grade Point Average (GPA) above 2.0 (75% see Tables G and H in Appendix B); and 3. BOG Metric 6: Bachelors degrees awarded in areas of strategic emphasis (includes STEM) (see Table 2 below). In summary, the data show that roughly 15% FTIC Biology majors graduate after four years, while 46% graduate after six years. These metrics match FAU as a whole and this means the Department of Biological Sciences with its large student body is part of the problem that the BOG has created. These FAU graduation rates are similar to national averages; FAU is being penalized for this metric in spite of the arguments that can be made justifying these numbers. We could change these rates by raising the GPA requirements for biology majors but this will presumably simply shift the problem to other departments.

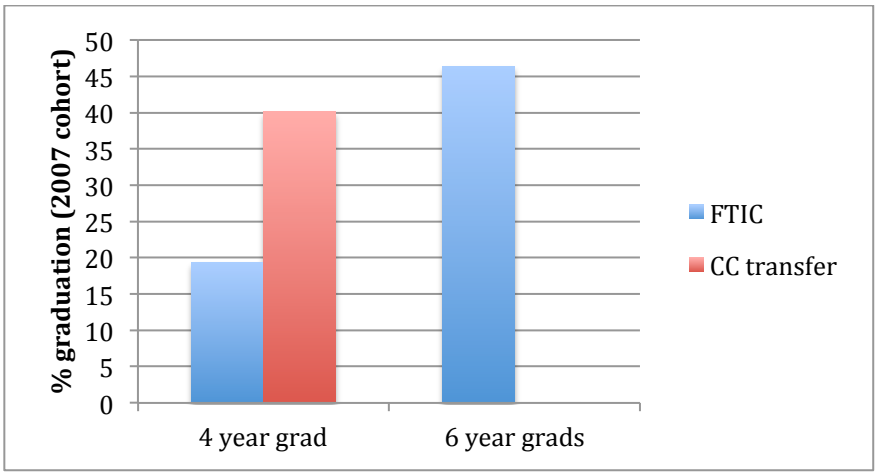
Table 2 from IEA shows the total number of B.A./B.S. degrees in Biological Sciences awarded, by year, since 2001-2002. A degree awarded with a single major contributes one degree, and a double major, contributes one-half degree.

Table 2: Total Number Of B.A./B.S. Degrees In Biological Sciences Awarded, By Year, Since 2001-2002.

	Year Degree Granted													All
	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	
Bachelors	156.0	157.5	188.0	173.0	225.5	236.5	235.0	239.5	248.0	275.0	317.0	296.5	370.0	3,117.5

Figure 5 with data taken from IEA tables (Tables F through H in Appendix B) shows the retention and graduation rates for undergraduate Biology majors from the 2007 cohort of FTIC and community college (CC) transfers through their fourth and sixth years.

Figure 5: 2007 Biology Cohort Graduation Rates.



We have chosen to plot the graduation rates of the 2007 cohort of FTICs and CC transfers because it is the most recent cohort on which there is six-year graduation rate data. As can be seen in Figure 5, 40-47% of both FTIC and CC transfer students take six years to graduate (assuming that CC transfers come to FAU with two years of school already).

xvi. Student recruitment –

Recruiting High School Students: The Jupiter campus has a strong recruiting program in the sciences targeted for high school students. For instance, the Tiger Woods Foundation STEM Career and College Conference was held in September 2014. A hands-on session was organized by the neuroscientists in the Department of Biological Sciences and provided an opportunity for middle and high school students and parents to participate in specialized instruction. More than 300 parents and students in grades 7-12 attended this free one-day conference.

High School Students Routinely Volunteer: Many of our laboratories in the Department of Biological Sciences, on every campus, routinely host high school student volunteers.

Phone Calls to Accepted Freshmen: In an effort to recruit successful students to FAU, all of the Biology faculty members took part in calling students that were admitted as FAU freshmen, but had not yet accepted, in August 2014.

The Annual Science Olympiad: Some of our faculty and graduate students participate in the Annual Science Olympiad that is hosted by the CESCOS. The event targets participant high schools with larger minority populations.

Clinic at Palm Beach State College: In October 2014, the Student Coordinator and a Student Advisor held an event for students who were interested in transferring into one of FAU's Biology programs either before or after completion of their A.A. or A.S. degree. The different undergraduate and graduate degree programs offered by the Department of Biological Sciences at FAU (including required coursework) were discussed with emphasis on the range of classes, research and professional development opportunities offered on the Jupiter Campus. In attendance were mostly college students, a dual-enrolled high school student and a few non-traditional/non-degree-seeking students. We have additional clinics scheduled for other state college campuses in the future.

Graduate Programs

Overview and assessment of the graduate programs

Masters. The Biological Sciences Department offers thesis and non-thesis M.S. degrees in both Biology and Environmental Sciences, M.S.T. and a recently introduced P.S.M. degree in Business Biotechnology. The programs are tailored to the needs and interests of the student, in multiple areas including Bacteriology, Cell Biology, Immunology, Molecular Genetics, Virology, Biotechnology, Microbiology, Anatomy and Development, Behavioral Biology, Ecology, Evolutionary Biology, Marine Biology, Environmental Sciences, Neuroscience, Physiology and Systematics. A Masters degree in biology prepares students for graduate study for the Ph.D. or health profession programs, teaching, research, or careers in business or government.

A thesis option is designed for students with career goals that include a research emphasis, such as the possibility of enrolling in a Ph.D. program. A non-thesis option is designed for students interested in the field of medicine, education at the elementary, middle and high school level, or those who simply wish to further their knowledge of biology. The M.S.T. is designed for graduate students who are interested in furthering their knowledge in biological sciences to pursue a career in teaching at various levels, including elementary, secondary, early childhood education and Community College. In 2011, the department started the P.S.M. program with the goal of placing graduating students into the biotechnology workforce.

Doctorate. Our IB Ph.D. Program was initiated in 2003 and has grown to a total of 60-70 students and has been stable at that number for five years. The first Ph.D. student graduated in 2007 and fifteen students graduated in 2012-13. The program was

designed primarily by the Departments of Biology and of Biomedical Science prior to the emergence of our independent Medical School. It was intended to be flexible and allow growth in various research areas. This flexibility has been utilized recently as we are in the process of establishing two concentrations within the IB Ph.D.: 1) IB-Neuroscience (IB-N) and 2) IB-Environmental Science (IB-ES). Recently, both concentrations were approved by the University Graduate Programs Committee and we are actively recruiting students.

The Department, with help from the Environmental Science Program, routinely assesses its seven graduate programs. The Masters degree with thesis is assessed for four learning outcomes that also address content, critical thinking, and communication. These outcomes are evaluated in graduate level classes, the research proposal, research thesis and oral presentation of the research. The Masters degree, non-thesis, is assessed for the same general learning outcomes. However, they are evaluated by both in-class work and a written/oral exit exam. The MST program has similar learning outcomes; they are assessed in class work. Certain classes incorporate oral presentation and significant term papers. The Masters students have met or exceeded the criteria set for success.

The IB Ph.D. Program is distributed between the CESCOS and the College of Medicine, with participation from the CMBB, HBOI, Torrey Pines Institute for Molecular Sciences (TPIMS), MPFI, the Scripps Research Institute, Florida and Vaccine and Gene Therapy Institute of Florida (VGTI). However, the IB Ph.D. Program is housed and assessed within Biological Sciences. As with the other programs described above it has four learning outcomes: 1) students will have mastered the content necessary for their progress and the skill of learning from the literature 2) they will be able to develop and test hypotheses 3) they will be able to communicate their results and 4) they will exhibit ethical conduct. These learning outcomes are assessed during the dissertation proposal and defense, both of which include written and oral components. The Assessment of Ph.D. Defense form and the Assessment of Ph.D. Proposal form are attached in Appendix A.

i. Limited access – Not applicable.

ii. Admissions criteria –
Incoming graduate students must meet admissions criteria established by the University as described in the University catalog:
http://www.fau.edu/academic/registrar/FAUcatalog/admissions.php

iii. Enrollment information –
Figure 6 shows the annual headcount since 2001 for all students in the Department of Biological Sciences. Data for this figure can be found in Table I of Appendix B. It is interesting that the number of graduate students has stopped growing. There may be a variety of reasons for this. The number of faculty has been constant over this period and this may limit the number of positions in labs. Since many of our students are local

Floridians, the graduate pool locally may be saturated and we need to recruit from outside southeast Florida.

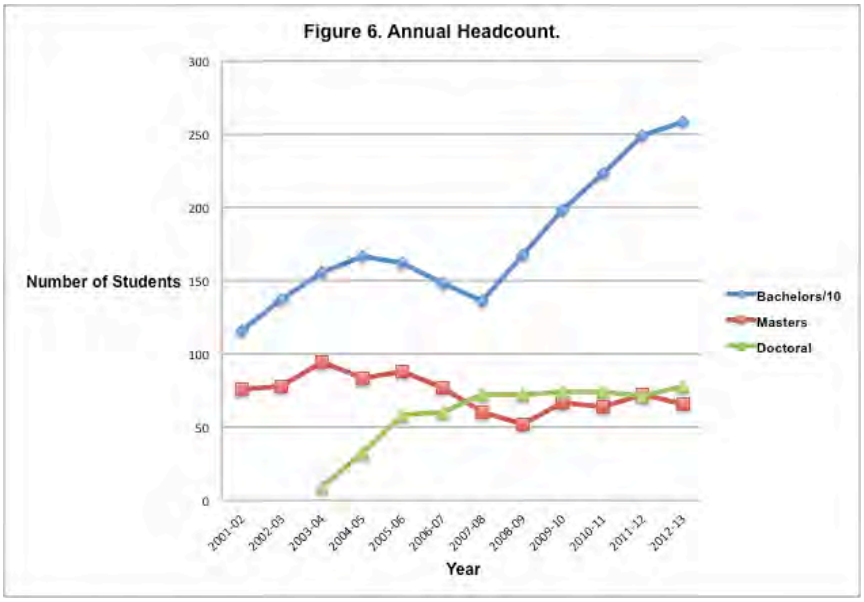
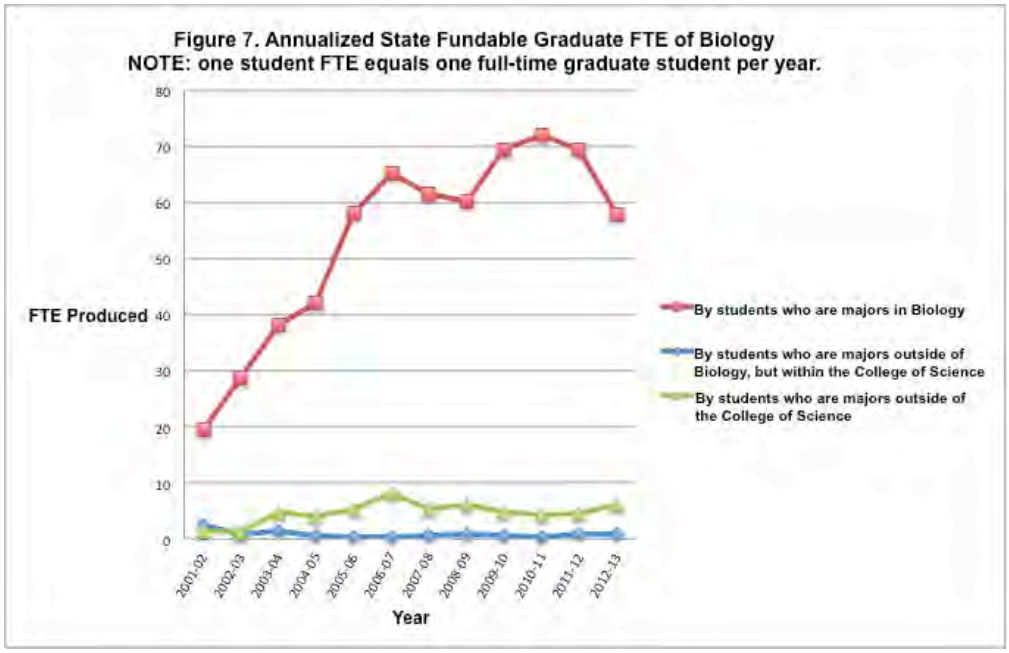


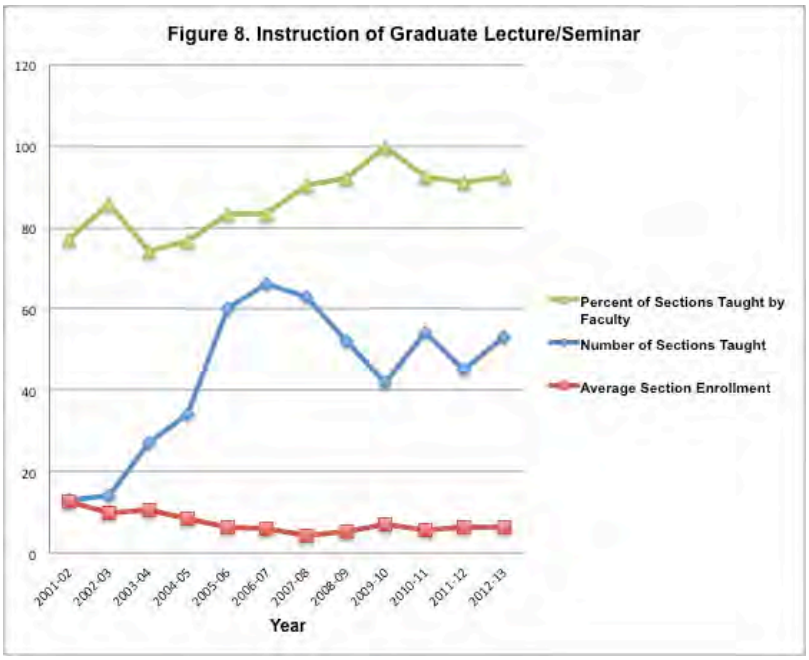
Figure 7 (Table J in Appendix B) details the annualized state fundable graduate FTE in/out of Biology or the CESCOS. It is clear that most of our effort goes into our own students. There is some service to majors outside of the CESCOS (green line in Figure 7) but this is a relatively small component.



iv. Average class size and faculty/student ratio

Table K in Appendix B lists the graduate average class size and Figure 8 plots the data below. The faculty/student ratio in lecture is approximately 1:15 and, in other course

types approximately 1:20. Over the past five years an average of 93.7% percent of our graduate lectures were taught by faculty members, with 92.5% of graduate lectures taught by faculty in 2012-2013. In other graduate course types, an average of 90.1% over the past five years, with 88% in 2012-2013 were taught by faculty.



v. Curriculum –

The Department of Biological Sciences offers thesis and non-thesis M.S. degrees in both Biology and Environmental Science, M.S.T. and a recently introduced P.S.M. degree in Business Biotechnology. The Curricula are listed in the university graduate catalog at the following site:
http://www.fau.edu/academic/registrar/FAUcatalog/science.php

Course work requirements

Doctoral degrees at FAU require at least 80 semester credits beyond the baccalaureate degree (a Masters degree is considered equivalent to 30 semester credits). The following are course requirements of the Integrative Biology Program: a minimum of 18 credits of course work with a cumulative grade point average of 3.0 or higher.

Required core courses

1) Integrative Biology I (BSC6390) (three credits): Through lectures, readings, journal club, classroom discussions and student papers, this course explores the idea of integrative biology and connectivity in biological systems. The course also provides an introduction to the IB program and the expectations of Ph.D. students. Integrative Biology 1 is offered only in the fall semester and must be taken within the first year.

2) One course in Biostatistics: A course in statistics appropriate to the area of specialization of the student (minimum three credits):

Experimental Design and Biometry (BSC 6206) (four credits)

Experimental Design 1 (PSY 6206) (four credits)

3) Scientific Communication (BSC 6846) (three credits): Introduces students to proposal writing and presentations for scientists.

Other course requirements for the doctoral degree

1) A minimum of three one-credit seminar/journal club courses over the entire term of residence in the program. Students are expected to give at least one presentation in one of the seminar/journal club courses.

2) A minimum of three elective courses, from the list of graduate courses in the CESCOS and the College of Medicine that are relevant to Integrative Biology. See for a list of potential courses is attached in Appendix A (from the Integrative Biology web page http://www.science.fau.edu/biology/intbio/course_selection.html). This list of elective courses is not exhaustive. The selection of elective courses to meet degree requirements will be determined by consultation between the student and the Ph.D. supervisor and/or the student's advisory committee. Other elective courses than those listed on the website may be chosen, but must be 5000, 6000, or 7000 level courses in biology, biomedical science, chemistry, or approved cognates. Courses designated as proficiency or remedial may not be used to satisfy the course requirements.

Other degree requirements

1) Research Credits:
   a) First and second semester: IB Lab Rotations (BSC 6905) when appropriate.
   b) After first/second semester but prior to candidacy: Advanced Research in Integrative Biology (BSC 7978)
   c) After attaining Candidacy: Dissertation Research Credits (BSC 7980). A minimum of 25 credits of doctoral dissertation research is required.

Preparation, presentation and defense of dissertation proposal

1) Written Dissertation proposal: The student shall submit a research proposal for review by the student's Dissertation Committee at least two weeks prior to the oral defense. Failure to do so may result in a delay of the oral defense. The proposal should be written in the format and structure using the IB guidelines and Proposal guidelines laid out in detail in ENC 6258 Scientific Communication course, unless the Dissertation Committee unanimously decides on another format. Finally, the student must seek guidance from his/her Ph.D. supervisor and/or other members of the Dissertation Committee with regard to the content of the proposal before submitting and defending it.

2) Oral Dissertation proposal defense: The student will be required to present and defend the research proposal in a meeting with the Dissertation Committee in which the student's proposed research and relevant scientific background will be explored in a comprehensive oral format.

3) Successful defense of the oral and written proposal shall qualify the student for candidacy, contingent upon satisfactory completion of the core and elective course

requirements. Students may propose and defend before completion of the course requirements, but formal advancement to candidacy will be delayed until the core course requirements are satisfied.

Dissertation research and defense of the dissertation
Dissertation research shall be conducted under the guidance of the student's Dissertation Committee. Students shall meet with the Ph.D. supervisor and other committee members on a regular basis (at least once a year) as the dissertation research proceeds. Students are expected to submit research findings for publication in scientific journals on a continuing basis. The student and the Ph.D. supervisor shall submit an annual research progress report approved by the dissertation committee via the program assistant to the director and associate directors at the end of each academic year. The IB Ph.D. Annual Research Progress Report is attached in Appendix A (and found on http://www.science.fau.edu/biology/intbio/form_download.htm). Without the annual research progress report a TA contract for the next semester will not be approved and students will not be allowed to register for any further course or research credits.

vi. Internships, practicum, study abroad, field experiences –
The FAU neuroscience group at Jupiter is forging alliances with Max Planck (MP) Institutes in Germany as well as with the local Max Planck Florida (MPFI). Two MP Institutes in Germany are working with FAU to develop international collaborations built around graduate students and postdocs who will work in exchange programs between the institutions. The initial contact was with the MP in Goettingen Germany where six Florida Faculty, three from MPFI and three from FAU visited the Georg August University in 2011 and learned how their program runs and explored ways to develop an international connection. One of our FAU students attended their short course in electrophysiology, attended a student-run international meeting and then returned to Florida where he served as TA for a new electrophysiology lab that we established. Again this year faculty members of FAU neuroscience attended the Horizons in Molecular Biology meeting (at The Max Planck Institute for Biophysical Chemistry) and two of the Ph.D. students attended the meeting and presented their work. Recently MPFI was awarded funds to establish an International Max Planck Research School (IMPRS) school in collaboration with FAU and the MPI in Bonn Germany. This program includes six FAU faculty members and the distribution of international students within the IB-N Program.

The P.S.M. degree in Business Biotechnology (with the goal of placing graduating students into the biotechnology workforce) places students in internships in biotech companies. More than 80% of the graduates were offered jobs while they were still in the internship or shortly after graduation. This success rate is as good or better than the national average for PSM graduates. The P.S.M. program enhances our collaborations with the local biotechnology industry.

The Environmental Science (ES) Program promotes internships for its students as a form of experiential learning where students learn by doing. South Florida is rich in

institutions involved in resource management and research so it is an ideal place to have students engaged in experiential learning as part of their academic studies. Internships are available for ES students at private consulting companies, state agencies (the South Florida Water Management District and the Florida Department of Environmental Protection), national agencies (US Environmental Protection Agency) and nearby parks and wildlife reserves (Everglades, state and local).

A new (summer 2014) study-abroad program is available to ES students. FAU recently concluded arrangements, originated by two members of the ES graduate faculty, in which the Tropical Forestry Research Institute (TFRI) in Guangzhou, China will provide funds for students to conduct a portion of their research at the TFRI. This collaboration will benefit students at FAU who are interested in mangrove ecology.

Field experiences are an important, but a small part of the ES curriculum. The courses take advantage of the varied environment around South Florida, from the Everglades to the ocean, and from estuaries to urban areas and most are in the Conservation and Ecology core subject area (examples of courses are Flora of South Florida, Marine Ecology, Marine Invertebrate Zoology and Natural History of the Indian River Lagoon).

vii. Pedagogy/pedagogical innovations –
Our graduate programs offer the students state-of-the-art innovative projects, which in turn allow the students to present at local, national and international conferences and to publish in peer-reviewed journals.

Both FAU undergraduate and graduate students have the opportunity to do research in the world-renowned institutes: Scripps Florida and MPFI. The sheer size of these institutes increases our ability to place students in research labs. It is worth noting that **nowhere else in the country is a university nestled amongst two renowned world-class research institutes**. FAU's unique physical location provides tremendous opportunities for STEM education and research training of all its students.

We have expanded our graduate course offerings to include several courses in Genetics, Development and Biotechnology. We are also expanding the neuroscience curriculum to include Advanced Neurophysiology (an intensive instrumentation course), Neuroanatomy, Practical Cell Neuroscience (based on Neurons in Action simulations) and Neurophysiology (with both wet and *in silico* labs). These four courses successfully run as special topics courses now and are pending approval to become formal graduate courses.

Video-conferencing rooms have been upgraded in the Department of Biological Sciences on all campuses. Upgrading these spaces greatly increases access to CESCOS coursework, scientific seminars (including graduate student seminars and advisory meetings) and other academic meetings allowing our students and faculty greater access to all campuses and other research institutes.

viii. Scope of institutional contributions –
The IB Ph.D. Program, based in the Department of Biological Sciences was jointly established between the CESCOS and the College of Medicine, with participation from the CMBB, HBOI, TPIMS, MPFI, Scripps, Florida and VGTI. As mentioned above this program has served as an effective platform to extend our graduate programs. The IB Ph.D. Program is being broadened by creating two research foci: one in Neuroscience (IB-N) and one in Environmental Science (IB-ES). These concentrations within IB are multi-college, multi-departmental and multi-institutional programs that benefit a larger community than just the Department of Biological Sciences (see Figure 7 above and Table J in Appendix B).

The IB program includes faculty and students in all of the Colleges and Institutes listed above. Additional faculty and students will enter from Scripps, Florida and MPFI for the IB-N degree, as well as, from the South Florida Water Management District, the USGS, Florida Fish and Wildlife and the US IFAS for the IB-ES degree.

Finally, the P.S.M. in Business Biotechnology Program requires students to take courses in both the CESCOS and the College of Business benefitting inter-college ties.

ix. Student profile –
Approximately 17% of the graduate students in Biology belong to underrepresented minority groups. This number continues to grow each year and we assume that it will eventually reach numbers similar to the undergraduate distribution of 45% underrepresented minorities. Table L in Appendix B shows the graduate student profile.

Departmental scholarships available to Biology graduate students are listed in Appendix A. There are multiple other scholarships available to graduate students through the Graduate College, the Alumni Association and directly through Financial Aid.

x. Advising procedures –
Supervisory committee (formed in the first semester of the first academic year)
The student's supervisory committee should be constituted before the end of the first semester; the chair of the committee shall be the Ph.D. supervisor of the student and constitute the supervisory committee in consultation with the student. For students without a Ph.D. supervisor, the Program Director or one of the Associate Directors will serve as a temporary chair until a Ph.D. supervisor is identified.

Identification of Ph.D. supervisor and research credits
Research conducted prior to candidacy:
1) All new incoming students (with the exceptions in #2 below) should register in the first semester for IB Lab Rotations BSC 6905. In the second semester students can either continue to do lab rotations until the end of the first calendar year, or can register for Advanced Research in Integrative Biology BSC 7978, with the approval of their identified Ph.D. supervisor.

2) Students who transfer from an FAU Masters with thesis program or who are being supported by RAs, and hence already have an identified Ph.D. supervisor, are not expected to rotate and can enroll for Advanced Research in Integrative Biology (BSC 7978) starting in the first semester.

Procedure for lab rotations and identification of the Ph.D. supervisor
Short-term laboratory rotations (three labs, each four weeks, first semester only) or long-term rotations (three to four labs, each eight weeks) over the first and second semester are an opportunity for faculty and students to meet without making a long-term commitment. Rotations allow the students to be exposed to a broader range of science, to network within the program, and to help the student make a well-informed choice of laboratory and the Ph.D. supervisor to conduct their thesis research. By trying out several laboratories, students can identify an area of research in which they are particularly interested, and a faculty member with whom they can develop a productive mentor-mentee relationship.

Students are encouraged to select a laboratory for their dissertation work by the beginning of their second semester but may continue to do rotations until end of the second semester. However, all students shall have an identified and approved Ph.D. supervisor at the latest by the end of the first academic year in the program.

Advancing to candidacy
Dissertation committee: (formed one semester before candidacy exam)
Once students have an identified Ph.D. supervisor they shall continue their course work as well as research by registering for Advanced Research in Integrative Biology BSC 7978. After a sufficient amount of research, as approved by their Ph.D. supervisor and/or supervisory committee, the student shall form their Dissertation Committee. The Dissertation Committee shall consist of four members, including the chair, whose responsibility is to guide the development of the dissertation research and administer the Dissertation Proposal review and Dissertation Defense.

xi. Licensure rates – Not applicable.

xii. Placement rates/employment profile –
Analysis of the 69 IB Ph.D. degrees awarded thus far show 41 alumni have pursued their careers at a University, either as postdoctoral fellows, adjunct faculty or non-tenure-track faulty or tenure-track faculty. These universities include: Indiana University/Purdue University, University of Michigan at Ann Arbor, Duke University, University of Florida, Texas A&M Health Science Center, Washington University School of Medicine, University of Tennessee Health Science Center, University of Illinois at Urbana, Johns Hopkins University, FAU, Wheaton College, Albert Einstein College of Medicine, University of Miami, Miller School of Medicine, Boston University, University of California at San Francisco and Stanford School of Medicine.

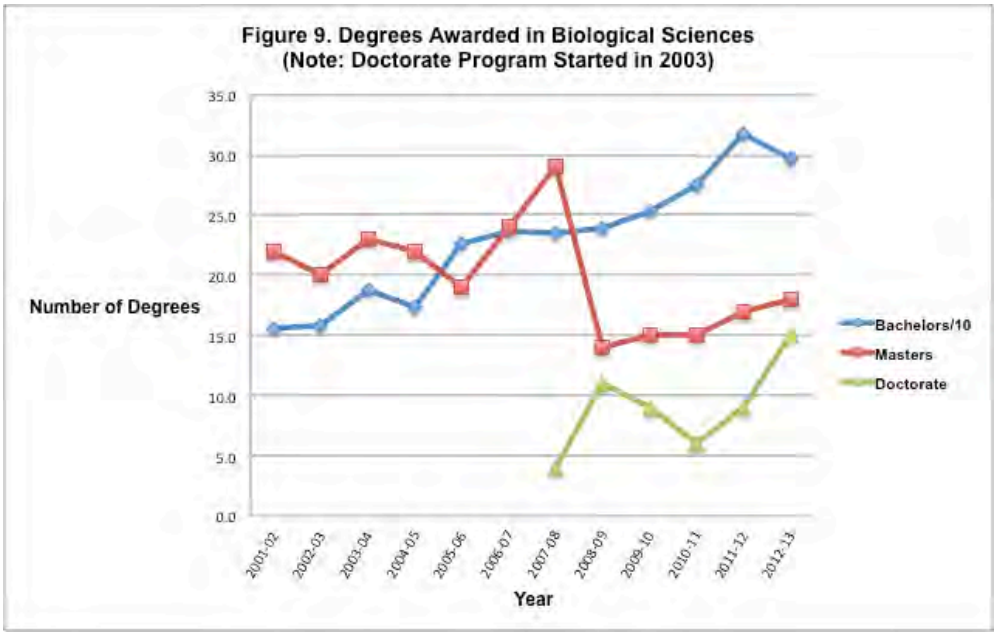
Eight alumni are/were postdoctoral fellows at research institutes in the region (Scripps, Florida, MPFI or VGTI). Two alumni are scientists at Pharmaceutical Companies (GlaxoSmithKline and Eli Lilly and Company).

Three alumni teach at the High School level. Other alumni are employed currently at various institutes including the USGS, Pacific Biodiversity Institute, EA Engineering, Integrated Health Care Associates, Teens4Oceans, Holy Cross Hospital, Nickel Producers Environmental Research Associates, Impact Medical Strategies, Institute for Regional Conservation and the Palm Beach Zoo. One of our most recent IB Ph.D. graduates has just started a science policy fellowship with the Congressional Black Caucus in Washington, D.C.

We don't have employment information for only six IB Ph.D. alumni.

xiii. Retention rates –
The total number of students that have been enrolled in the IB Ph.D. Program (i.e. accepted and attended) since its conception is 181. Sixty students are currently enrolled. Sixty-nine students have graduated with an IB Ph.D. from FAU. Currently enrolled and graduated students represent 71% of the total enrolled students. Fifty-two students have left the program without completing the Ph.D.

xiv. Graduation rates –
Tables 2 (above) and Table M (in Appendix B) from IEA show the data for Figure 9 below. A degree awarded with a single major contributes one degree, and a double major, contributes one-half degree. It can be seen from the data that M.S. degree-seeking student numbers dropped when the doctorate program started.



xv. Student recruitment –

IB Ph.D. Student Retreat: The 7th annual IB Ph.D. Student Retreat will take place in 2015. At the retreat, IB Ph.D. students showcase their research in a poster session. The retreat also gives prospective Ph.D. students the chance to tour the Boca campus and learn about the IB Ph.D. Program's research opportunities at the poster session. Every year a distinguished keynote speaker is invited; our speaker in 2015 will be Dr. Martin Chalfie, Nobel Laureate, and in 2014, it was Dr. Polly Matzinger, from the NIH, one of *Discover* magazine's Top 50 Most Important Women in Science. As part of recruitment, an IB alumnus is invited to the retreat and delivers a talk on what they learned during the IB Ph.D. Program, their success after completing the program and how the IB Ph.D. Program contributed to their success. The invited alumnus is awarded the "Distinguished Alumnus Award" based on outstanding contributions to the program. Alumni nominees for this honor are evaluated on the basis of their outstanding contributions to: 1) The IB Ph.D. Program (e.g. committee member, service to faculty or students), 2) Representation of the IB Ph.D. Program during their time in the program (e.g. invited talks, conferences, air-time on national TV), 3) Originality and creativity of their research (scope of the research project and techniques used to solve the problem), 4) Impact (significance in the field) and 5) Awards and funding received during their time in the IB Ph.D. Program. Honors undergraduate students and Masters students are invited to the retreat for recruitment purposes. Finally, the IB Ph.D. Retreat offers the opportunity to mingle with Ph.D. Program faculty, current students and the invited keynote speaker at a social mixer.

Our Graduate Program Coordinator and current graduate students hosted a biology graduate programs recruitment table at the 2014 Annual Graduate College Open House and will continue to do so here at FAU.

We submitted and were awarded a request for a $1,000 graduate recruitment grant and a $2,500 Provost's fellowship for the 2015-16 academic year from the FAU Graduate College. We have used previous recruitment grants to reimburse prospective students for travel to our annual recruitment event, the IB Ph.D. Student Retreat. The Provost's fellowship is meant to assist the program with recruitment by adding funds to the student assistantship (teaching or research) and increasing the program's appeal to incoming students.

We are expanding student recruitment for the Ph.D. Program to include popular scientific meetings. We hosted an IB-N recruitment table at the Society for Neuroscience (SfN) meeting (with over 31,000 attendees) in November 2014 in Washington, D.C. There were only 50 booths at the SfN Graduate Program Fair and many students stopped at our booth to discuss the program and its particulars. We handed out program brochures, a list of over 35 presentations by our IB-N faculty and students at the conference, pens and phone chargers with IB-N web sites and logos. We had two iPADs for students to input their data so that we may farther recruit interested students with more electronic information.

Our undergraduate Honors Program acts as a feeder to our graduate programs (as discussed in the "Undergraduate placement rates section" previously).

Academic clubs are always attractive to incoming students and thus serve as useful recruitment tools. The Association of Biological and Biomedical Students (ABBS) is run by our graduate students in Biological Sciences and the College of Medicine, and consists mostly of IB Ph.D. graduate students. ABBS hosts social mixers, seminars and workshops for students at both the undergraduate and graduate levels with the goal of getting students involved and has positively impacted recruitment for the IB Ph.D. Program.

The IB Ph.D. students are starting up a new club called the IB Club and will parallel the efforts of the ABBS club but focus more on IB Ph.D. students specifically. The IB Club also plans to have a stronger emphasis on professional development.

Faculty

i. Administrative structure -

The large size of the Department of Biological Sciences and the distributed nature of the campuses require considerable care in holding the pieces together. The overall strategy was designed to take advantage of the distributed campuses and make it a positive aspect of the department for both teaching and research.

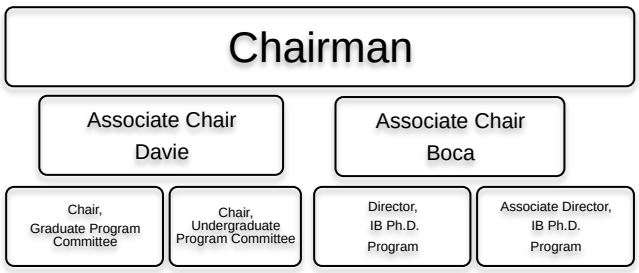
There are two Associate Chairs, one in Boca Raton and one in Davie. Dr. David Binninger, the Associate Chair in Boca Raton maintains and controls the course schedule, works with staff to assign teaching assistants to the laboratories and implements the assignments for the large teaching operation in Boca Raton. He also coordinates the course schedule and teaching assignments with Dr. Jay Lyons, the Associate Chair in Davie. The Boca Raton Associate Chair is also in charge of the molecular core facilities in Boca Raton and works with the Chairman to assign office, research and teaching space in Boca Raton.

Dr. Rod Murphey, the Chairman of Biology, speaks each morning with the Associate Chair in Davie to make sure that everyone is working toward the same goals. Since Davie ran relatively independently prior to Fall of 2000, and the Associate Chair guided the Davie operation, this has worked well to integrate the two parts of the Department. The Chairman and two Associate Chairs have worked together to increase the number of courses and the number of students using the Davie campus. We did this by taking advantage of the commuter campus and adding courses that are in heavy demand to the Davie campus; this has increased the number of seats from less than 100 per semester to more than 400 per semester in three years. The Associate Chair for Davie was also the point person for the new building and he coordinated the design and construction of the new Biology laboratories that moved to this new site.

In addition to the Associate Chairs, both the undergraduate program and the graduate program committees are chaired by another senior faculty member, Dr. Randy Brooks, who manages the programs and represents the Department of Biological Sciences on the College-Level Committees for graduate and undergraduate programs. Finally, the interdepartmental IB Ph.D. program is under the direction of both the Chairman of

Biology and Dr. Ken Dawson-Scully, Associate Director. Figure 10 is a schematic of the Department of Biological Science's administrative structure.

Figure 10. Administrative Structure of the Department of Biological Sciences.



ii. Faculty profile –

At the time of this writing in fall 2014 there are 28 faculty members in the Department: four Assistant Professors, thirteen Associate Professors, eleven Full Professors (two of the Full Professors are former administrators, M.J. Saunders, the former President and Brenda Claiborne, the former Provost, who have tenure positions in Biology and have returned to teaching this year). Nine of these faculty members are based primarily in Davie, thirteen are primarily in Boca, five primarily in Jupiter and one at HBOI in Fort Pierce. Finally, we have three Instructors who carry major teaching loads as lecturers and three full time staff who develop, maintain and operate the teaching labs. Including the Instructors, nine of these faculty members are women, three are black, four are Asian and one is Hispanic. Faculty diversity data can be found in Tables N1 and N2 in Appendix B and Table 3 below.

iii. Faculty teaching load –

The faculty teaching assignments for research active faculty are typically one large majors course (>100 students, some as large as 300) and one upper level undergraduate/graduate course. In addition, most research active faculty members mentor at least one graduate student and one undergraduate student (in our Research Experience for Undergraduates/Honors Programs). Figure 11 illustrates the workload for the Department as a whole. It shows a steady increase in FTEs doubling in the past decade. In contrast the number of faculty members has grown much more slowly, approximately 10%, for that same decade. Table 3 outlines teaching and academic responsibilities outside of research.

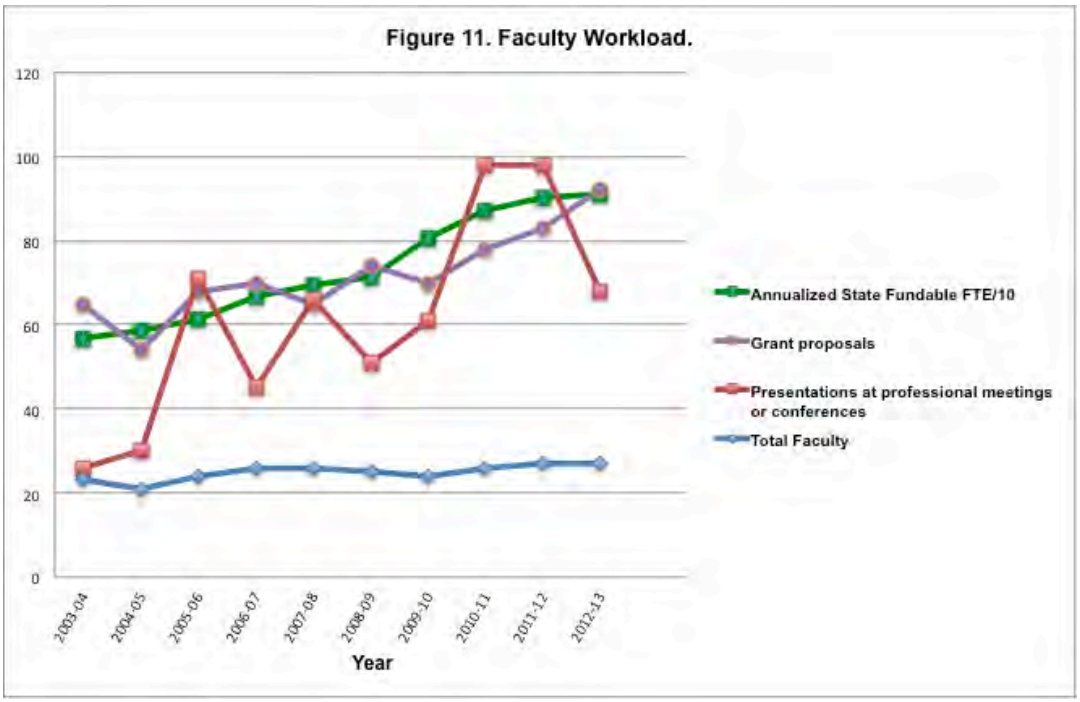


Table 3. Faculty Teaching And Academic Responsibilities For Academic Year 2012- 2013.

Biological Sciences	All	Under-represented minorities*	%	Women	%	TL**	UTA***	%	FD#	%	CC##	%
Tenure Track: Tenured & Non-Tenured	22	3	14%	5	23%	1.7	22	100%	3	14%	7	32%
Non-Tenure Track: Full Time	6	1	17%	3	50%	2.2	6	100%	3	50%	1	17%
Non-Tenure Track: Part Time	4	0	0%	1	25%	0.8	4	100%	0	0%	1	25%
Total Faculty	**32**	**4**	**0.1%**	**9**	**28%**	**N/A**	**32**	**100%**	**6**	**19%**	**9**	**28%**

* Underrepresented minorities: Black, African American, Hispanic, Latino/a, American Indian, Alaska Native, and Native Pacific Islander.
** Teaching Load (average per term)
*** Had an Undergraduate Teaching Assignment
# Participated in Faculty Development Activities (non-scientific research)
Participated in Undergraduate Curricular Changes

The FTEs produced per instructional person-year provides one measure of the teaching workload being carried by the average faculty member. The numbers are fairly

consistent across the CESCOS; in Biology the number is 15-16 FTE per person-year compared to 20 FTEs for the college as a whole (Table 4). However, these FTE numbers incorporate and thus are influenced by the number of graduate TAs in a given department.

If we adjust for the number of graduate TAs, then departments with large laboratory components and a large cadre of TAs (such as Psychology or Biology), increases by a factor of two-three fold and reaches 45 FTE per person-year. Such adjustments put the FTE production of a Biology faculty member in the top echelon of the institution.

Table 4. Annualized FTE Produced Per Instructional Person-Year.

	Biological Sciences			College Total	University Total
	2010-11	2011-12	2012-13	2012-13	2012-13
Undergraduate	14.1	14.5	15.1	19.4	19.1
Graduate	1.4	1.3	1.2	1.1	2.8
Total	**15.4**	**15.8**	**16.2**	**20.5**	**21.9**

Source: Instruction and Research File and Student Data Course File, IEA.
Includes Instructional Person-Years from all personnel categories.
Annualized FTE produced for each person-year devoted to instruction.

iv. Summary of faculty research productivity –
As Figure 11 and Tables O, P1 and P2 in Appendix B illustrate, research productivity has increased steadily over the last decade. The number of publications has more than doubled, as has the number of grant proposals submitted. In spite of the steady increase in grant proposals the number funded has decreased as the research funding agencies have tightened their criteria and the competition has become quite fierce. We have added patents and business funding to the departmental portfolio and one of the Jupiter biologists has funding from a Biotech company. The number of graduate students who support the research endeavor has nearly doubled in the past decade and the distribution has shifted from exclusively Masters students to a 50:50 split of M.S. and Ph.D. students as the IB Ph.D. program became established and grew to its present size of 60 to 70 students.

v. Strategic Planning for Hires –
The guiding principle is to hire faculty who will add to our research clusters and strengthen research groups while taking care of the teaching assignments. The faculty agreed as a whole to the most recent hires at a retreat two years ago. After a thorough discussion of the options the faculty decided the number one priority was a behavioral ecologist. We recently accomplished this goal with the hiring of a young behavioral ecologist, Dr. Rindy Anderson, who is an unusually good fit for the department as a whole. She will serve a number of constituencies, teaching in animal behavior, doing research in social behavior, sensory mechanisms and cognition and thereby making connections to all three research foci in the department. A second hire, Dr. Marianne Porter, is a biomechanics researcher. This second hire was a more opportunistic hire

and was part of a retention package. However, she fit the long-range plan established by the faculty and added nicely to our organismic group in Boca. Her research interests are making connections to the engineers among other interdisciplinary groups that have been lacking in our department. Finally, the administration has provided the resources to hire neuroscientists to the Jupiter wing of the department and we are trying to hire faculty who will complement the group in Jupiter as well as the other neuroscientists at MPFI and Scripps, Florida. We have hired one such faculty member in a joint hire with the Honors College, Dr. Greg Macleod. We are searching for mid-career faculty who are already funded and who will fit with the group in Jupiter.

D. Research

i. Review of part II of DDIs –

See "Summary of faculty research productivity" section above, Figure 11 above and Tables O, P1 and P2 in Appendix B.

ii. Interdisciplinary efforts and community engagement efforts –

Much of the Chairman's effort for the last 18 months has been focused on the Jupiter Life Science Initiative that was designed to establish strong links to Scripps, Florida and MPFI. We organized the move of six neuroscience faculty members (five from Biology and one from Psychology) and their associated personnel from Boca to Jupiter. The goal has been to establish research collaborations with the two institutes and enhance the overall neuroscience program on the MacArthur campus. This is working well and every FAU faculty member has one or more collaborations with a group or groups at one of the two research institutes. In addition, we established a neuroscience track within our IB Ph.D. program that includes faculty from FAU, Scripps, Florida and MPFI.

In parallel the Director of the Environmental Sciences program (a senior member of the Biology faculty, Dr. Dale Gawlik) led refinement of their Masters Program and has now added a track in the IB Ph.D. program. In addition, the Dean of the CESCOS has moved a free standing Center for Environmental Science from Jupiter to Davie further enhancing the Environmental emphasis. One example of the value of this interaction is a recent symposium initiated by CESCOS which brought together FAU Deans of Business, Education, Architecture, Science and Economics together with community leaders, researchers and educators concerning environmental issues to begin communication and outreach to increase the public awareness of environmental concerns and initiatives.

iii. Establishment of goals for research –

The research goals for the Department are pretty standard for a life science department – publish in high quality journals and succeed in the grant competition. In the long run we want the faculty to be successful at both grants and publications. This department has been relatively successful over the last decade as we have brought in young investigators who have succeeded because we chose good people, gave them the resources to succeed, monitored their progress carefully and mentored them as they moved toward tenure. In this decade all the junior faculty have succeeded in publishing regularly and obtaining grants as they proceed toward tenure and everyone we put up

for tenure has received tenure. A broad-based department like ours has to adjust for the history of its faculty as well as the aspirations of the department. The older faculty may make their contributions by mentoring the young faculty and taking on more of the teaching load.

iv. Assessment of how well the goals are being met –
Assessment is relatively straightforward because most faculty members know the rules and appreciate the standards toward which they are working. The tenure system at FAU has clearly tightened in this last decade and the rules are clear. Each of our new junior faculty has succeeded and has established their research projects, trained students, received grants and published their papers. My view is the goals are being met.

E. Service/Community Engagement
Table Q in Appendix B reviews Part II of the Department Dashboard Indicators for service and community engagement.

The Department of Biological Sciences has continued to show leadership in various community issues related to the Life Sciences through seminars, board membership, consultancy, applied research and mentoring. Dr. Nwadiuto Esiobu at the Davie Campus hosted a widely publicized and well-attended community forum entitled "Beyond Ebola: Building healthcare infrastructure in West Africa". Dr. M.J. Saunders serves on the task force for the FAU Chapter of the New Association for Women in Science. Dr. Esiobu, the founding Senior Vice President, crafts the strategic goals of the Palm Beach/Broward County Chapter of the US National Commission for UN Women. The leadership of the Biology faculty in their various professional organizations continues to build the Life Science enterprise in the nation and around the globe. These networks and strong commitment to the needs of the larger public make FAU even more relevant to the community while advancing the University's goals.

F. Other Department Goals
N/A

G. Strengths and Opportunities
The Department of Biological Sciences has an amazing set of opportunities, some scientific, some geographic, some political, and we are working to take advantage of them.

- In environmental science the natural environment and especially the Everglades and the marine environments are opportunities that our faculty routinely take advantage to enhance their research projects. The political and financial commitment to restoring the Everglades provides an amazing research resource that our faculty utilize to fund their research.
- In neuroscience, the state of Florida has invested nearly $1 billion in establishing Scripps, Florida Institute and MPFI on our MacArthur campus. The Department of Biological Sciences led the way in establishing connections to these institutes by moving the CMBB and a group of neuroscience faculty into a building on the MacArthur campus adjacent to Scripps and MPFI.

H. Weaknesses and Threats

- The distributed faculty between three main sites is a double-edged sword. It allows us to cluster faculty by common interests and common techniques, but it divides our relatively small faculty into even smaller groups.
- The distributed faculty also handicaps students from several perspectives. In some cases they must spend time and expense to travel in order to enroll in upper division and graduate courses, work in specific research laboratories and take advantage of university facilities and programs. We have made great strides at utilizing new technologies to broadcast courses and meetings to distributed sites, but still find many weaknesses in their application.
- Our ethnically diverse student body and urban campuses present unique problems in improving student retention. Most of our students are employed either full- or part-time in order to remain in college. It is difficult to significantly improve our retention rate in light of this situation. What programs can we facilitate to improve the rate of progress of our students through the program and their retention?

I. Resources

Further growth in enrollment and staff will require expansion of our current facilities. In Boca, although we have some limited faculty office and research laboratories available, our student laboratory and classroom space is practically exhausted. We are especially in need of large lecture facilities (enrollments in excess of 350) to present our undergraduate courses such as Life Science, Anatomy and Physiology, Genetics and Evolution. Our staff facilities in Davie and Jupiter are filled, as we have no more faculty offices or research laboratories at either site. We still have capability to expand our student laboratory offerings at both sites, however we also need more large classrooms (enrollments above 150 in Davie).

We are in need of an additional faculty line in the field of Aquatic Biology to add expertise in freshwater biology, limnology, fisheries science, and/or invasive species biology, which is of particular relevance to the Marine and Coastal Issues Signature Research Theme. The individual will complement existing expertise within the department and college, increasing the breadth of applicability to external funding sources as well as facilitating interdisciplinary research in the Environmental Sciences Program. Additionally, he/she will contribute to undergraduate instructional capacity by teaching an additional section of a high-enrollment upper-division course required for the Biology B.S. major (e.g., Principles of Ecology), enabling the department to keep pace with anticipated increases in enrollment in the major, as well as add breadth to graduate instruction through development of an advanced course in their area of expertise.

In order to grow the neuroscience group in Jupiter, we are recruiting mid-career faculty in cellular and molecular neuroscience. These faculty members will contribute to the growth and development of the new neuroscience focus at the MacArthur campus complementing the neuroscience groups at the Scripps Florida Institute and MPFI.

These people will enhance our reputation by bringing extramural funding to the campus as well as our ability to compete for umbrella grants in the field in joint grants with the two local research institutes. Finally they will contribute to the teaching mission at the undergraduate and graduate levels as well as providing mentoring for undergraduate and graduate students in the neurosciences.

The Department of Biological Sciences is extremely successful at engaging undergraduates in research experiences (refer to undergraduate pedagogy/pedagogical innovations section above). Research training of undergraduate students (in addition to our graduate students) poses high demands on Biology faculty time. We suggest that faculty should receive more credit for the training of undergraduate "directed independent studies" and relief from lecture courses.

A resource concern is the support staff in the Boca departmental office is understaffed or only employed part-time. We are currently recruiting additional support. In order to provide faculty their time in research, teaching and community engagement, support staff responsibilities might include: assisting in assembly of research proposals, manning our web sites, providing statistical support and helping with student support (funding and advising).

One of the main resource issues for the department is the limited support for graduate assistants. As Table 5 shows below, FAU is at the bottom of the ranking for MS stipends and health care. Only FIU pays a comparable stipend ($11,250 per nine months). Every other SUS institution surveyed pays a significantly larger stipend with UF paying double the salary for nine months. And every SUS institution surveyed pays most if not all of the student health care costs. Similar results are available for the Ph.D. students. These numbers can be directly linked to success in recruiting graduate students.

Table 5. Support For MS Students Across The SUS.

University	MS Stipend	Months	Tuition waiver	Health insurance
FAU	**9,636**	9	100% (in-state)	**No**
FIU	15,000	12	9 cr/sem.	75% of cost
USF	18,600	9	100%	100%
UF	18,000	9	100%	100%
FSU	20,000	12	100%	$900 supp.
UCF	10,000	9	100%	Y

J. Future Direction-Overall Vision for the Next Five to Ten Years

Three to five broad questions for the review team:

- How do we maximize our strong points yet prevent the department from fragmenting due to interest clusters as well as geographic clusters that tend to separate the interest groups? Clustering the faculty by interest enhances

intellectual cohesion but separates the various sub-groups of the department. How do we maintain cohesion?

- In keeping with President Kelly's plan to enhance STEM, particularly at the Jupiter campus, how can Biology enhance its cross-disciplinary efforts with other areas of science such as chemistry, psychology and math as well as engineering?
- Is our new "flexible curriculum" allowing students to customize their degree program towards a career goal? Early indications show very significant shifts in enrollment between the four required major courses.
- What programs can we establish to improve the retention rate of our uniquely diverse, urban and commuter student body?

K. Student Feedback

Similar to the lack of undergraduate student follow-up, FAU does not have an official procedure in place to collect this data for the graduate students. We surveyed IB Ph.D. graduate students and received nine responses. It became clear that the distance between the various campuses posed some difficulty, as well as the communication between the different parts of FAU and the graduate policy changes. This data is provided with the disclaimer that it may not be representative of all graduate students. The questions and graduate student responses are in Appendix A.

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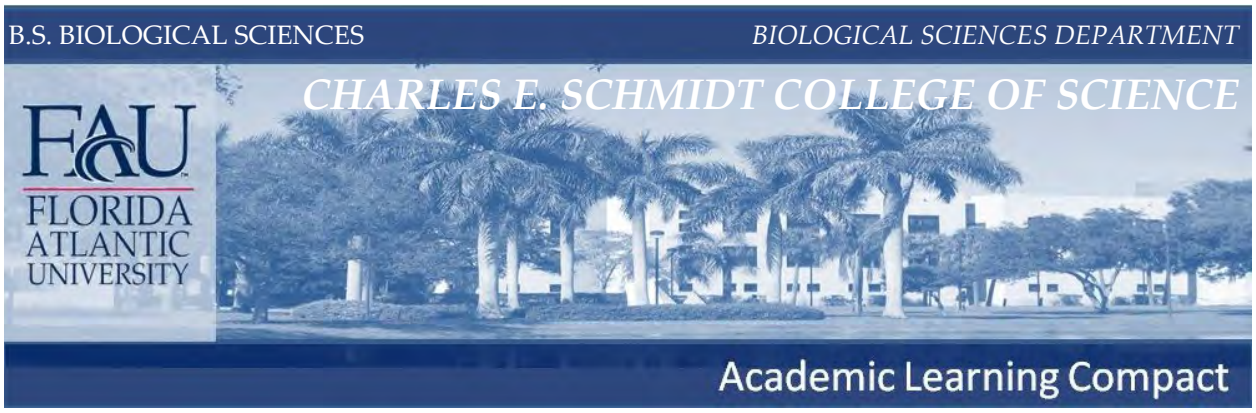
Appendix A. Supporting Documents.

Table of Contents



The principal mission of the Department of Biological Sciences is to train students for careers in biological sciences or pursue advanced training in graduate and professional schools. Through both education and research, our department seeks an increased appreciation and respect for our environment and awareness of the impact of our decisions on local, regional and global issues concerning the economy, personal health and welfare, and the environment.

CONTENT KNOWLEDGE (Declarative Knowledge): Students will demonstrate an understanding of cell structure, cell physiology and the molecular processes of cells. Students will be able to describe features that distinguish the major groups of organisms and the developmental and physiological mechanisms fundamental to all living organisms. Students will demonstrate an understanding of the principles of organismal genetics, evolution and ecology. Students receiving the BS degree in biological sciences are required to successfully complete the following core courses:

BSC 1010: Biological Principles

BSC 1011: Biodiversity

PCB 4023: Molecular and Cell Biology

PCB 4043: Principles of Ecology

PCB 3063: Genetics

Students' knowledge of the material will be assessed by examinations, typically using multiple-choice and short-answer questions. In upper division courses, examinations consist of advanced objective questions and high level problem solving.

CONTENT KNOWLEDGE (Technical Skills): Students will demonstrate proper laboratory practice, use of equipment, and ability to use basic and advanced techniques in several areas of biology.

CHARLES E. SCHMIDT COLLEGE OF SCIENCE

DEPARTMENT OF BIOLOGICAL SCIENCES

B.S. BIOLOGICAL SCIENCES

Students receiving a BS degree in biological sciences are required to successfully complete the following core laboratory courses:

BSC 1010L: Biological Principles Laboratory

BSC 1011L: Biodiversity Laboratory

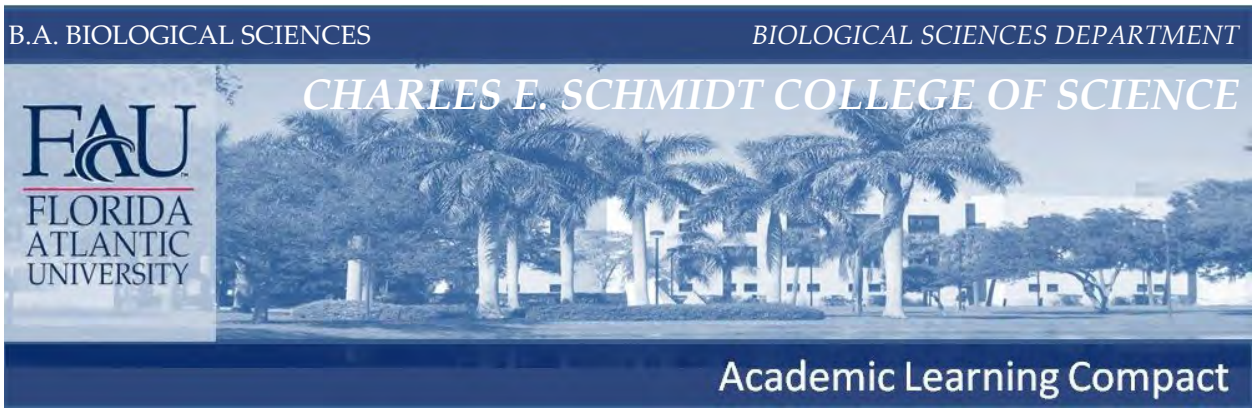
In BSC 1010L, students are tested on concepts by short answer and essay questions; in BSC 1011L, students are tested on their technical skills by practical examinations.

COMMUNICATION (Written Communication, Oral Communication): Students will demonstrate the ability to speak and write effectively on biological topics. BSC 1010L and BSC 1011L students are assigned to discussion groups of eight to ten students where they discuss course concepts and are evaluated for group participation. Students are tested for written communication skills by essay and short answer examinations.

CRITICAL THINKING (Analytical Skills): Students will use critical thinking to

evaluate data by applying basic principles of scientific methodology including (1) the nature of scientific explanations, (2) threats to the validity and reliability of observations, (3) the limitations of measurement scales, (4) using experimental and quasi-experimental designs to test hypotheses and (5) appropriate interpretation and correlation of experimental data.

COMPLETE BS DEGREE REQUIREMENTS APPEAR IN FAU'S UNIVERSITY CATALOG



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BSC 1010: Biological Principles

BSC 1011: Biodiversity

PCB 4043: Principles of Ecology

PCB 3063: Genetics

Students' knowledge of the material will be assessed by examinations, typically using multiple-choice and short-answer questions. In upper division courses, examinations consist of advanced objective questions and high level problem solving.

CONTENT KNOWLEDGE (Technical Skills): Students will demonstrate proper laboratory practice, use of equipment, and ability to use basic and advanced techniques in several areas of biology.

CHARLES E. SCHMIDT COLLEGE OF SCIENCE

DEPARTMENT OF BIOLOGICAL SCIENCES

B.A. BIOLOGICAL SCIENCES

Students receiving a BA degree in biological sciences are required to successfully complete the following core laboratory courses:

BSC 1010L: Biological Principles Laboratory

BSC 1011L: Biodiversity Laboratory

In BSC 1010L, students are tested on concepts by short answer and essay questions; in BSC 1011L, students are tested on their technical skills by practical examinations.

COMMUNICATION (Written Communication, Oral Communication): Students will demonstrate the ability to speak and write effectively on biological topics. BSC 1010L and BSC 1011L students are assigned to discussion groups of eight to ten students where they discuss course concepts and are evaluated for group participation. Students are tested for written communication skills by essay and short answer examinations.

CRITICAL THINKING (Analytical Skills): Students will use critical thinking to evaluate data by applying basic principles of scientific methodology including (1) the nature of scientific explanations, (2) threats to the validity and reliability of observations, (3) the

limitations of measurement scales, (4) using experimental and quasi-experimental designs to test hypotheses and (5) appropriate interpretation and correlation of experimental data.

COMPLETE BA DEGREE REQUIREMENTS APPEAR IN FAU'S UNIVERSITY CATALOG

FLORIDA ATLANTIC UNIVERSITY – INTELLECTUAL FOUNDATION PROGRAM 2014 - 2015

All courses are three (3) credits unless otherwise indicated. Course selections should be made in consultation with an academic advisor.

FOUNDATIONS OF WRITTEN COMMUNICATION
(Gordon Rule Writing (GRW), 6 credits required)
(A grade of "C" or higher is required in each course)

___ **ENC 1101** ..... **College Writing I (REQUIRED)**
___ ENC 1102**+** ..... College Writing II

THE FOLLOWING COURSES CAN BE SUBSTITUTED FOR ENC 1102:

___ ANT 1471**+** ..... Cultural Difference in a Globalized Society
___ ENC 1930**+** ..... University Honors Seminar in Writing **(Permit Only)**
___ ENC 1939**+** ..... Special Topic: College Writing II
___ HIS 2934**+** ..... Writing History
___ NSP 1195**+** ..... Being Cared For: Reflections from Other Side of Bed

Students must take four (4) GRW Courses.
Two (2) must be taken from Foundations of Written Communications. §

FOUNDATIONS OF SOCIETY & HUMAN BEHAVIOR
(6 credits required, select 2 courses from 2 different departments)

Anthropology Department
___ ANT 2000 **& D**.....Introduction to Anthropology

Economics Department
___ ECO 2013# .....Macroeconomic Principles
___ ECO 2023# .....Microeconomic Principles
___ ECP 2002.....Contemporary Economic Issues

Exceptional Student Education Department
___ EEX 2091.....Disability and Society

Geosciences Department
___ EVR 2017.....Environment and Society

Political Science Department
___ POS 2041 .....Government of the United States

Psychology Department
___ PSY 1012.....General Psychology

Public Administration Department
___ PAD 2258.....Changing Env. of Soc., Bus., & Government

Sociology Department
___ SYG 1000 .....Sociological Perspectives
___ SYG 2010 .....Social Problems

Urban & Regional Planning Department
___ URP 2051 .....Designing the City

FOUNDATIONS OF SCIENCE & THE NATURAL WORLD
(6 credits required, select 2 courses from 2 different departments)
(One (1) course must have a Lab)

---------- *For Non-Science Majors:* ----------

Anthropology Department
___ ANT 2511 **& L**..... Intro to Biological Anthropology (4 cr incl. Lab)

Biology Department
___ BSC 1005 **& L**..... Life Science (3 credits incl. Lab)

Chemistry Department
___ CHM 1020**C**..... Contemporary Chemical Issues
___ CHM 2083 **(P/F)**..... Chemistry in Modern Life **(Online Course)**

Engineering Dean Department
___ ETG 2831 ..... Nature: Inter. of Sc., Eng. and the Humanities

Geology Department
___ ESC 2070 ..... Blue Planet (**Online Course**)
___ GLY 2010**C** ..... Physical Geology (4 credits include lab)
___ GLY 2100..... History of Earth and Life
___ MET 2010 **& D** ..... Weather and Climate

Physics Department
___ AST 2002 **(P/F)**..... Introduction to Astronomy
___ PSC 2121 ..... Physical Science

---------- *For Science and/or Engineering Majors:* ----------

Biology Department
___ BSC 1010 **& L & D** ..... Biological Principles (4 cr. incl. Lab & Disc)
___ BSC 1011 **& L & D** ..... Biodiversity (4 cr. incl. Lab and Discussion)
___ BSC 2085 **& L*** ..... Anatomy & Physiology I (4 credits incl. Lab)

Chemistry Department
___ CHM 2032 **& L**..... Chemistry for Health Sciences (4 credits)
___ CHM 2045 **& L‡**..... General Chemistry I (4 credits Incl. Lab)

Physics Department
___ PHY 2043**** ..... Physics for Engineers I (3 credits)
___ PHY 2048 **& L**** ..... General Physics I (5 credits incl. Lab)
___ PHY 2053***** ..... College Physics I (4 credits)

FOUNDATIONS OF MATHEMATICS & QUANTITATIVE REASONING
(Grade of "C" or higher required. 6 credits required)
PRETEST IS REQUIRED BEFORE TAKING YOUR FIRST MATH CLASS
NOTE: Students must take at least one course with the prefix MAC or MGF from the list below

___ MGF 1106.....Math for Liberal Arts I
___ MGF 1107.....Math for Liberal Arts II
___ MAC 1105.....College Algebra
___ MAC 1114.....Trigonometry
___ MAC 1140.....Precalculus Algebra
___ MAC 1147.....Precalculus Algebra & Trigonometry (5 cr)
___ MAC 2233.....Methods of Calculus
___ MAC 2311.....Calculus with Analytic Geometry I (4 cr)
___ MAC 2312.....Calculus with Analytic Geometry II (4 cr)
___ STA 2023.....Introductory Statistics
___ PHI 2102.....Logic

FOUNDATIONS IN GLOBAL CITIZENSHIP
(Select 2 courses from 2 different departments) (6 cr. req.)
At least 1 course must be Global Perspectives – (GP)

Anthropology Department
___ ANT 2410 .....Culture and Society **(GP)**

Curriculum, Culture, & Educational Inquiry Department
___ EDF 2854 .....Educated Citizen in Global Context **(GP)**

Geography Department
___ GEA 2000 .....World Geography **(GP)**

History Department
___ AMH 2010 (P/F).....United States History to 1877
___ AMH 2020 (P/F).....United States History Since 1877
___ WOH 2012 & D++....History of Civilization I **(GRW) (GP)**
___ WOH 2022.....History of Civilization II **(GP)**

Languages, Linguistics, & Comparative Literature Department
___ LAS 2000.....Intro to Caribbean & Latin American Studies
___ LIN 2607 .....Global Perspectives on Language **(GP)**

Philosophy Department
___ PHI 2010 & D ++ .....Introduction to Philosophy **(GRW)**

Political Science Department
___ INR 2002 .....Introduction to World Politics **(GP)**

Sociology Department
___ SYD 2790 .....Race, Class, Gender, and Sexuality
___ SYP 2450 .....Global Society **(GP)**

Social Work Department
___ SOW 1005.....Global Perspectives of Social Services **(GP)**

FOUNDATIONS OF CREATIVE EXPRESSION
(6 credits req., select 2 courses from 2 different departments)

Architecture Department
___ ARC 2208.....Culture & Architecture

Visual Art & Art History Department
___ ARH 2000 **(P/F)**.....Art Appreciation

School of Communication & Multimedia Studies
___ FIL 2000 **& D**. .....Film Appreciation

English Department
___ LIT 2010**++** .....Interpretation of Fiction **(GRW)**
___ LIT 2030**++** .....Interpretation of Poetry **(GRW)**
___ LIT 2040**++** .....Interpretation of Drama **(GRW)**
___ LIT 2070**++** .....Interpretation of Creative Nonfiction **(GRW)**

Languages, Linguistics, & Comparative Literature Department
___ LIT 2100 .....Intro to World Literature

Music Department
___ MUL 2010 .....History & Appreciation of Music

Theatre & Dance Department
___ DAN 2100 .....Appreciation of Dance
___ THE 2000 .....Appreciation of Theatre

STUDENTS ASSUME RESPONSIBILITY FOR MEETING ALL GRADUATION REQUIREMENTS
Course selections should be made in consultation with an advisor

Legend

+ - ENC 1101 is a prerequisite.
++ - Two Foundations of Written Communications classes are required before taking this class.
# - Sophomore standing (30 credits earned) is required.
***** - Nursing majors are required to take this class in their first semester.
****** - MAC 2311 is a prerequisite for this class. If a lab is needed take General Physics 1 Lab (PHY 2048 Lab).
******* - MAC 1105 and MAC 1114 are prerequisites for this class. If a lab is needed take General Physics 1 Lab (PHY 2048 Lab).
‡ - Co-requisite of College Algebra (MAC 1105) or a prerequisite of Introductory Chemistry (CHM 1025).
¤ - College Algebra (MAC 1105) is a prerequisite for this class with a earned grade of "C" or better.
GRW - (WAC) Writing across the curriculum class.

§ Gordon Rule/Writing Across the Curriculum (WAC)

Students must attain grades of "C" or higher. 12 credits of writing (GRW) and 6 credits of mathematics are required.

Please note:
Students must take four (4) GRW courses. Two (2) courses are to be taken from Foundations of Written Communication. We strongly recommend the two additional GRW courses come from Foundations of Global Citizenship and/or Foundations of Creative Expressions. Courses include: PHI 2010, WOH 2012, LIT 2010, LIT 2030, LIT 2040 and LIT 2070. See advisor for additional details.

Elective Credits

The number of elective credits allowed varies by major. Please consult with an academic advisor to determine the number of elective credits required for your major. ***Certain majors do not allow any electives.***

(D) = Discussion, (L) = Lab

Courses indicating a (D) or (L) are linked with a lecture, a lab, and/or a discussion. If you select one of these courses, you must register for the lecture, lab, and/or discussion. You **must** attend the lecture, lab, and/or discussion.

Summer Credits

Students admitted to FAU as freshmen or who transfer with fewer than 60 credits must earn a minimum of 9 credits by attending one or more summer terms at either FAU or another university in the Florida State University System.

Florida Virtual Campus

Go to www.flvc.org to:

- Research majors and career options
- Submit an electronic **Transient Student Form***:
  - For instructions on how to complete the Transient Student Form please refer to the link available on the University Advising Services website.

***** Students who wish to take courses at another university or community college within the state of Florida must complete a Transient Student Form.

P/F

Certain designated undergraduate courses may be taken for a letter grade of pass (P) or fail (F). Students must indicate the grade option preferred when registering; otherwise, a letter grade will be given. The maximum credit available to any student on the P/F option is one course per term with a maximum of 12 credits during a student's entire course of study. This option is not available for courses in the student's major, for students on probation, or for **Engineering** majors.

Freshman Warning, Academic Probation, and Suspension

Students on freshman warning, academic probation, or suspension are required to meet with their academic advisor to discuss their academic status, and for special assistance in improving their academic performance.

Change of Major

Students who have earned fewer than 30 credit hours may change their major at any time at the Office of University Advising Services or at the Office of the Registrar. Students with 30 credit hours or more must go to their intended college or the Office of the Registrar. Changing the major requires permission from the new department. Students must satisfy the same academic qualifications as those for new applicants seeking admission to that department.

Transfer Credits

- **AP (Advanced Placement)**
- **IB (International Baccalaureate)**
- **CLEP (College Level Examination Program)**
- **High School Dual Enrollment**
- **AICE (Advance International Certificate in Education)**
- **Other University/College Transfer Credits**

Students should consult with an academic advisor to determine Florida Atlantic University Intellectual Foundation Program equivalency.

http://myfau.fau.edu

Go to MyFAU to:

- Check e-mail
- See FAU Announcements
- **FAU Self-Service:**
  - Course schedules
  - Registration (drop/add classes) and withdrawals
  - Student records and financial aid
  - Tuition payments
  - The University Course Catalog

FLORIDA ATLANTIC UNIVERSITY

All courses are three (3) credits unless otherwise indicated. Course selections should be made in consultation with an academic advisor.

BIOLOGY MAJOR
(2014 – 2015)

The Charles E. Schmidt College of Science
Bachelor of Arts (BA) and Bachelor of Science (BS)

FOUNDATIONS OF WRITTEN COMMUNICATION
(Gordon Rule Writing (GRW), 6 credits required)
(A grade of "C" or higher is required in each course)

___ **ENC 1101** ..... **College Writing I (REQUIRED)**
___ ENC 1102**+** ..... College Writing II

THE FOLLOWING COURSES CAN BE SUBSTITUTED FOR ENC 1102:

___ ANT 1471**+**..... Cultural Difference in a Globalized Society
___ ENC 1930**+** ..... University Honors Seminar in Writing **(Permit Only)**
___ ENC 1939**+** ..... Special Topic: College Writing II
___ HIS 2934**+**..... Writing History
___ NSP 1195**+** ..... Being Cared For: Reflections from Other Side of Bed

Students must take four (4) GRW Courses.
Two (2) must be taken from Foundations of Written Communications.
§Two additional courses are REQUIRED.

FOUNDATIONS OF SOCIETY & HUMAN BEHAVIOR
(6 credits required, select 2 courses from 2 different departments)

Anthropology Department
___ ANT 2000 **& D** .....Introduction to Anthropology

Economics Department
___ ECO 2013**#**.....Macroeconomic Principles
___ ECO 2023**#**.....Microeconomic Principles
___ ECP 2002 .....Contemporary Economic Issues

Exceptional Student Education Department
___ EEX 2091.....Disability and Society

Geosciences Department
___ EVR 2017 .....Environment and Society

Political Science Department
___ POS 2041 .....Government of the United States

Psychology Department
___ **PSY 1012**.....**General Psychology (REQUIRED)**

Public Administration Department
___ PAD 2258 .....Changing Env. of Soc., Bus., & Government

Sociology Department
___ SYG 1000 .....Sociological Perspectives
___ SYG 2010 .....Social Problems

Urban & Regional Planning Department
___ URP 2051 .....Designing the City

FOUNDATIONS OF SCIENCE & THE NATURAL WORLD
(8 credits req., select 2 courses from 2 different departments)
(All labs and discussions are required)
A grade of "C" or better is required in each class.

Biology Department
___ BSC 1011 **& L & D** ..... Biodiversity (4 cr. incl. Lab and Discussion)

Chemistry Department
___ CHM 2045 **& L‡**..... General Chemistry I (4 credits. Incl. Lab)

Additional Biology and Chemistry classes are needed.
Refer to the B.A. and B.S. sections of this curriculum sheet.

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FOUNDATIONS OF MATHEMATICS & QUANTITATIVE REASONING
(Grade of "C" or higher required. 6 credits required)
PRETEST IS REQUIRED BEFORE TAKING YOUR FIRST MATH CLASS
NOTE: Students must take at least one course with the prefix MAC from the list below

___ MAC 1105.....College Algebra
___ MAC 2233.....Methods of Calculus (or higher)
___ MAC 2311.....Calculus with Analytic Geometry I (4 cr)

Calculus with Analytic Geometry 1 requires a solid background in Algebra and Trigonometry. If you are not ready to take this course the following courses will provide the necessary background:

___ MAC 1114.....Trigonometry
___ MAC 1140.....Precalculus Algebra
___ MAC 1147.....Precalculus Algebra & Trigonometry (5 cr)

FOUNDATIONS IN GLOBAL CITIZENSHIP
(Select 2 courses from 2 different departments) (6 cr. req.)
At least 1 course must be Global Perspectives – (GP)

Anthropology Department
___ ANT 2410 .....Culture and Society **(GP)**

Curriculum, Culture, & Educational Inquiry Department
___ EDF 2854 .....Educated Citizen in Global Context **(GP)**

Geography Department
___ GEA 2000 .....World Geography **(GP)**

History Department
___ AMH 2010 (P/F).....United States History to 1877
___ AMH 2020 (P/F).....United States History Since 1877
___ WOH 2012 & D++....History of Civilization I **(GRW) (GP)**
___ WOH 2022.....History of Civilization II **(GP)**

Languages, Linguistics, & Comparative Literature Department
___ LAS 2000.....Intro to Caribbean & Latin American Studies
___ LIN 2607 .....Global Perspectives on Language **(GP)**

Philosophy Department
___ PHI 2010 & D++ .....Introduction to Philosophy **(GRW)**

Political Science Department
___ INR 2002 .....Introduction to World Politics **(GP)**

Sociology Department
___ SYD 2790 .....Race, Class, Gender, and Sexuality
___ SYP 2450 .....Global Society **(GP)**

Social Work Department
___ SOW 1005.....Global Perspectives of Social Services **(GP)**

FOUNDATIONS OF CREATIVE EXPRESSION
(6 credits req., select 2 courses from 2 different departments)

Architecture Department
___ ARC 2208 .....Culture & Architecture

Visual Art & Art History Department
___ ARH 2000 **(P/F)**.....Art Appreciation

School of Communication & Multimedia Studies
___ FIL 2000 **& D**. .....Film Appreciation

English Department
___ LIT 2010**++** .....Interpretation of Fiction **(GRW)**
___ LIT 2030**++** .....Interpretation of Poetry **(GRW)**
___ LIT 2040**++** .....Interpretation of Drama **(GRW)**
___ LIT 2070**++** .....Interpretation of Creative Nonfiction **(GRW)**

Languages, Linguistics, & Comparative Literature Department
___ LIT 2100 .....Intro to World Literature

Music Department
___ MUL 2010 .....History & Appreciation of Music

Theatre & Dance Department
___ DAN 2100 .....Appreciation of Dance
___ THE 2000 .....Appreciation of Theatre

STUDENTS ASSUME RESPONSIBILITY FOR MEETING ALL GRADUATION REQUIREMENTS
Course selections should be made in consultation with an advisor

Legend

+	- ENC 1101 is a prerequisite.
++	- Two Foundations of Written Communications classes are required before taking this class.
#	- Sophomore standing (30 credits earned) is required.
******	- MAC 2311 is a prerequisite for this class. If a lab is needed take General Physics 1 Lab (PHY 2048 Lab).
*******	- MAC 1105 and MAC 1114 are prerequisites for this class. If a lab is needed take General Physics 1 Lab (PHY 2048 Lab).
‡	- A corequisite of College Algebra (MAC 1105) or a prerequisite of Introductory Chemistry (CHM 1025).
GRW	- (WAC) Writing across the curriculum class.
D	- A discussion may be linked to the lecture. Students must register for the discussion in addition to the lecture.
L	- A lab is linked to the lecture. Students must register for the lab in addition to the lecture.
P/F	- Course may be taken pass (P) or fail (F) or for a letter grade. Indicate your preferred grading option during registration.
§	- We strongly recommend the two additional GRW courses come from Foundations of Global Citizenship and/or Foundations of Creative Expressions. Courses include: PHI 2010, WOH 2012, LIT 2010, LIT 2030, LIT 2040, & LIT 2070. See advisor for additional details.

FOREIGN LANGUAGE (4 - 8 credits, 1 or more courses in the same language) - **REQUIRED FOR MAJOR**
Students with more than one year of a foreign language in high school should enroll in the second half of the beginners foreign language class (ARA/CHI/FRE/GER/HBR/ITA/JPN/LAT/SPN 1121) or a higher level course. Proficiency for a first-level course can be earned by successfully completing a second-level course. For questions related to this requirement, consult an academic advisor. CLEP exam credits meet this requirement: see the catalog.

NOTE: *Native Speakers of a foreign language must consult the Languages, Linguistics, and Comparative Literature Department regarding this requirement.*

NOTE: *Honors Seminars SHALL BE ACCEPTED AS MEETING THE GORDON RULE WRITING REQUIREMENT. See the University Advising Services Office for details.*

HONORS NOTE: *Students can apply for the PSYCHOLOGY HONORS PROGRAM after completion of 60 credits, and before completion of 105 credits. Students must have a 3.2 overall & Psychology GPA to be admitted and retained in the Honors track.*

NOTE: See catalog for specific requirements, course descriptions, and additional information. The requirements for some Intellectual Foundations Program (I.F.P.) courses & other courses may be satisfied by passing the appropriate AP or CLEP exam. Check with your advisor and college.

The Charles E. Schmidt College of Science has the following requirements:

(1) A student must maintain a "C-" average or better in all biology AND cognate courses taken as part of the requirements for an undergraduate degree in Biological Sciences. However, students must maintain a "C" average in chemistry courses.

(2) Any course work in the major field transferred from another institution must be approved by the major dept.

(3) No major course may be taken pass/fail.

(4) The maximum amount of credit which may be earned through co-op is 10 credits; some departments allow some of these credits to substitute for major courses, check with department for specifics.

MAJOR COURSES, COLLEGE REQUIREMENTS and ELECTIVES
B.A. DEGREE

Required Courses (Biology Core): 40 - 41 credits:

BSC 1011 & L	Biodiversity and Lab	4 cr – **as indicated on first page**
BSC 1010 & L	Biological Principles and Lab	4 cr

(BSC 1011 & BSC 1010 also require a discussion)

CHM 2045 & L[1]	General Chemistry I and Lab	4 cr – **as indicated on first page**
CHM 2046 & L[1]	General Chemistry II and Lab	4 cr
CHM 2210 & D[1]	Organic Chemistry I	3 cr
CHM 2211[1]	Organic Chemistry II	3 cr
PSC 2121	Physical Science	3 cr

[1]Chemistry courses require a "C" or better

OR	MAC 2233	Methods of Calculus	3 cr
	MAC 2311	Calculus w/Analytic Geometry	4 cr
OR	STA 3173	Introduction to Biostatistics	3 cr (**prerequisite MAC 2233**)
	PSY 3234	Exp. Design & Stat. Inference	3 cr

Select at least three (3) of the courses below (the other course may be used as an elective): 9 – 10 credits

PCB 3063	Genetics	4 cr
PCB 4023	Molecular and Cell Biology	3 cr (**prerequisite BCH 3033**)
PCB 4043	Principles of Ecology	3 cr
PCB 4674	Evolution	3 cr

*** BCH 3033 (Biochemistry I) is a prerequisite and can serve as an elective.

Biology electives (select 15 credits): Please note you must have course prerequisite(s) completed

BCH 3033 Biochemistry 1	3 cr	OCB 4032 & 4032L Marine Biodiversity and Lab	4 cr
BOT 3223 & 3223L Vascular Plant Anatomy & Lab	4 cr	OCB 4043 & 4043L Marine Biology and Lab	4 cr
BOT 4404 & 4404L Marine Botany & Lab	4 cr	OCB 4525 & 4525L Marine Microbiology & Molecular Bio & Lab	4 cr
BOT 4503 & 4503L Principles of Plant Physiology & Lab	4 cr	OCB 4633 & 4633L Marine Ecology & Lab	4 cr
BOT 4713 & 4713L Plant Taxonomy & Lab	4 cr	OCE 4006 Marine Science	4 cr
BOT 4734C Plant Biotechnology	3 cr	PCB 3352 Issues in Human Ecology	3 cr
BSC 4403L Biotechnology 1 Lab	2 cr	PCB 3703 & 3703L Human Morph. & Function 1 & Lab	4 cr
BSC 4427L Biotechnology 2 Lab	2 cr	PCB 3704 & 3704L Human Morph. & Function 2 & Lab **or**	4 cr
BSC 4806 Biology of Cancer	3 cr	PCB 4233 Immunology	3 cr
BSC 4905 Directed Independent Study	1-3 cr	PCB 4522 Molecular Genetics	4 cr
BSC 4917 Honors Thesis Research 1	3 cr	PCB 4723 & 4723L Comparative Animal Physiology & Lab	4 cr
BSC 4918 Honors Thesis Research 2	3 cr	PCB 4803 Reproductive Endocrinology	3 cr
BSC 4930 Special Topics: (Model Systems Genetics Lab)	3 cr	PCB 4842 Cellular Neuroscience & Disease	3 cr
CHM 2211L Organic Chemistry Lab	2 cr	PCB 4843C Practical Cell Neuroscience	3 cr
MCB 3020 & 3020L General Microbiology & Lab	3 cr	ZOO 2203 & 2203L Invertebrate Zoology & Lab	5 cr
MCB 4203 Medical Bacteriology	3 cr	ZOO 4472 & 4472L Ornithology & Lab	4 cr
MCB 4603 Microbial Ecology	3 cr	ZOO 4402 & 4402L Functional Bio of Marine Animals & Lab	4 cr
		ZOO 4690 & 4690L Comparative Vertebrate Morph & Lab	5 cr

31 – 35 credits	Intellectual Foundations Program and Foreign Language
40 – 41 credits	Biology Core
15 credits	Biology Electives
29 – 34 credits	Free Electives – (**17 – 20 credits must be upper-division**)
120 CREDITS	**TOTAL (45 credits at upper division minimum)**

B.S. DEGREE

Required Courses (Biology Core): 47 - 48 credits

	BSC 1011 & L	Biodiversity and Lab	4 cr – **as indicated on first page**
	BSC 1010 & L	Biological Principles and Lab	4 cr
	(BSC 1011 & BSC 1010 also require a discussion)		
	CHM 2045 & L[1]	General Chemistry I and Lab	4 cr – **as indicated on first page**
	CHM 2046 & L	General Chemistry II and Lab	4 cr
	CHM 2210 & D	Organic Chemistry I[1]	3 cr
	CHM 2211	Organic Chemistry II[1]	3 cr
OR	MAC 2233	Methods of Calculus	3 cr
	MAC 2311	Calculus w/Analytic Geometry	4 cr
	PHY 2053	College Physics I[2]	4 cr (**prerequisite MAC 2233**)
	PHY 2048L	General Physics I Lab	1 cr
OR			
	PHY 2048	General Physics I[3]	4 cr (**prerequisite MAC 2311**)
	PHY 2048L	General Physics I Lab	1 cr
	PHY 2054	College Physics II	4 cr
	PHY 2049L	General Physics II Lab	1 cr
OR			
	PHY 2049	General Physics II	4 cr
	PHY 2049L	General Physics II Lab	1 cr
OR	STA 3173	Introduction to Biostatistics	3 cr (**prerequisite MAC 2233**)
	PSY 3234	Exp. Design & Stat. Inference	3 cr

[1]Chemistry courses require a "C" or better
[2]Prerequisite of a "C" in one these math courses: MAC 1114 / 1147 / 2233 / 2311
[3]Prerequisite of a "C" in MAC 2311

Select at least three (3) of the courses below (the other course may be used as an elective): 9 – 10 credits

PCB 3063	Genetics	4 credits
PCB 4023	Molecular and Cell Biology	3 credits
PCB 4043	Principles of Ecology	3 credits
PCB 4674	Evolution	3 credits

Electives: (select at least 21 credits from the list below): Please note you must have course prerequisite(s) completed

BCH 3033 Biochemistry 1	3 cr	OCB 4032 & 4032L Marine Biodiversity and Lab	4 cr
BOT 3223 & 3223L Vascular Plant Anatomy & Lab	4 cr	OCB 4043 & 4043L Marine Biology and Lab	4 cr
BOT 4404 & 4404L Marine Botany & Lab	4 cr	OCB 4525 & 4525L Marine Microbiology & Molecular Bio & Lab	4 cr
BOT 4503 & 4503L Principles of Plant Physiology & Lab	4 cr	OCB 4633 & 4633L Marine Ecology & Lab	4 cr
BOT 4713 & 4713L Plant Taxonomy & Lab	4 cr	OCE 4006 Marine Science	4 cr
BOT 4734C Plant Biotechnology	3 cr	PCB 3352 Issues in Human Ecology	3 cr
BSC 4403L Biotechnology 1 Lab	2 cr	PCB 3703 & 3703L Human Morph. & Function 1 & Lab	4 cr
BSC 4427L Biotechnology 2 Lab	2 cr	PCB 3704 & 3704L Human Morph. & Function 2 & Lab **or**	4 cr
BSC 4806 Biology of Cancer	3 cr	PCB 4233 Immunology	3 cr
BSC 4905 Directed Independent Study	1-3 cr	PCB 4522 Molecular Genetics	4 cr
BSC 4917 Honors Thesis Research 1	3 cr	PCB 4723 & 4723L Comparative Animal Physiology & Lab	4 cr
BSC 4918 Honors Thesis Research 2	3 cr	PCB 4803 Reproductive Endocrinology	3 cr
BSC 4930 Special Topics: (Model Systems Genetics Lab)	3 cr	PCB 4842 Cellular Neuroscience & Disease	3 cr
CHM 2211L Organic Chemistry Lab	2 cr	PCB 4843C Practical Cell Neuroscience	3 cr
MCB 3020 & 3020L General Microbiology & Lab	3 cr	ZOO 2203 & 2203L Invertebrate Zoology & Lab	5 cr
MCB 4203 Medical Bacteriology	3 cr	ZOO 4472 & 4472L Ornithology & Lab	4 cr
MCB 4603 Microbial Ecology	3 cr	ZOO 4402 & 4402L Functional Bio of Marine Animals & Lab	4 cr
		ZOO 4690 & 4690L Comparative Vertebrate Morph & Lab	5 cr

31 – 35 credits	Intellectual Foundations Program and Foreign Language
47 – 48 credits	Biology Core
21 credits	Biology Electives
17 – 20 credits	Free Electives – (**11 – 14 credits must be upper-division**)
120 CREDITS	**TOTAL (45 credits at upper division minimum)**

Undergraduate Scholarships:

Scholarships available to incoming freshmen from FAU's Office of Undergraduate Admissions include:

- FAU Presidential Scholarship: $24,000. Awards of $6,000 per year for first-time-in-college (FTIC) freshmen. Renewable up to four years based on academic achievement.
- Spirit of FAU: $20,000. Awards of $5,000 per year for FTIC freshmen. Renewable up to four years based on academic achievement.
- Elite Owl Scholarship: $12,000. Awards of $3,000 per year for FTIC freshmen. Renewable up to four years based on academic achievement.
- Welcome to FAU Scholarship: $1,000. Limited awards of $1,000 ($500 per semester for the fall and spring of the student's first year) are available for freshmen entering FAU as full-time students in the fall semester. This is a non-renewable award. A scholarship application is not required for this award as a students' eligibility is determined when an undergraduate application and supporting documents are reviewed for admission. The award is based on the competitive level of the pool of applicants.
- Academic Excellence Award (AEA): Awards of approximately $1,475, per semester are given in the form of non-resident tuition waiver for three credit hours. Scholarships are awarded to students who are classified as Non-Florida resident for tuition purposes.

Scholarships available to transfer students from FAU's Office of Undergraduate Admissions include:

- Honors/Phi Theta Kappa Scholarship: $3,200 per year for incoming junior transfer students with a minimum 3.5 GPA.
- Community College Scholars Award: Scholarships of $3,000 per year for incoming transfer students from one of Florida's College System institutions.
- All Academic Team Scholar: Awards of $3,000 per year to members of the Florida College System All-Academic Team.
- Transfer Educational Achievement Award (TEAA): Awards of $3,000 per year available for incoming junior transfer students from one of Florida's College System institutions.
- Brain Bowl: Awards of $2,250 per year for students on the winning brain bowl team.
- Depan International Transfer Student Scholarship: $2,000 per year for a student transferring to FAU on a student or scholar visa.
- Depan Transfer Scholarship Indian River Community College: An award of $2,000 per year, renewable up to two years, is offered to students transferring to FAU from Indian River State College.
- M. Brenn Green Scholarship: Awards of $1,000 per year, available for undergraduate transfer students majoring in one of the following areas: anthropology, criminal justice, economics, geography, health administration, political science, social work or sociology.
- Broward College International Center Graduates Transfer Award: International

graduates of the Associate of Arts (AA) or articulated Associate of Science (AS) degrees received at Broward College International Centers who apply to continue their education at Florida Atlantic University towards a bachelor degree, may also apply for a transfer award from FAU.

- Welcome to FAU Transfer Scholarship: Awards of $1,000 ($500 per semester for the fall and the spring of the student's first year) are available for transfer students entering FAU as full-time students in the fall semester.

International Student Scholarships are also available from FAU's Office of Undergraduate Admissions including:

- Depan International Freshman Student Scholarship: $8,000. $2,000 awarded annually over eight consecutive semesters for a freshman student on a student or scholar visa.
- Depan International Transfer Student Scholarship: $4,000. $ 2,000 awarded annually over four semesters for a transfer student on a student or scholar visa.
- International Scholarship For Non-Resident Freshman Students: A limited number of scholarships of approximately $1,438 per semester are given in the form of a non-resident tuition waiver for three credit hours to cover the cost of out-of-state tuition.
- Florida Linkage Institutes Tuition Waiver Awards (for students from specific countries and/or regions): Florida Statute 288.9175 established Linkage Institutes between postsecondary institutions in the state of Florida and foreign countries.

Scholarships available to undergraduate biology alumni from FAU's Alumni Association include:

- Hall of Fame Award.
- Distinguished Alumni of the Colleges.
- Outstanding Young Owls.
- Alumni Talon Award and Parliament of OWLS.
- Degree of Difference Award.

Integrative Biology PhD program, assessment of PhD Defense.

Date:

Name of Student: _____
Name of Evaluator: _____
Evaluators Field of Study: _____

Please evaluate this PhD proposal, giving a score of 1 to 5 with 5 being highest, so that the Integrative Biology PhD program can assess quality. Use a zero, 0, if you feel unqualified to judge a particular criterion. In grey below, some adjectives are presented which describe mediocrity versus excellence to guide scoring.

Breadth of knowledge of the field Shallow and mistaken or commanding with deep understanding of theory?	
Originality of research Unoriginal, or novel and exciting?	
Scope of research Narrow or ambitious?	
Research approaches and methods Contains mistakes or brilliant and elegant?	
Scope and quality of data and analyses presented Missing, or rich and persuasive?	
Strength of conclusions Unsupported, or thoughtful?	
Significance of research Will make no contribution, or with exciting applications?	
Quality of presentation Sloppy, or clear and engaging?	
Quality of written thesis.	
Students response to questions and criticisms Confused, or able to respond appropriately, present counter arguments?	
Overall evaluation Has student demonstrated ability to be an independent scientist?	

Other comments:

Integrative Biology PhD program, assessment of PhD proposal.

Date:

Name of Student: _____
Name of Evaluator: _____
Evaluators Field of Study: _____

Please evaluate this PhD Proposal Defense, giving a score of 1 to 5 with 5 being highest, so that the Integrative Biology PhD program can assess quality. Use a zero, 0, if you feel unqualified to judge a particular criterion. In grey below, some adjectives are presented which describe mediocrity versus excellence to guide scoring.

Exposition and analysis of literature in the field Shallow and mistaken or commanding with deep understanding of theory?	
Development of research questions Faulty logic and missing theory, or creative and sophisticated?	
Originality of research question Unoriginal, or novel and exciting?	
Scope of research Narrow or ambitious?	
Significance of research question Trivial, or brilliant with exciting implications?	
Research approaches and methods Contains mistakes or brilliant and elegant?	
Scope and quality of preliminary data Missing, or persuasive regarding feasibility of study?	
Quality of data analyses proposed Missing, mistaken, or novel and thorough?	
Quality of Presentation Sloppy, or clear and engaging?	
Overall evaluation. Has student developed a project suitable for dissertation research?	

Other comments:

IB Ph.D. Electives

Conservation Biology

Advanced Ecology (PCB 6046)
Provides graduate students with a background in development of ecology as a science and current ecological theory and application of ecology for ecosystems management.

Ecological Modelling (EVR 6029)
The course gives an overview of modeling and simulation techniques, with particular emphasis on applications in environmental science.

Ecological Theory (PCB 6406)
A functional approach to and a critical examination of the principles and concepts in ecosystem theory.

Ecosystems-S. Florida (BSC 6936)
Examine in detail the Ecosystems of South Florida, both through classroom and field activities. Ecosystem structure and function using comparisons of the historical and current landscape of South Florida and link content to the Comprehensive Everglades Restoration Plan."

Environmental Physiology (BSC 6936)
This class examines how animals function and respond to their natural environments, with reflections on behavioral strategies, ecology, evolution, and physiology. The initial part of the course looks at general adaptations to specific challenges faced by animals in different environments, the second part of the class examines how animals adapt to specific environments (e.g. desert, polar).

Marine Ecology (PCB 6317)
A study of the principles, concepts, and techniques of marine and estuarine ecology. Environmental factors, adaptations, habitats, communities, and applications of current ecological theory and studied. Lecture, laboratory, and fieldwork are included.

Symbiosis (BSC 6365)
Introduces concepts of symbiosis and the role of such associations in the evolution, coevolution, and ecology or organisms.

MARINE BIOLOGY

Advanced Marine Mammal Biology & Medicine (BSC 6936)
Course provides advanced level coverage of marine mammal: biology and adaptive physiology, health assessment studies, genetics, photo-identification and monitoring, behavior research, emerging diseases, stranding and rehabilitation husbandry, necropsy procedures and terminology, medicine and conservation outreach programs (HBOI).

Advanced Marine Microbiology and Molecular Biology/ Lab (BSC 6936)
The MMMB laboratory is designed to give students hands-on exposure to some of the microorganisms and techniques discussed in the MMMB lecture course. Because the majority of microorganisms (0.1 - 1%) are currently uncultivable, the techniques (such as PCR, microscopy, colony isolation, antimicrobial assays, gene cloning, RFLP and bioinformatics) will address these shortfalls through hands on experiments and analysis by students in modern microbiological and molecular laboratories (HBOI).

Behavior of Marine Animals (PCB 6412)
An introduction to the behavior of marine organisms in relation to their ecology and evolution. Physiology of Marine Animals (PCB 6775). A study of how marine animals function in their environment.

Marine Animal Behavior (Behavior of Marine Animals) (PCB 6412)
An introduction to the behavior of marine organisms in relation to their ecology and evolution.

Marine Ecology (PCB 6317)
A study of the principles, concepts, and techniques of marine and estuarine ecology. Environmental factors, adaptations, habitats, communities, and applications of current ecological theory and studied. Lecture, Laboratory, and fieldwork are included.

Natural History of Fishes (ZOO 6456); Lab (6456L)
The natural history of marine and freshwater fishes, emphasizing anatomy, functional morphology, general classification, and phylogenetic relationships, as well as biology of fishes in different habitats. Lecture, laboratory, and field study are included.

Seminar in Ichthyology (ZOO 6459)
A critical review of current literature dealing with fishes and fisheries. This course may be repeated for credit to a maximum of 4 credits.

MOLECULAR, CELLULAR, AND DEVELOPMENTAL BIOLOGY
Advanced Cardiovascular Physiology (BSC 5931)
A comprehensive study of cardiovascular physiology including cardiac electrophysiology, electrocardiography, cardiac mechanics, hemodynamics, microcirculation and lymphatics, peripheral circulation and control, control of cardiac output, exercise and hemorrhage.

Advanced Immunology (PCB 6236)
A study of the chemical and biological natures of antigens and antibodies: their preparation and reactions in vivo and in vitro, their applications in basic science and therapy, and the immunochemical and experimental methods involved with tagged or free immunologic products.

Biochemistry of the Gene (BCH 5415)
A detailed study of selected topics in molecular biology, including DNA replication, gene regulation, transcription and RNA processing, and techniques of genetic engineering.

Bioinformatics (BSC 6458)
A practical approach to accessing nucleic/protein databases, management of databases, identification of genes, and electronic expression profiling.

Brain Diseases: Mechanism and Therapy (BMS 6736)
Discussion of the molecular and cellular basis of brain diseases and of the current status of therapeutic intervention for those diseases.

Case Based Problems in Clinical Medicine (currently PCB 6930)
Use of clinical cases to teach human integrated biology.

Cell Physiology of the Heart (currently PCB 6930)
Analysis of physiological functions of heart cells.

Cellular Neuroscience and Disease (BSC 6936)
Cellular neuroscience from the point of view of human neurological diseases. This will connect various defects in development to neurological disorders such as Alzheimer's, Parkinson's, and Lou Gehrig's disease. This will examine molecular mechanisms involved in axon/dendrite growth and guidance, synapse formation, regeneration and degeneration. This course will also examine synaptic plasticity in context of memory and learning. The final part will cover electrical properties of neurons and muscles and their connections to such diseases as Myasthenia Gravis and cardiac arrhythmics.

Cell Structure and Function (BSC 6936)
This course provides a clear in-depth look into the discoveries made in the recent past and present especially focusing on the key concepts in the exciting areas of Eukaryotic Molecular Biology while studying a variety of biological processes at the cellular and molecular levels.

Computational Neuroscience I (ISC 6460)
Covers the basics of computational neurosciences and introduces many research topics of both biological and artificial neural networks.

Computational Neuroscience II (ISC 6461)
This course is organized as lecture and project. It is for graduate students who have taken Computaional Neuroscience I or equivalent. The topics will change every years so students can take it more than once.

Developmental Biology Seminar (BSC 6936)
Integration of cellular and molecular biology with research will involve seminars on various research projects, Critique of journal articles and seminar on specific signaling pathways.

Developmental Neurobiology (PSB 6515)
In-depth coverage of the principles and recent advances in the development of the brain and nervous system, including nerve cell migration, axon outgrowth, specificity, plasticity, neurotrophism, nerve cell death, and the influence of experience on the nervous system.

Environmental Physiology (BSC 6936)
This class examines how animals function and respond to their natural environments, with reflections on behavioral strategies, ecology, evolution, and physiology. The initial part of the course looks at general adaptations to specific challenges faced by animals in different environments, the second part of the class examines how animals adapt to specific environments (e.g. desert, polar).

Journal Club - Molecular Biology (BSC 6956)
A practical approach to learning how to discuss scientific literature in molecular biology in a journal club format.

Methods in Complex Systems (ISC 6450)
Classical statistical analysis and inference of systems and how those statistical methods analysis procedures differ for nonlinear complex systems. topics include fractals, chaos, neural networks, and self-organizing critical systems.

Molecular Basis of Disease and Therapy
This course will explore the molecular basis of selected viral pathogens, genetic diseases and cancer through a series of lectures from the instructor and presentation by faculty members in the College of Science, Biomedical Science, Scripps Florida and the private industry. Novel technologies aimed at the development of therapeutics will be discussed together with the activity of modern biotechnologies in drug development. Journal Reviews and group discussions will integrate the lectures. Students will be expected to attend lectures, participate in discussions, and give an oral presentation related to the topics discussed during the course.

Molecular Biology of Cardiovascular Systems & Cardiac disease (currently PCB 6930)
This course will introduce the principal aspects of cadiovascular responses to mechanical, hormonal and ischemic stress and examine the implications for future therapies of cell fate decisions including cell cycle processes and apoptosis.

Neuroscience 1 (PSB 6345)
In-depth coverage of the principles of neural science, including nerve cell biology, membrane biophysics, neurotransmission, and functional neuroanatomy.

Neuroscience 2 (PSB 6346)
Prerequisite: PSB 6345 or permission of instructor. In-depth coverage of the principles of neural science, including functional neuroanatomy, sensory processes, neural development and higher brain function such as learning and memory.

Principles of Neuroscience (PSB 6037)
A survey of principles of neuroscience as they relate to behavior. Topics include morphology and connectivity of neural cells, biological potentials, gross structure of the central and peripheral nervous system, and sensory, motor, and higher-order integrative functions.

Protein Misfolding and Disease (PCB 6933)
In this course we will discuss a range of diseases that result from misfolding in relation to their structural bases, molecular pathology, implications for normal folding, possible treatments and roles in non-Mendelian inheritance.

Reproductive Endocrinology (PCB 6804)
Study the anatomy, histology, biochemistry and physiology of the human reproductive system, with an emphasis in reproductive endocrinology. This course is taught in a case-base manner. A student seminar is required at the end of the course.

RNA Biology and Diseases (PCB 6525)
Course provides advanced-level training in molecular biology of RNA. Topics covered include principles of RNA structure, function, and metabolism; methodologies for studying RNA; diseases related to RNA deficiencies; and applications of RNA technologies in research and clinical development.

OTHERS
History of Experimental Biology (BSC 6162)
An overview of the development of the physiological sciences from Mesopotamia to the present day.

Seminar in Hypoxic Stress (BSC 6936)
In this class we will be looking at the effects of oxygen and hypoxia on living organisms, from the molecular level to populations and the environment. We begin with a review of oxygen-dependent physiology and the catastrophe of the absence of oxygen. Students then present papers in a journal club style format on their area of interest related to hypoxia. Guest lecturers will also present topics of interest in their field of speciality.

Integrative Biology Ph.D. annual research progress report

Research Advisor/Chair and student of the student's committee: Shall submit this form once a year **(starting from the end of the second academic year)** for each student you are supervising.

Annual deadline: *End of Fall semester* after the annual supervisory/dissertation committee meeting.

Project year:

Research advisor:

Committee Members:
1.

2.

3.

4.

5.

Student:

Date of the last committee meeting:

Fill in sections A-F as appropriate. Retain the header and type on the space provided under each section as appropriate. Enter N/A if no information is provided.

A. Research progress: Briefly describe the research activities conducted by the student during the project year. Include overall evaluations from the committee, and if any deficiencies noted and proposed recommendations by the committee to rectify with a specific time frame.

_____.

B-F: Include if applicable.

B. Presentations: List abstracts, posters presented during the project year. Include internal and external presentations/seminars.

_____.

C. Manuscripts: List manuscripts submitted/accepted or published during the project year. Give details on author citations/journals etc for in press/published manuscripts.

_____.

D. Grants: List any grant application (s) in which the student's work has been used as data. Give only the title of the grant/agency/PI information.
_____.

E. Patents: List any patent applications with dates (invention disclosure/provisional/full) filed based on the work by the student.
_____.

F. Others: Include anything else you feel necessary.

_____.

Chair of the committee:

Full name: _____

_____ _____
Signed by Name (signature in original) Date

Student: I read this progress report and agree to comply with the recommendations.

Full name: _____

_____ _____
Signed by Name (signature in original) Date

NOTE: THE SIGNATURE PAGE MUST CONTAIN A PART OF THE TEXT FROM THE PREVIOUS SECTIONS. SUBMISSION OF THIS FORM IS THE RESPONSIBILITY OF THE RESEARCH ADVISOR.

Mail original to Ms. Jennifer Govender, SC 136 – Boca Campus

Graduate Student Scholarships from the Department:

- **Boca Raton Orchid Society Endowed Scholarship:** Established in 1995 by the Boca Raton Orchid Society, this scholarship, which provides awards to botany majors, is based on academic ability.
- **Rosalyn E. Schonzeit Scholarship in Environmental Studies:** Established in 2000 by the late Sydney Altman in memory of his late wife, this scholarship is awarded to students pursuing a course of study in environmental studies, with a minimum 3.0 GPA, and demonstrated financial need.
- **Courtenay Graduate Scholarships in Conservation Biology:** Created by faculty, staff, and friends of Dr. Walter Courtenay, who retired from a 32-year teaching career in 1999, the scholarship is awarded to a graduate student in conservation biology based on academic merit.
- **Capt. Al Nathan Memorial Scholarship:** This scholarship is awarded annually to graduate students studying marine biology.
- **Vincent Saurino Fellowship for Graduate Students in Biological Science:** This fellowship was created in 2000 by Richard Huisking, in memory of Dr. Saurino, a founding faculty member in the Biological Sciences Department. It is to be used to annually award scholarship support to four outstanding graduate students who are pursuing academic and professional careers in Biological Sciences.
- **Dr. G. Alex and Carla Marsh Scholarship Fund:** Created in 2006 by the generosity of Dr. G. Alex and Mrs. Carla Marsh, this fund is used to award two scholarships annually; one to a student enrolled in Marine Biology and one to a student in the Ecology program.
- **Lutz Memorial Scholarship:** Established in memory of the late Dr. Peter Lutz, Eminent Scholar in Biology, this scholarship is awarded to two outstanding students pursuing a course of study in marine biology, with a minimum 3.0 GPA and demonstrated financial need.
- **National Save the Sea Turtle Foundation Scholarship:** This scholarship is awarded to promising graduate students pursuing research in marine biology, which contributes to sea turtle biology and conservation.

Graduate Student Feedback

1. What has been your experience thus far as a student in the Department of Biological Sciences?

a. This far my experience has been fine.

b. I enjoy the research that I am doing and my colleagues, but I feel that the university places too much emphasis on constantly changing paperwork and regulations. Since I have been here, many policies, including major ones, have changed on a semester-to-semester basis. The availability of relevant coursework is lacking. I would feel more connected to my program if the program was interested in what I am doing, rather than if I complete required paperwork on time.

c. My experience in the Biology department has included both undergraduate and graduate experience. Although nice, it would have been nice if there were a way to inform current students, regardless of educational level, of the events and programs that are available to them.

d. My experience has been positive, however quite frustrating at times because there is no clear explanation of many of the requirements for the Department of Biology and I often receive conflicting answers from people in the department.

e. I am a first semester Masters student at the Harbor Branch campus. Thus far, I have found that choosing classes has been difficult because very few are taught from or videoed to HBOI. Determining program requirements has also been extremely difficult. The Masters/Graduate Biology website contains only the bare minimum, with some links that fail to work. When seeking clarification, I have also found that many faculty or staff of the department will give conflicting answers.

f. I think the graduate program at FAU was the right choice for me. There is a lot of great research on diverse topics within the Biology Department. I have met some fantastic mentors and made great friends here.

g. I have had a really great experience as a student within the Department of Biological Sciences. I enjoy my classes, there are a lot of resources available to me, and I can get all my questions answered. Compared to my last Department of Biology, FAU's department is more organized and friendly.

h. Having just my completed my first master's thesis semester I would say my experience has been considerably smooth and educational.

i. Excellent, nothing negative stands out!

2. Are you progressing toward all of your academic targets in a timely fashion?

a. Eventually, yes. There was a snag next semester with a class being cancelled, but I will take it later.

b. Yes, I completed all my required coursework and proposed my dissertation research within my first two years. I am currently taking only research credits.

c. With the help of Michelle Cavallo and Rebecca Dixon I have been able to stay on track with all of my studies and my plans.

d. Yes, I am on track academically

e. So far yes, but it is only my first semester.

f. I feel that I am on track, however, I do feel that my efforts are doubled in trying to make everything work out because I am a student at the Harbor Branch Oceanographic Institute, and there are very few courses offered up on this campus. The commute to Boca Raton is long and takes a lot of time out of my busy schedule.

g. yes

h. Everything seems to be progressing well.

i. Yes, mostly

3. Who specifically has been helpful to you within the Department of Biological Sciences?

a. Geri Mayer, Michelle Cavallo, Cathy Trivigno, and Ken Dawson-Scully have been phenomenal.

b. It's difficult to say who has been helpful, since most of the administrative positions are temporary and many members have interim titles. I feel like most of the time, people and policies are changing so quickly so that no one can catch up, and when I have a question, no one can answer it. However, both my advisor and Michelle Cavallo have been extremely helpful and diligent in tracking down answers to our questions.

c. See above answer.

d. Mainly my advisor has been the biggest help

e. My adviser, Dr. Joshua Voss, has been the most helpful at answering my questions or finding someone who can.

f. Michelle Cavallo, Rebecca Dixon and Geri Mayer have been most helpful to me. My Adviser Dr. Shirley Pomponi, as well as Dr. Wyneken and Dr. Brooks have played a huge role in my graduate career as mentors.

g. Michelle Cavallo, Sheryl Van Der Heiden, Cristina De La Rosa

h. I have been very fortunate to have the help of Rebecca Dixon, Michelle Cavallo, Kailiang Jia, Geri Meyer, and Daniela Scheurle.

i. Michelle Cavallo and Cathy Trivigno along with my primary advisor of course

4. What are some good things that have happened to you since becoming an FAU student majoring in Biology?

a. I have learned an immense amount and gained valuable experience.

b. I have met many colleagues in my field, both at FAU and other institutions, that I feel will be helpful in my future career. I have been particularly lucky with funding sources, so I am able to conduct the research I am interested in on a timely schedule. I know other students are no so lucky in this respect, so I consider my experience relatively unique.

c. I have thankfully received several fellowships and scholarships that have been essential to continuing my education with less stress than it already comes with. This is all in thanks to the emails sent from Michelle.

d. I received an RA position

e. I received a position as a research assistant in my adviser's lab.

f. I discovered a new area of research interest; realized some subjects that I would like to further studies in to better improve my background knowledge; and I have become a lot better and organizing all of my activities and duties.

g. I have been working on my research in a field that I really enjoy.

h. Working as a TA and receiving aid in tuition has been amazing. Also, the assistance Dr. Jia has given me as a mentor has been unbelievably helpful.

i. Having more opportunities to present my research

5. What are some things/resources that you do not have that would be helpful to you?

a. A shuttle to the Jupiter campus would be lovely.

b. I wish there was an online resource that has updated information regarding program requirements and available courses.

c. Easier access to software for research/thesis writing.

d. Clear explanation of required classes, if any. Up to date class schedules when trying to register for class, there always seems to be issues with classes either not being offered or not being available when registration opens. I would also like to see a better use of the video conference capabilities when meetings are made mandatory at the Boca campus to broadcast them to other campuses.

e. A more informative website, with working links and information about program requirements.
More graduate classes or opportunities on the HBOI campus, not just Boca.

f. Better communication and transportation between the HBOI campus and Boca Raton. I think the university can do a better job and finding some way to make students up here, including myself, feel a part of the FAU community rather than isolated outsiders.

g. I would like to know about major events or speakers in chemistry, physics, or mathematics. Right now, I am not really sure where to find this information.

h. The main thing that seems lacking is available courses to fulfill my departmental requirements in the Biological Science category that are not Ecology or Neuroscience oriented.

i. Easier transportation between campuses and an on campus gym

6. What are some things that you would like to see happen within the Department of Biological Sciences?

a. I don’t have any suggestions yet.

b. Less constant change of policies and requirement, more stable administrative positions.

c. A biology newsletter.

d. I would like to see more conformity in the information I receive from different people within the department, as well as mandatory meetings and trainings either broadcast to other campuses or done so they provide more accurate information.

e. The mandatory annual Masters student meeting should be removed. It was uninformative, often providing contradictory information, and took much more time than necessary.
Also, I would like to see more classes broadcast to HBOI and other satellite campuses.

f. I really enjoy the events hosted by ABBS and GPSA. Perhaps more social events and science collaboration events within the Biology department for undergraduate and graduate students.

g. More integration with the different science departments.

h. I would like to see a clearer pathway for those who are interested in molecular biology that would be separate from the previously mentioned courses.

i. More student and faculty social meetings between campuses

7. Do you feel that when you have a problem that a Faculty or Staff member is accessible to talk to you within the department?

a. Absolutely.

b. “Yes, my advisor and Michelle Cavallo are always available to answer questions.”

c. Yes.

d. I feel they are accessible, however I often get conflicting answers.

e. Overall, no. When trying to find the appropriate person to ask questions of, I have found that I either receive contradictory responses or am told to contact other people who then reroute me to additional people or to the original person I tried to contact.

f. Always.

g. Yes, most definitely.

h. The faculty and staff have been accessible, available, and very gracious.

i. Yes

Appendix B. Data Tables.

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Table A. Annualized State Fundable Undergraduate FTE in/out of Biology or the College of Science.

Biological Sciences					**College Total**	**University Total**
		2011-12	**2011-12**	**2012-13**	**2012-13**	**2012-13**
Lower Division	Majors within the department	115.8	127.9	132.5	202.4	729.1
	Majors outside the department, but within the college	64.6	74	73.4	839.9	1,743.9
	Majors outside the college	232.2	253.3	271.7	1,606.2	4,111.2
	Total	412.7	455.3	477.5	**2,648.5**	**6,584.2**
Upper Division	FTE produced by students who are:					
	Majors within the department	320.2	308.3	296.6	785.7	5,103.4
	Majors outside the department, but within the college	27.3	30.3	38.2	268.5	2,343.8
	Majors outside the college	33.1	34.2	34	246.0	1,313.6
	Total	380.7	372.8	368.9	**1,300.2**	**8,750.8**

Table B. Undergraduate Average Class Size And Faculty/Student Ratio.

Undergraduate Classes		Biological Sciences			College Total	University Total
		2010-11	2011-12	2012-13	2012-13	2012-13
Type						
Lecture/ Seminar	# Sections	89	97	85	692	5,154
	# Enrolled	8,821	9,255	9,378	47,552	192,004
	Avg Section Enrollment	99.1	95.4	110.3	**68.7**	**37.3**
	# Faculty Taught	63	62	68	475	3,487
	% Faculty Taught	70.8	63.9	80	**68.6**	**67.7**
Lab	# Sections	273	310	316	633	931
	# Enrolled	5,487	5,889	6,223	12,456	18,859
	Avg Section Enrollment	20.1	19	19.7	**19.7**	**20.3**
	# Faculty Taught	45	52	62	345	502
	% Faculty Taught	16.5	16.8	19.6	**54.5**	**53.9**
Discussion	# Sections	6	54	58	125	258
	# Enrolled	132	1,272	1,354	3,989	7,208
	Avg Section Enrollment	22	23.6	23.3	**31.9**	**27.9**
	# Faculty Taught	0	54	58	78	211
	% Faculty Taught	0	100	100	**62.4**	**81.8**
Other Course Types	# Sections	134	144	132	322	1,380
	# Enrolled	422	441	435	974	8,897
	Avg Section Enrollment	3.1	3.1	3.3	**3.0**	**6.4**
	# Faculty Taught	118	129	119	304	1,073
	% Faculty Taught	88.1	89.6	90.2	94.4	77.8

Table C. Undergraduate Students Engaged In Scientific Research In The Department Of Biological Sciences - 2012-2013 (Including Summer 2012).

	Total	Underrepresented minorities*		Women	
	Number	Number	Percent	Number	Percent
Undergraduate researchers (100% enrolled at FAU)	224	106	47%	150	67%
Biology faculty mentors hosting undergraduate researchers	22	3	14%	7	32%

*Black, African American, Hispanic, Latino/a, American Indian, Alaska Native, and Native Pacific Islander.

Table D. Undergraduate Student Profile.

Undergraduate (Program CIP: 260101)		Biological Sciences		College Total	University Total
		2011-12	2012-13	2012-13	2012-13
American Indian/ Alaskan Native	Female	6	8	23	96
	Male	4	10	13	77
	Total	10	18	36	173
Asian or Pacific Islander	Female	148	143	247	776
	Male	79	85	145	664
	Total	227	228	392	1,440
Black (Not of Hispanic Origin)	Female	356	354	769	3,535
	Male	156	169	334	2,129
	Total	512	523	1,103	5,664
Hispanic	Female	359	414	952	3,922
	Male	205	228	435	2,855
	Total	564	642	1,387	6,777
White (Not of Hispanic Origin)	Female	674	657	1,576	7,431
	Male	423	427	956	6,217
	Total	1097	1084	2,532	13,648
Non-Resident Alien	Female	42	44	87	318
	Male	20	16	30	294
	Total	62	60	117	612
Not Reported	Female	8	15	33	130
	Male	6	12	17	79
	Total	14	27	50	209
Total	Female	1,593	1,635	3,687	16,208
	Male	893	947	1,930	12,315
	Total	2,486	2,582	5,617	28,523

Table E. Graduating Senior Surveys.

	2010-11	2011-12	2012-13	Average
Number of respondents	62	74	87	74
Number of graduates (bachelors)	275	317	297	296
Percent of graduates that responded	23%	23%	29%	25%
Percent pursuing graduate/professional education	72.6	77	70.1	73%
Percent planning to reside in South Florida	74.2	75.7	73.6	75%
Percent very satisfied/satisfied with preparation for graduate/professional school	77.4	72.9	73.5	75%
Percent that stated that FAU contributed a great deal to their ability to apply scientific knowledge and skills	62.9	62.2	66.7	64%

Table F: Outcomes Through Year 2 For Undergraduate Biology Majors Transferring From A Florida Public Community College (With Or Without An AA Degree).

Outcomes through year 2			Entering Year											
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total		#	111	102	121	172	180	209	231	207	223	299	327	366	393
		%	100	100	100	100	100	100	100	100	100	100	100	100	100
Graduate @ FAU		#	11	12	13	19	23	30	31	7	16	20	24	18	-
		%	9.9	11.8	10.7	11.0	12.8	14.4	13.4	3.4	7.2	6.7	7.3	4.9	-
Graduate @ other SUS Institution		#	1	1	-	1	-	-	1	1	-	1	-	-	-
		%	0.9	1.0	-	0.6	-	-	0.4	0.5	-	0.3	-	-	-
Persist		#	68	72	79	112	124	131	145	151	154	217	254	264	-
		%	61.3	70.6	65.3	65.1	68.9	62.7	62.8	72.9	69.1	72.6	77.7	72.1	-
Transfer to other SUS		#	9	4	5	3	3	6	12	7	10	9	9	9	-
		%	8.1	3.9	4.1	1.7	1.7	2.9	5.2	3.4	4.5	3.0	2.8	2.5	-
Leave		#	22	13	24	37	30	42	42	41	43	52	40	75	-
		%	19.8	12.7	19.8	21.5	16.7	20.1	18.2	19.8	19.3	17.4	12.2	20.5	-

Table G: Outcomes Through Year 4 For Undergraduate Biology Majors Transferring From A Florida Public Community College (With Or Without An AA Degree).

Outcomes through year 4		Entering Year												
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total	#	111	102	121	172	180	209	231	207	223	299	327	366	393
	%	100	100	100	100	100	100	100	100	100	100	100	100	100
Graduate @ FAU	#	53	48	51	73	84	93	94	83	91	126	-	-	-
	%	47.7	47.1	42.1	42.4	46.7	44.5	40.7	40.1	40.8	42.1	-	-	-
Graduate @ other SUS Institution	#	7	3	3	4	1	7	12	8	6	6	-	-	-
	%	6.3	2.9	2.5	2.3	0.6	3.3	5.2	3.9	2.7	2.0	-	-	-
Persist	#	15	15	24	31	34	39	42	44	39	58	-	-	-
	%	13.5	14.7	19.8	18.0	18.9	18.7	18.2	21.3	17.5	19.4	-	-	-
Transfer to other SUS	#	4	1	4	3	3	3	5	8	8	9	-	-	-
	%	3.6	1.0	3.3	1.7	1.7	1.4	2.2	3.9	3.6	3.0	-	-	-
Leave	#	32	35	39	61	58	67	78	64	79	100	-	-	-
	%	28.8	34.3	32.2	35.5	32.2	32.1	33.8	30.9	35.4	33.4	-	-	-

Table H: Outcomes Through Year 6 For FTIC Undergraduate Biology Majors.

Outcomes through year 6		Entering Year												
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total	#	240	235	266	351	369	302	331	388	432	416	503	625	560
	%	100	100	100	100	100	100	100	100	100	100	100	100	100.0
Graduate @ FAU	#	88	101	115	136	146	145	144	180	-	-	-	-	-
	%	36.7	43.0	43.2	38.7	39.6	48.0	43.5	46.4	-	-	-	-	-
Graduate @ other SUS Institution	#	12	13	14	15	21	19	11	17	-	-	-	-	-
	%	5.0	5.5	5.3	4.3	5.7	6.3	3.3	4.4	-	-	-	-	-
Persist	#	32	33	32	56	46	35	43	58	-	-	-	-	-
	%	13.3	14.0	12.0	16.0	12.5	11.6	13.0	14.9	-	-	-	-	-
Transfer to other SUS	#	8	4	9	14	7	7	8	7	-	-	-	-	-
	%	3.3	1.7	3.4	4.0	1.9	2.3	2.4	1.8	-	-	-	-	-
Leave	#	100	84	96	130	149	96	125	126	-	-	-	-	-
	%	41.7	35.7	36.1	37.0	40.4	31.8	37.8	32.5	-	-	-	-	-

Table I. Graduate Student Enrollment Information.

Annual Headcount (Program CIP: 260101)	Biological Sciences												College Total	University Total
	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2012-13	2012-13
Masters	76	78	94	83	88	77	60	52	67	64	72	66	228	4675
Doctoral			9	32	58	60	72	72	74	74	71	78	279	927

Table J. Annualized State Fundable Graduate FTE in/out of Biology or the College of Science.

Annualized State-Fundable FTE	Biological Sciences												College Total	University Total
	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2012-13	2012-13
Graduate Total	23	30.8	44.5	46.9	63.7	73.8	67.3	67.1	74.7	76.6	74.7	65	228.2	2,223.70

Annualized Graduate State-Fundable FTE Produced In/Out of Department/College		Biological Sciences												College Total	University Total
		2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2012-13	2012-13
FTE produced by students who are:															
Majors within the department		19.4	28.8	38.1	42.1	58.2	65.2	61.4	60.2	69.4	72.1	69.3	57.8	188.3	1730.7
Majors outside the department, but within the college		2.3	0.9	1.4	0.7	0.2	0.4	0.5	0.8	0.5	0.3	0.8	0.9	17	348.50
Majors outside the college		1.3	1.2	4.9	4.1	5.3	8.3	5.4	6.1	4.7	4.3	4.6	6.2	22.9	144.4
Total		**23**	**30.8**	**44.5**	**46.9**	**63.7**	**73.8**	**67.3**	**67.1**	**74.7**	**76.6**	**74.7**	**62**	**228.2**	**2,223.70**

Table K. Graduate Average Class Size And Faculty/Student Ratio.

		Biological Sciences												College Total	University Total
		2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2012-13	2012-13
Lecture/ Seminar	# Sections Offered	13	14	27	34	60	66	63	52	42	54	45	53	167	1,575
	# Enrolled	164	137	288	286	389	409	270	280	300	303	289	339	1,386	22,406
	Average Section Enrollment	**12.6**	**9.7**	**10.6**	**8.4**	**6.4**	**6.1**	**4.3**	**5.4**	**7.1**	**5.6**	**6.4**	**6.4**	**8.3**	**14.2**
	# Sections Faculty-Taught	10	12	20	26	50	55	57	48	42	50	41	49	158	1,318
	% Sections Faculty-Taught	**76.9**	**85.7**	**74.1**	**76.5**	**83.3**	**83.3**	**90.5**	**92.3**	**100**	**92.6**	**91.1**	**92.5**	**94.6**	**83.7**
Lab	# Sections Offered	1	1	2	2	2		1	1		2	1		1	42
	# Enrolled	13	12	15	13	15		4	2		13	5		20	465
	Average Section Enrollment	**13**	**12**	**7.5**	**6.5**	**7.5**		**4**	**2**		**6.5**	**5**		**20**	**11.1**
	# Sections Faculty-Taught	1		1	2			1	1		1	1		1	26
	% Sections Faculty-Taught	**100**		**50**	**100**			**100**	**100**		**50**	**100**		**100**	**61.9**
Other Course Types	# Sections Offered	11	28	84	180	206	238	241	277	277	313	301	332	756	1,951
	# Enrolled	124	179	207	250	287	322	343	391	443	450	457	428	1,080	4,840
	Average Section Enrollment	**11.2**	**6.3**	**2.4**	**1.3**	**1.3**	**1.3**	**1.4**	**1.4**	**1.6**	**1.4**	**1.5**	**1.3**	**1.4**	**2.5**
	# Sections Faculty-Taught	9	28	79	169	177	196	222	248	251	285	275	292	703	1,831
	% Sections Faculty-Taught	**81.8**	**100**	**94**	**93.9**	**85.9**	**82.4**	**92.1**	**89.5**	**90.6**	**91.1**	**91.4**	**88**	**93**	**93.8**

Table L. Graduate Student Profile.

		Biological Sciences												College	University Total
		2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2012-13	2012-13
American Indian/Alaskan Native	Female													2	11
	Male			1	0										8
	Total			1	0									2	19
Asian or Pacific Islander	Female	3	4	10	9	9	6	7	8	5	5	5	3	14	155
	Male	1	2	1	1	1	1	1	1	2	2	2	3	13	119
	Total	4	6	11	10	10	7	8	9	7	7	7	6	27	274
Black (Not of Hispanic Origin)	Female	3	5	6	4	1	1	1	2	2	2	2	3	10	624
	Male		1			2	1	1	2	2	3	2	2	20	265
	Total	3	6	6	4	3	2	2	4	4	5	4	5	30	889
Hispanic	Female	2	2	9	13	12	11	8	9	9	9	6	10	27	495
	Male	2	3	3		5	4	1	2	2	3	3	4	25	318
	Total	4	5	12	13	17	15	9	11	11	12	9	14	52	813
White (Not of Hispanic Origin)	Female	32	28	35	49	56	61	47	44	62	60	62	54	158	1,926
	Male	20	22	32	24	25	30	38	31	34	35	36	40	143	1,233
	Total	52	50	67	73	81	91	85	75	96	95	98	94	301	3,159
Non-Resident Alien	Female	11	10	10	9	22	10	14	15	14	14	18	17	38	177
	Male	2	1	2	6	13	12	14	10	9	5	6	6	53	200
	Total	13	11	12	15	35	22	28	25	23	19	24	23	91	377
Not Reported	Female											1	2	4	41
	Male											0			30
	Total											1	2	4	71
Total	Female	51	49	70	84	100	89	77	78	92	90	94	89	253	3,429
	Male	25	29	39	31	46	48	55	46	49	48	49	55	254	2,173
	Total	76	78	109	115	146	137	132	124	141	138	143	144	507	5,602

Table M. Masters And Doctorate Graduation Rates.

	Year Degree Granted													All
	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	
Degree Level														
Masters	28.0	22.0	30.0	25.0	23.0	29.0	34.0	16.0	18.0	18.0	22.0	32.0	38.0	**335.0**
Doctorate							4.0	11.0	9.0	6.0	9.0	15.0	11.0	**65.0**
All	28.0	22.0	30.0	25.0	23.0	29.0	38.0	27.0	27.0	24.0	31.0	47.0	49.0	**400.0**

Table N1. Faculty Profile: Instructional Faculty (Tenured, Tenure-Earning, & Non-Tenure-Earning).

Instructional Faculty (Tenured, tenure-earning, & non-tenure-earning)	Biological Sciences		College Total			University Total
	2010-11		2011-12	2012-13	2012-13	2012-13
American Indian/Alaskan Native	Male					1
	Total					1
Asian or Pacific Islander			0	0	1	1
	Female				7	28
	Male	5	5	5	15	78
	Total	5	5	5	23	107
Black (Not of Hispanic Origin)						1
	Female	1	1	1	1	30
	Male	2	2	2	3	18
	Total	3	3	3	4	49
Hispanic					1	1
	Female	1	1	1	3	34
	Male				4	23
	Total	1	1	1	8	58
White (Not of Hispanic Origin)		0		0	0	3
	Female	4	4	4	23	276
	Male	13	14	14	86	382
	Total	17	18	18	109	661
Total		0	0	0	2	6
	Female	6	6	6	34	368
	Male	20	21	21	108	502
	Total	26	27	27	144	876

Source: Instruction and Research File, IEA.

Instructional Faculty includes tenured, tenure-earning and non-tenure-earning faculty members who taught a course during the year.

Table N2. Faculty Profile: Instructional Faculty (Adjuncts).

Adjuncts		Biological Sciences			College Total	University Total
		2010-11	2011-12	2012-13	2012-13	2012-2013
American Indian/Alaskan Native	Female					1
	Total					1
Asian or Pacific Islander	Female		1		1	11
	Male		1	1	1	11
	Total		2	1	2	22
Black (Not of Hispanic Origin)	Female	1	1		3	33
	Male					14
	Total	1	1		3	47
Hispanic	Female		1			10
	Male					10
	Total		1			20
White (Not of Hispanic Origin)	Female	4	4	3	14	288
	Male	9	7	4	13	219
	Total	13	11	7	27	507
Total	Female	5	7	3	18	343
	Male	9	8	5	14	254
	Total	14	15	8	32	597

Source: Instruction and Research File. IEA.

Table O. Faculty Research: Review Of Department Dashboard Indicators In Part II.

				Biological Sciences			College Total	University Total
				2010-11	2011-12	2012-13	2012-13	2012-13
Departmental Research	Tenured & tenure-earning faculty	Professor, Assoc Professor, Asst Professor	Person-Years	7.6	5.9	5.8	20.0	92.7
			FTE	10.1	7.8	7.8	26.7	123.6
	Non-tenure-earning faculty	Instructors, Lecturers, Visiting Faculty	Person-Years	0.3	0.7	0.7	1.4	4.1
			FTE	0.3	0.9	1.0	1.8	5.5
	Other personn paid on faculty pay plan	--	Person-Years				1.6	15.9
			FTE				2.1	21.2
	Total		Person-Years	7.8	6.6	6.6	22.9	112.8
			FTE	10.5	8.7	8.7	30.6	150.4
Sponsored Research	Tenured & tenure-earning faculty	Professor, Assoc Professor, Asst Professor	Person-Years	2.1	1.7	1.1	6.4	24.9
			FTE	2.8	2.3	1.5	8.5	33.2
	Non-tenure-earning faculty	Instructors, Lecturers, Visiting Faculty	Person-Years	0.1	0.3	0.3	0.3	3.7
			FTE	0.2	0.4	0.4	0.4	4.9
	Other personn paid on faculty pay plan	--	Person-Years	0.3			7.3	38.2
			FTE	0.3			9.8	50.9
	Total		Person-Years	2.5	2.1	1.4	14.0	66.8
			FTE	3.3	2.8	1.9	18.7	89.0

Table P1. Absolute Numbers For Various Aspects Of Research In Biological Sciences.

		Biological Sciences			College Total	University Total
		2010-2111	2011-2012	2012-2013	2012-2013	2012-2013
1. Books (including monographs & compositions)	#	4	3	1	22	146
2. Other peer-reviewed publications	#	49	52	46	229	1,161
3. All other publications	#	7	13	0	31	501
4. Presentations at professional meetings or conferences	#	98	98	68	308	1,435
5. Productions/Performances/Exhibitions	#	0	0	0	36	377
6. Grant Proposals Submitted	#	34	33	52	109	385
Sponsored Research & Program Expenditures						
7. Organized Research	#	$1,666,854	$1,564,706	$1,314,970	$8,625,887	$15,603,749
8. Sponsored Instruction	#	$416,521	$436,174	$393,362	$1,242,409	$6,138,254
9. Other Sponsored Activities	#	$154,222	$60,326	$1,230	$620,037	$2,565,166

Table P2. The Same Aspects Of Research In Biological Sciences In Terms Of Per Faculty Member In The Department.

		Biological Sciences			College Total	University Total
		2010-2011	2011-2012	2012-2013	2012-2013	2012-2013
1. Books (including monographs & compositions) per faculty member		0.2	0.1	0.0	0.2	0.2
2. Other peer-review publications per faculty member		2.1	2.4	2.1	2.1	1.8
3. All other publications per faculty member		0.3	0.6	0.0	0.3	0.8
4. Presentations at professional meetings or conferences per faculty member		4.3	4.5	3.1	2.9	2.3
5. Productions/Performances/Exhibitions per faculty member		0.0	0.0	0.0	0.3	0.6
6. Grant proposals submitted per faculty member		1.5	1.5	2.4	1.0	0.6
Sponsored Research & Program Expenditures						
7. Organized research expenditures per faculty member		$72,472	$71,123	$59,771	$80,616	$24,534
8. Sponsored instruction expenditures per faculty member		$18,110	$19,826	$17,880	$11,611	$9,651
9. Other sponsored activity expenditures per faculty member		$6,705	$2,742	$56	$5,795	$4,033

Table Q. Service And Community Engagement, Review Of Part II Of The Department Dashboard Indicators.

	Biological Sciences				College Total	University Total
	2010-2011		2011-2012	2012-2013	2012-2013	2012-2013
1. Faculty memberships on department, college or university committees	#	74	82	77	273	2,348
2. Faculty memberships on community or professional committees	#	37	10	12	69	972
3. Faculty serving as editors or referees for professional publications	#	93	20	23	96	611

Appendix C. Abbreviated CVs from Current Faculty Members and Instructors.

Table of Contents

ABBREVIATED FACULTY CV
Rindy C. Anderson, Ph.D.

A. Professional Preparation

Ph.D.: December 2006 University of Miami, Biology
M.S.: University of San Diego, Marine Science
B.S.: Arizona State University, Zoology
Postdoctoral Preparation: Duke University, 2006-2012

B. Appointments

Assistant Professor, Florida Atlantic University, 2014
Research Scientist, Duke University, 2012-2014
Postdoctoral Research Associate, Duke University, 2007-2012
Ph.D. Candidate, University of Miami, Biology, 2003-2006
Instructor, Biology Laboratory Courses, University of Miami 2001, 2003
Research Biologist, Hubbs–Sea World Research Institute, 1999-2001

C. Selected Peer-Reviewed Publications (most recent five from the last 7 yrs)

Grace MK, **Anderson RC** (2014). No frequency shift in Carolina chickadee 'D' notes in response to traffic noise. *Behavioral Ecology and Sociobiology*, in press.

Lachlan RF, **Anderson RC,** Peters S, Searcy WA, Nowicki S. (2014). Typical versions of learned swamp sparrow songs are more effective signals than are less typical versions. *Proceedings of the Royal Society B* 281: 20140252

Anderson RC, Klofstad CA, Mayhew WJ, Venkatachalam M. (2014). Vocal fry may undermine the success of young women in the labor market. *PLoS One* 9(5) e97506

Anderson RC, Peters S, Nowicki, S (2014). Effects of early auditory experience on the development of local song preference in female swamp sparrows. *Behavioral Ecology and Sociobiology* 68(3) 437-447

Anderson RC, DuBois AL, Piech DK, Searcy WA, Nowicki S (2013). Receiver response to an aggressive visual signal, the wing-wave display, in swamp sparrows. *Behavioral Ecology and Sociobiology* 67(4) 593–600

D. Selected Other Publications or Products/Grants (most recent five from the last 7 yrs)

MacLean EL, Hare BA, Nunn CL, Addessi E, Amici F, **Anderson RC** et al. (58 authors total) (2014). The Evolution of Self Control. *Proceedings of the National Academy of Sciences*, doi: 10.1073/pnas.1323533111

Searcy WA, **Anderson RC**, Ballentine B, Nowicki S (2013). Limits to reliability in avian aggressive signals. *Behaviour* 150(5) 1129-1145

Anderson RC, Hughes M, Searcy WA, Nowicki S (2012). The receiver-dependent cost of soft song: a signal of aggressive intent in songbirds. *Animal Behaviour,* 83(6): 1443-1448

Maddison CJ, **Anderson RC**, Prior NH, Taves MD, Soma KK (2012). Soft song during aggressive interactions: seasonal changes and endocrine correlates in song sparrows. *Hormones and Behavior*, 62: 455–463

Klofstad CA, **Anderson RC**, Peters S (2012). Sounds like a winner: Voice pitch influences perception of leadership capacity in both men and women. *Proceedings of the Royal Society of London, Biological Sciences*, 279(1738): 2698-2704

E. Synergistic Activities

-Organized symposium for the 2014 Animal Behavior Society Meeting on the function and evolution of low-amplitude signals
-National Evolutionary Synthesis Center, Durham, NC. Member of the PhyloPsy Working Group (Nov 2009) (https://www.nescent.org/wg_phylopsy/Main_Page)
-Preparing Future Faculty Fellowship Program, Duke University, 2007-2008
-NSF ADVANCE Faculty Development Workshops, Rice University, 2007 and 2010

F. Collaborators and Other Affiliations

Melissa Hughes (College of Charleston), Robert Lachlan (Queen Mary University of London), Richard Mooney (Duke University), Jonathan Prather (University of Wyoming), William A. Searcy (University of Miami), Neeltje Boogert (McGill University), Kiran Soma (University of British Columbia), Kendra Sewall (Virginia Tech), Kimberly Rosvall (Indiana University), Elizabeth Derryberry (Tulane University).

Graduate and post-doctoral advisors
M.S. advisor: Ann Bowles (Hubbs-SeaWorld Research Institute and University of San Diego)
Ph.D. Advisor: William Searcy (University of Miami)
Post-doctoral advisor: Stephen Nowicki (Duke University)

G. Courses Taught

Topics in Behavioral Ecology (University of Miami), Introductory Biology Laboratory I and II (University of Miami), How Organisms Communicate (Duke University)

H. Community Engagement or Out-reach

-National Association of Science Writers Annual Meeting (Oct 2010), invited speaker for "Lunch with a Scientist"
-Served as a mentor for three 8th grade girls in the Durham NC Women and Math Program (2010)
-Research lecture at the North Carolina Museum of Natural Sciences, April 2011
-Numerous press interviews related to published research:

-NPR health blog related to my research on the human voice:
http://www.npr.org/blogs/health/2014/10/24/357584372/video-what-women-get-flak-for-when-they-talk

-Anderson RC et al (2014). Vocal fry may undermine the success of young women in the labor market. *PLoS One* 9(5) e97506 ***Press:*** **ScienceMag.org, Huffington Post, New York Magazine (online), The Atlantic (online), CBS News (online), Shape.com**

-Anderson RC, et al. (2013). Receiver response to an aggressive visual signal, the wing-wave display, in swamp sparrows. *Behavioral Ecology and Sociobiology* 67(4) 593–600 ***Press:*** **Discovery Channel's "Daily Planet," National Geographic (online), Popular Science (online)**

-Klofstad CA, **Anderson RC**, Peters S (2012). Sounds like a winner: Voice pitch influences perception of leadership capacity in both men and women. *Proceedings of the Royal Society of London, Biological Sciences*, 279(1738): 2698-2704 ***ress:*** **BBC, NPR, The Economist (online), Scientific American (online), ScienceDaily.com, U.S. News & World Report**

Abbreviated Curriculum Vitae
John D. Baldwin Ph.D.
Professor
Department of Biological Sciences
Charles E. Schmidt College of Science
Florida Atlantic University – Davie Campus
Davie West Bldg. Rm. 438
3200 College Ave, Davie, FL 33314
Phone: (954) 236-1151
Email: jbaldwin@fau.edu
Webpage: www.science.fau.edu/biology/faculty/baldwin

A. Professional Preparation

Post-Doctoral Researcher, 1997 – 1998, Dept. Fisheries and Aquatic Sciences, School Forest Resources and Conservation, University of Florida, Gainesville, Florida

Ph.D., Cell and Developmental Biology, 1997. Div. Biological Sciences, University of California, Davis

B.S., Zoology, 1988. Department of Zoology, University of Maryland, College Park

B. Appointments

2014 – Present	*Professor*, Department of Biological Sciences, Charles E. Schmidt College of Science, Florida Atlantic University
2014 – Present	*Associate Director*, Center for Environmental Studies, Charles E. Schmidt College of Science, Florida Atlantic University
2004 – 2014	*Associate Professor*, Department of Biological Sciences, Charles E. Schmidt College of Science, Florida Atlantic University
2011– 2012	*Interim-Director,* Environmental Sciences Program, Charles E. Schmidt College of Science, Florida Atlantic University
2009 – 2010	*Research Fellow*, (Sabbatical), South Florida Natural Resource Center, Everglades and Dry Tortugas National Park, NPS, DOI, Homestead, FL
1998 – 2004	*Assistant Professor*, Department of Biological Sciences, Charles E. Schmidt College of Science, Florida Atlantic University

C. Selected Peer-Reviewed Publications

Ogden, J.C., J.D. Baldwin, O. Bass, J. Browder, M. Cook, S. Davis, P. Fletcher, P. Fredrick, P.E. Frezza, R. Galvez, A. Hodgson, K. Meyer, L. Oberhofer, A. Paul, and J. Lorenz. 2014. Waterbirds as Indicators of Ecosystem Health in the Coastal Marine Habitats of Southern Florida: 1. Selection and Justification for a Suite of Indicator Species. *Ecological Indicators* 44, 128-147.

Ogden, J.C., J.D. Baldwin, O. Bass, J. Browder, M. Cook, S. Davis, P. Fletcher, P. Fredrick, P.E. Frezza, R. Galvez, A. Hodgson, K. Meyer, L. Oberhofer, A. Paul, and J. Lorenz. 2014. Waterbirds as Indicators of Ecosystem Health in the Coastal Marine Habitats of Southern Florida: 2. Conceptual Ecological Models. *Ecological Indicators* 44, 148-163.

Theisen, T. and J.D. Baldwin. 2012. Movements and depth/temperature distribution of the ectothermic Scombrid *Acanthocybium solandri* (wahoo) in the western North Atlantic. *Marine Biology* 159 (10) 2249-2258.

Baldwin, J.D., J.W. Bosley, L. Oberhofer, and O.L. Bass. 2012. Long-Term Changes, 1958–2010, In the Reproduction of Bald Eagles of Florida Bay, Southern Coastal Everglades. *Journal of Raptor Research* 46(4) 336-348.

Green. M.L., D.L. Herzing, and J.D. Baldwin. 2011. Reproductive success of male Atlantic spotted dolphins (*Stenella frontalis*) revealed by noninvasive genetic analysis of paternity. *Canadian Journal of Zoology* 89 (3) 239-253.

D. Selected Other Publications or Products/Grants

Hanson, M. and J.D. Baldwin. (*Submitted)*. Diets of Bald Eagles Breeding in the Subtropical Estuary of Florida Bay. *Journal of Field Ornithology*. 30pp.

Green, M.L., D.L. Herzing, and J.D. Baldwin. *(Submitted)*. Blurring the lines: Social organization influences fine-scale genetic structure in Atlantic spotted dolphins (*Stenella frontalis*) *Molecular Ecology.* 38pp.

Green. M.L., D.L. Herzing, and J.D. Baldwin. (*In Revision)*. Molecular Evidence of Promiscuity Among Female Atlantic Spotted Dolphins: Implications for Multi-male Mating Strategies. *Behavioral Ecology and Sociobiology.* 26pp.

Baldwin, J.D. 2011. Evaluation of Bald Eagle Population Dynamics and Foraging Ecology: Current and Historical Trends in Florida Bay and the Southern Estuaries of Everglades National Park. Final Report for Everglades and Dry Tortugas National Park, National Park Service. 63pp.

Theisen, T.C., B.W. Bowen, W. Lanier, and J.D. Baldwin. 2008. Lack of global population structure in the pelagic wahoo, *Acanthocybium solandri* (tuna family Scombridae). *Molecular Ecology* 17 (19) 4233-4247.

E. Synergistic Activities

Baldwin, J.D. Wildlife Species as Ecological Indicators for Everglades Restoration. Rural Sustainable Development International Congress - Savannas and Wetlands, Universidade Federal de Mato Grosso do Sul, Campo Grande, Mato Grosso do Sul, Brazil. April 1-5, 2012. (*Invited speaker*)

Denton, M., K. M. Hart, A. Oleinik, J.D. Baldwin. Diet and foraging ecology of mangrove diamondback terrapins (*Malaclemys terrapin rhizophorarum*) in Everglades National Park, FL. 33rd Annual Symposium on Sea Turtle Biology and Conservation, Baltimore, Maryland, USA. February 2-8, 2013.

Bosley, J.W., J.D. Baldwin, and E. Noonburg. Fitting an occupancy model to a declining population of bald eagle, *Haliaeetus leucocephalus*, breeding territories. 5th North American Ornithological Conference (NAOC-V) in Vancouver, British Columbia, Canada. August 14-18, 2012.

F. Collaborators and Other Affiliations

2010 – pres. Technical Science Rep., South Florida-Caribbean Cooperative Ecosystem Studies Unit 2007 – pres. Science Coordination Group, South Florida Ecosystem Restoration Federal Task Force

2000 – pres. Courtesy Assoc. Professor, Dept. Fisheries and Aquatic Sciences, Univ. of Florida

2009– 2010 Research Fellow, Dry Tortugas and Everglades National Park, NPS, Dept. of Interior

2007 – pres. Affiliate Faculty Appointment: Dept. of Geosciences, FAU

G. Courses Taught

Undergraduate Courses Taught

BCH 3033 Biochemistry I, BCH 3034 Biochemistry II, BCH 3103 Biochemistry Laboratory, BSC 3036 Genetics, BSC 4930 Ichthyology, OCB 4043 Marine Biology, OCB 4043L Marine Biology Field Studies, OCB 4633 Marine Ecology, OCB 4633L Marine Ecology Lab, ZOO 2203 Invertebrate Zoology, ZOO 2203L Invertebrate Zoology Lab, Directed Independent Studies

Graduate Courses Taught

ZOO 6456 Natural History of Fishes, ZOO 6456L Natural History of Fishes Lab, ZOO 6459 Seminar in Ichthyology, BSC 6936 Molecular Ecology 1

H. Community Engagement or Out-reach

2014 – pres. Board of Directors, South Plantation High School, Environmental Magnet Program

2007 – pres. Conservation and Research Advisory Board, The Florida Aquarium, Tampa Florida 2006 – pres. Math-Superstars Program Mentor, Broward County Public School System, Florida

ABBREVIATED FACULTY CV
Brian William Benscoter, Ph.D.

A. Professional Preparation

Southern Illinois University-Carbondale	Plant Biology	Ph.D., 2007
Villanova University	Biology	M.S., 2002
Villanova University	Biology	B.S., 2000

B. Appointments

2014-present	National Academies Education Fellow in the Life Sciences
2013-2014	Researcher of the Year (Asst. Professor), Florida Atlantic University
2014-present	Chair-Elect, Society of Wetland Scientists Peatland Section
2013-2014	Chair, Society of Wetland Scientists Biogeochemistry Section
2010-present	Assistant Professor of Plant Ecology, Florida Atlantic University
2008-2010	Post-Doctoral Associate, University of Guelph
2007-2008	Post-Doctoral Associate, Michigan State University
2003-2006	Science To Achieve Results (STAR) Fellow, US Environmental Protection Agency

C. Selected Peer-Reviewed Publications

Lauck, M and BW Benscoter. Non-destructive estimation of aboveground biomass in sawgrass communities of the Florida Everglades. Wetlands, *in press.*

Nungesser, M, C Saunders, C Coronado-Molina, J Obeysekera, J Johnson, C McVoy, BW Benscoter. Potential effects of climate change in the Florida Everglades. Environmental Management, *in press.*

Turetsky, MR, BW Benscoter, S Page, G Rein, G van der Werf, A Watts. Vulnerability of peatlands to fire and carbon loss. Nature-Geosciences (invited review), *in press.*

Meingast, KM, MJ Falkowski, ES Kane, LR Potvin, BW Benscoter, AMS Smith, LL Bourgeau-Chavez, and ME Miller. 2014. Spectral detection of near surface moisture content and water table position in northern peatland ecosystems. Remote Sensing of Environment, 152: 536-546.

Kettridge, N, DK Thompson, L Bombanato, MR Turetsky, BW Benscoter, JM Waddington. 2013 The ecohydrology of forested peatlands: simulating the effects of tree shading on moss evaporation and species composition. Journal of Geophysical Research-Biogeosciences, 118: 422-435.

D. Selected Other Publications or Products/Grants

US Department of Energy, Terrestrial Ecosystem Science 2012-2015. "Carbon dynamics of the Greater Everglades watershed and implications of climate change" ($845,554; PI: R Hinkle; Co-I: BW Benscoter ($570,915), X Comas, D Sumner, D DeAngelis) – *extension pending*

National Aeronautics and Space Administration (NASA), 2012-2015. "Fuel consumption and carbon cycling in northern peatland ecosystems: understanding vulnerability to burning, fuel consumption, and emissions via remote sensing of fuel moisture and radiative energy." ($815,133; PI: M Falkowski; Co-I: ES Kane, L Bourgeau-Chavez, N French, E Levin, ME Miller, R Kremens; Unfunded Collaborator: BW Benscoter, AMS Smith)

US Fish and Wildlife Service, 2012-2017. "Synergistic effects of invasive species (*Melaleuca quinquenervia*) and management practices on native plant community resilience in the Florida Everglades." ($45,000; PI: BW Benscoter)

US Geological Survey, 2011-2015. "Cooperative Agreement: Carbon Dynamics of the Greater Everglades" ($323,827; PI: L Berry; Co-I: BW Benscoter ($162,320), X Comas)

US Bureau of Land Management, Joint Fire Sciences Program, January 2012-2015. "Influence of fuel moisture and density on black carbon formation during combustion of boreal peat fuels" ($70,916; PI: BW Benscoter; Unfunded Co-I: ES Kane, M Falkowski)

E. Synergistic Activities

- Past-Chair, Society of Wetland Scientists, Biogeochemistry Section.
- Chair-Elect, Society of Wetland Scientists, Peatland Section
- Mentor, Society of Wetland Scientists, Undergraduate Diversity Program
- In the past 4 years, attendance at 17 technical workshops and 9 professional conferences, with over 28 presentations by members of my research lab.

F. Collaborators and Other Affiliations

Vanessa Bailey, Department of Energy
Ben Bond-Lamberty, Department of Energy
Laura Bourgeau-Chavez, Michigan Tech Research Institute
Rod Chimner, Michigan Tech University
Greg Corace, US Fish and Wildlife
William DeGroot, Canadian Forest Service
Mike Falkowski, Michigan Tech University
Michael Flannigan, University of Alberta & Canadian Forest Service
Nancy French, Michigan Tech Research Institute
Rebekah Gibble, US Fish and Wildlife
Evan Kane, Michigan Tech University
Eric Kasischke, University of Maryland
Robert Keane, US Forest Service
Paul Morris, McMaster University
Thomas Pipker, University of British Columbia
James Reardon, US Forest Service
Alistar Smith, US Forest Service
David Sumner, US Geological Survey
Tiffany Troxler, Florida International University
Merritt Turetsky, University of Guelph
Shawn Urbanski, US Forest Service
J. Michael Waddington, McMaster University
Jon Wallace, US Fish & Wildlife Service
B. Mike Wotton, University of Toronto & Canadian Forest Service

G. Courses Taught

Department of Biological Sciences, Florida Atlantic University

- BOT 5155 & 5155L Flora of South Florida & Lab, Spring 2011
- PCB 4355 Principles of Ecology, Spring 2012, Fall 2012, 2013, 2014
- BSC 6934 Plant Ecology & Lab, Spring 2013, 2014, 2015

H. Community Engagement or Out-reach

DAVID M. BINNINGER, PH.D.
ASSOCIATE PROFESSOR

A. PROFESSIONAL PREPARATION

Ph.D., Molecular Genetics, University of North Carolina, Chapel Hill, NC. December 1987. Dissertation: A transformation system for the filamentous basidiomycete, *Coprinus cinereus*.

M.S., Microbiology, University of South Florida, Tampa, FL. December 1981. Thesis: Coordinate regulation of polypeptide chain initiation and elongation in intact rabbit reticulocytes.

B.S., Biological Sciences, University of South Florida, Tampa, FL. June 1979.

B. APPOINTMENTS

2010 to Present	Director, Professional Masters Science Program – Business Biotechnology
2004 to 2007	Curriculum Director – partnership with the Workforce Alliance of Palm Beach. A grant for training in biotechnology. Funded by the Department of Labor under the President's High Growth Job Training Initiative.
2000 to Present	Associate Chair, Department of Biological Sciences, Florida Atlantic University, Boca Raton, FL
1999 to Present	Associate Professor (joint appointment), Department of Biomedical Sciences, Florida Atlantic University, Boca Raton, FL
1997 to Present	Member, Center for Molecular Biology and Biotechnology, Florida Atlantic University, Boca Raton, FL
1996 to Present	Associate Professor, Department of Biological Sciences, Florida Atlantic University, Boca Raton, FL
1990 - 1996	Assistant Professor, Department of Biological Sciences, Florida Atlantic University, Boca Raton, FL
1987 - 1990	Postdoctoral Research Fellow with the late Professor James Boyd, Genetics Department, University of California, Davis, CA.

C. Selected Peer-Reviewed Publications

M. Marchetti, L. Resnick, E. Gamliel, S. Kesaraju, H. Weissbach, and **D. Binninger** (2009) Sulindac Enhances the Killing of Cancer Cells Exposed to Oxidative Stress. PLoS One. 4(6): e5804. doi:10.1371/journal.pone.0005804

D. Brunell, M. Marchetti, E. Gamliel, D. Sagher, N. Brot, H. Weissbach, and **D. Binninger** (2009) Metabolism and Biological Activity of Sulindac and its Epimers FASEB J. **23:** 527.2 (abstract)

L. Resnick, H. Rabinovitz, **D. M. Binninger**, M. Marchetti, H. Weissbach (2009) Topical Sulindac Combined with Hydrogen Peroxide in the Treatment of Actinic Keratoses: Rationale and Clinical Trial. J. Drugs Dermatol. **8:** 29-32

D. Selected Other Publications/Products

Binninger, D. Role of oxidative damage to protein in aging, Institute on Aging, National Institutes of Health (2R15AG022556-02A1) $175,275, August 1, 2008 – December 31, 2011.

Binninger, D. Role of oxidative stress on aging and age-related neurodegenerative diseases Faculty Research seed Grant Program. Division of Research, Florida Atlantic University. $5,000. January 1, 2012 – December 31, 2013

E. Synergistic Activities

F. Collaborators and Other Affiliations

G. Courses Taught

Genetics	PCB 3063
Biotechnology Laboratory 1	BSC 4403L
Biotechnology Laboratory 2	BSC 4448L
CMBB Research Seminar	BSC 4905 and BSC 6905
Biotechnology for Bioengineers	BSC 6936 (special topics)

H. Community Engagement or Out-reach

Science Olympiad – an annual science competition for middle school and high school students in south Florida. I have been responsible for the competition in the areas of microbiology, cell biology and genetics. This year (2014) was my third or fourth time participating in this academic event.

Curriculum Vitae (November 2014) – RANDY BROOKS, PhD

A. Professional Preparation

Southwestern College, Winfield, Kansas	B.S. 1979	Biology
Florida State University, Tallahassee, Florida	M.S. 1981	Marine Biology
Florida State University, Tallahassee, Florida	PhD 1984	Marine Biology

B. Appointments

1984-1987	Assistant Professor Biology, Auburn University at Montomgery, Alabama
1987-1991	Assistant Professor of Biology, Florida Atlantic University
1991-1996	Associate Professor of Biology, Florida Atlantic University
1992-2000t	Adjunct Professor Biology, Broward County Community College
1993-1995	Visiting Researcher, Duke University Marine Laboratory, NC
1996-present	Professor of Biology, Florida Atlantic University

C. Research Interests

My research emphasis has been in the area of behavioral/physiological ecology of marine organisms, with a particular interest in symbiotic associations. These associations represent tremendous potential in demonstrating alternatives to competition as major selective agents. The significance of coevolutionary adaptations by associated organisms is just recently being acknowledged as a major evolutionary force (e.g., endosymbiotic hypothesis for development of eukaryotes). Specifically, I have usually studied associations involving organisms that live with cnidarians, including dinoflagellates, fishes, hermit crabs, and shrimp. Recently, I have also been involved in the long-term monitoring of coral reef conditions using video transects. Some recent projects involving graduate students involve: 1) temperature-induced bleaching response of zooxanthellae living in cnidarians; 2) behavioral interactions among echinoderms and symbiotic crabs; 3) predator/prey interactions within the sargassum community. My research has been extramurally funded.

D. Select Publications

A.M. McCammon and W. R. Brooks. Protection of host anemones by snapping shrimps: A case for symbiotic mutualism? *Symbiosis*. 2014, 63(2): 71-78 (DOI: 10.1007/s13199-014-0289-8)

W.R. Brooks. Behavioral, Physiological and Ecological Effects of Organisms in symbiotic Associations. In *Symbiosis: Evolution, Biology and Ecological Effects*. Eds. A.F. Camisao & C.C. Pedroso. 2012, Ch. 6, pp. 143-158.

M.A. Salazar and W.R. Brooks. Morphology, Distribution and Comparative Functional Morphology of Setae on the Carapace of the Florida Speck Claw Decorator Crab Microphrys bicornutus (Decapoda, Brachyura). *J Marine Sci Res Dev*., 2012. 2:109. doi:10.4172/2155-9910.1000109

W.R. Brooks. The Importance of Symbioses in Biological Systems. *J Marine Sci Res Dev*., 2012. 2:e108. doi:10.4172/2155-9910.1000e108

L.J. Ambrosio and W.R. Brooks. Recognition and use of ascidian hosts, and mate acquisition by the symbiotic pea crab *Tunicotheres moseri* (Rathbun, 1918): the role of chemical, visual and tactile cues. *Symbiosis*, 2011, 53, 53-61.

C.F Jobe, and W.R. Brooks Habitat Selection and Host Location by Symbiotic Shrimps Associated with *Sargassum* Communities: The Role of Chemical and Visual Cues, *Symbiosis,* 2009, 49, 77-85,

W.R. Brooks, K.A. Hutchinson, and M.G. Tolbert. Pelagic Sargassum mediates predation among symbiotic fishes and shrimps. Gulf of Mexico Sci., 2007, 2: 144-152.

E. Books/Study Guide Publications

Barcharts: Biology Terminology – 2013; Science Terminology – 2013; Molecular Biology – 2012; Zoology – 1997; Biology- 2003, 2012; Marine Biology – 2000; Botany – 2001; Physiology – 2003; Biology 2 – 2004; Ecology – 2005; Becoming a Doctor – 2006; Genetics – 2007; Biology Booklet – 2006, Bio Lab Basics, 2008; Environmental Science, 2010.

Biodiversity: The Diversity of Life, Pearson Custom Publishing, 2000, 2005.

Biological Principles: The Way Life Works, Pearson Custom Publishing, 2000, 2005.

G. Select Grants

2001-02	National Science Foundation, $130,000 project entitled, "Exploring IDEAS: An Integrated Design Enhancing Academic Success in Science, Reading and Mathematics" (with N. Romance, D. Lowell, J. Haky and D. Ploger).
2002-03	National Science Foundation, $74,999 project entitled, "Success by Design: Building Faculty Capacity to Improve Curriculum and Instruction" (with D. Lowell, J. Haky, and R. Jordan).
1997-04	National Oceanic & Atmospheric Administration, $26,000 per-year project entitled, "Coral Reef Monitoring off the Southeastern Florida Coast: Establishing Techniques and Baseline Data for Both Video and Fixed-Transect Monitoring."

H. Courses Taught

Auburn University at Montgomery, 1984-1987,
- Introduction to Marine Biology
- Human Anatomy & Physiology
- Introductory Biology
- Invertebrate Zoology

Florida Atlantic University, 1987-present
- Principles of Ecology
- Biodiversity
- Biological Principles
- Honors General Biology I & II
- Comparative Vertebrate Anatomy
- Coevolution
- Symbiosis
- Marine Biology
- Anatomy & Physiology

Broward Community College, 1992-1998
- Introductory Biology
- Anatomy & Physiology

ABBREVIATED FACULTY CV
Joseph P. Caruso, Ph.D.

A. Professional Preparation
June 2014: Small World Initiative (SWI) for Antibiotic Discovery Training Workshop for Partner Instructors, Yale University Medical School.
May 2014: attended annual meetings of American Society for Microbiology (ASM) and ASM Conference of Undergraduate Educators, Boston.

B. Appointments
August 2014: Reappointed to Editorial Board for *Journal of Microbiology & Biology Education.*
June 2014: Promoted to Senior Instructor.
May 2014: Appointed Small World Initiative Partner Instructor and one of 14 Faculty worldwide selected to attend onsite training in Antibiotic Discovery at Yale University Medical School.

C. Publications & Presentations (=undergraduate author)**
Caruso JP. 2014a. Scientific teaching at heavily minority-serving universities, part 1: converting a general microbiology course from lectures to multiple active learning methods improved student performance in one semester; ready for *J Res Science Teaching*.
Caruso JP. 2014b. Scientific teaching at heavily minority-serving universities, part 2: converting a medical bacteriology course from lectures to multiple active learning methods significantly improved student performance in one semester; ready for *J Res Science Teaching*.
Caruso JP. 2014c. Calibrated peer review use improved low-achieving student performance on the california critical thinking skills test post-test; in revision after initial submission to *J Micro & Biol Education.*
Huffman J,** Frazier E, Caruso JP. 2014d. Identification and comparison of intestinal parasites found within *Gopherus polyphemus* at two differing Southeastern Florida habitats. Poster at FAU's College of Science Research Day (1st place in Undergraduate category) and FAU Undergraduate Research Day (1st place, Marine/Environmtl. Sci.).
Elhassani D,** Caruso JP, Frazier E. 2014e. Comparative Survey of Hemoparasites at the Florida Atlantic University's Gopher Tortoise Population. Poster at FAU's College of Science Research Day and FAU's Undergraduate Research Day (2nd place, Marine/Environmtl. Sci.).

D. Selected Other Publications or Products/Grants (=undergraduate author)**
Caruso JP, Pavlovic MD, Zopo AR. 2014f. Rapid, effective blood glucose control in a type 2 diabetes patient for over ten years with a low-glycemic, high-fiber diet with added cinnamon. Manuscript ready for submission.
Caruso JP, Pavlovic MD, Lloyd BN,** Barahona LJ,** Milton SL, Kats AM, Hartmann JX. 2014g. Evidence for free immunoglobulin light and heavy chains in the blood of physiologically normal *Trachemys scripta*. Manuscript in preparation.
Caruso JP, Israel N. 2014h. The Small World Initiative Antibiotic Discovery for FAU Intro. Biology non-majors; developed and co-taught authentic research-based lab course (ongoing)
Caruso JP, Marshall P, Binninger DM. 2014i. Citizen science for the 21st century ..., Submitted to NSF IUSE, February for $1.2 million; in revision.
Caruso JP, Marshall P, Binninger DM. 2013. Metagenomics for the masses ..., Submitted as NIH R01, November for $890,000; in revision.

E. Synergistic Activities

FAU Administrator, Calibrated Peer Review (since 2011)
FAU Administrator, California Critical Thinking Skills Test (since 2011)
Member, Dept. of Biol. Sciences Assessment & Curriculum Committee
Committee member, one PhD student, Ms. Joy Young (Colin Hughes, defending 19 November);
Committee member, two MS candidates: R. Clifford Blair (Kate Detwiler), Ryan Ebanks (Evelyn Frazier), with a third in the near future (Xing-Hai Zhang)

F. Collaborators and Other Affiliations

Dr. Evelyn Frazier, Dept. of Biol. Sciences, Defining external and endoparasite dynamics in gopher tortoise populations in South Florida; AND Determining the incidence of trichinosis and sarcocystosis in feral pigs in FL.
Dr. Sarah Milton, Dept. of Biol. Sciences, Defining parameters of formazan reduction-based phagocytosis assays in two sea turtle species; AND Diagnosing/describing parasites and viruses in sea turtle blood.
Dr. David Binninger, Dept. of Biol. Sciences, Metagenomics of human skin-associated microbes.
Dr. James Hartmann, Dept. of Biol. Sciences, Immunoglobulins and immune responses in turtles.
Dr. Kate Detwiler, FAU Dept of Anthropology, Intestinal parasites of *Cercopithecus ascanius, C. mitis* and a recently emerged hybrid population in Gombe' National Park, Tanzania; AND Intestinal parasites of *Cercopithecus lomamiensis*, a recently-described guenon species.
2014 Partner Instructor for The Small World Initiative: Crowdsourcing Antibiotic Discovery

G. Courses Taught

General Microbiology, Medical Bacteriology, Microbiology for the Health Services, Inquiry-based Microbiology Lab, Honors Immunology, Life Science Lecture, Molecular Genetics, Genetics, the Small World Initiative Antibiotic Discovery for nonmajors (Life Science Lab)

H. Community Engagement/Outreach

Ad Hoc Reviewer, Tropical Disease and Travel Medicine, Journal of the Canadian Medical Asssociation (recently reviewed paper on Ebola isolation protocols).
Caruso JP, Marshall P, Binninger DM. 2014. Citizen science for the 21st century ..., Grant to NSF for $1.2 million to improve high school STEM Education in FL and AZ; in revision.
Caruso JP, Marshall P, Binninger DM. 2013. Metagenomics for the masses ..., NIH R01 Grant for $890,000 to improve high school and undergraduate STEM Education in FL and AZ; in revision.
Ongoing citizen science projects on antibiotic discovery and the human skin microbiome.

Abbreviated Curriculum Vitae

Brenda J. Claiborne, Ph.D.
Professor and Program Director, Jupiter Neuroscience
Florida Atlantic University
5353 Parkside Drive, Building 19, #108
Jupiter, FL 33458
Phone: 561-400-3184; Email: brenda.claiborne@fau.edu

A. Professional Preparation

1966 - 1968	Undergraduate, University of California, Davis
1970	Bachelor of Arts, Zoology, University of California, Berkeley
1975	Master of Science, Biology, University of Oregon
1981	Doctor of Philosophy, Biology, University of California, San Diego

B. Academic Appointments

1981 - 1985	Post-doctoral Fellow and Research Associate Mentor: Dr. W. Maxwell Cowan (deceased) Developmental Neurobiology The Salk Institute for Biological Studies, La Jolla, California
1986 - 1990	Assistant Professor, Division of Life Sciences, University of Texas at San Antonio
1990 - 1997	Associate Professor, Div. of Life Sciences, University of Texas at San Antonio
1997 - 2007	Professor, Department of Biology, University of Texas at San Antonio
2007 - 2011	Professor, Department of Biology, University of New Mexico
2007 - 2011	Professor, Secondary Appointment, Department of Neurosciences School of Medicine, University of New Mexico
2011 - date	Professor, Department of Biological Sciences, Florida Atlantic University Professor, Secondary Appointment, Department of Biomedical Sciences, School of Medicine, Florida Atlantic University

Administrative Appointments

1992 - 1993	Interim Associate Vice President for Graduate Studies and Research, University of Texas at San Antonio
1993 - 1997	Dean of Graduate Studies and Associate Vice President for Research (title changed in 1996 from Associate Vice President for Graduate Studies and Research), University of Texas at San Antonio
2004 - 2007	Founding Director, UTSA Institute for Aging Research, University of Texas at San Antonio
2007 - 2011	Dean, College of Arts and Sciences, University of New Mexico
2011 - 2013	Provost and Chief Academic Officer, Florida Atlantic University
2011 – date	Program Director, Jupiter Neuroscience

C. Selected Peer-Reviewed Publications and Book Chapter (last 7 years; served as full-time administrator from 2007 - 2014)

Cunningham, R.L., B.J. Claiborne, and M.Y. McGinnis (2007) Pubertal exposure to anabolic androgenic steroids increases spine densities on neurons in the limbic system of male rats. *Neuroscience*, 150: 609-615.

Rahimi, O., and B.J. Claiborne (2007) Morphological development and maturation of granule neuron dendrites in the rat dentate gyrus. *Progress in Brain Research*, 163: 167-181.

Jacobs, G., Claiborne, B., and K. Harris (2009) Reconstruction of neuronal morphology. In *Computational Modeling Methods for Neuroscientists* (E. De Schutter, ed.), MIT Press, Cambridge, MA. pp. 187-210.

D. Selected Other Publications and Research Funding (last 7 years)

Gross, A., M. Schmidt, J. Bergdorf, R. Kroes, J. Moskal, and B.J. Claiborne, B. (2008) Lateralized gene expression patterns in the hippocampal formation of embryonic rats. *Society for Neuroscience Abstracts*, #820.16

Ybarra, N., E.J. Barea-Rodriguez, and B.J. Claiborne. (2009) Effects of Morris water maze training and testing on CA1 pyramidal neurons in GFP-expressing mice throughout senescence. *Society for Neuroscience Abstracts*, #783.10.

Barea-Rodriguez, E.J., N. Ybarra, and B.J. Claiborne (2009) Age-related cognitive impairments and morphological correlates in CA1 pyramidal neurons in GFP-expressing mice. *Society for Neuroscience Abstracts*, #783.11.

Gross, A.L., M. Schmidt, J.S. Burgdorf, R.A. Kroes, J.R. Moskal, and B.J. Claiborne (2010) Genes related to gap junction signaling are differentially expressed at embryonic day 18 in the rat hippocampal formation. *Society for Neuroscience Abstracts*, #336.1.

Claiborne, B.J., A.L. Gross, M. Schmidt, J.S. Burgdorf, R.A. Kroes, and J.R. Moskal (2010) N-methyl-D-aspartate receptor-mediated synaptic activity affects hippocampal formation gene expression patterns during early postnatal development. *Society for Neuroscience Abstracts*, #336.2

Research Funding: National Science Foundation (PI) *Development of lateralized gene expression patterns in the rodent brain* $173,387 total costs (5/1/07 to 4/30/09; Unfunded extension to 3/31/10)

E. Synergistic Activities (selected; last 7 years)

Doctoral Dissertation Supervisor:

Ybarra, N. (2009) The effects of aging on neuronal morphology and on learning and memory in male mice. Doctoral Dissertation, University of Texas at San Antonio, San Antonio, TX.

Gross, A. (2011) Development of lateralization in the rat hippocampal formation. Doctoral Dissertation, University of New Mexico, Albuquerque, NM.

Professional Service

2008	Special Review Committee, National Institutes of Health
2004 – 2009	Finance Committee, Society for Neuroscience
2005 – 2007	Board of Directors, Biomedical Research Foundation of South Texas
2011 – 2014	Treasurer-elect, Treasurer and Past Treasurer (elected), Society for Neuroscience
2011 – 2014	Council, Society for Neuroscience
2012 – 2013	Chair, Finance Committee, Society for Neuroscience
2011 – 2014	Investment Committee, Society for Neuroscience
2012 – 2013	Publications Committee, Society for Neuroscience
2014	Audit Committee, Society for Neuroscience

F. Collaborators and Other Affiliations

2004 – date: Research collaborator, Dr. Joe Moskal, Northwestern University, Evanston, IL

G. Courses Taught (last 7 years)

2007 – 2011: Department of Biology, University of New Mexico

Developmental Neurobiology Seminar, BIOL 402/502

Undergraduate Problems, BIOL 499; Senior Honors Thesis, BIOL 400; Research Problems, BIOL 551; Disseration, BIOL 699

2014 – date: Department of Biological Sciences, Florida Atlantic University

Honors Essentials of Human Anatomy and Physiology, BSC 2084

Human Neuroanatomy, BSC 4930/Honors Human Neuroanatomy, BSC 4930

Human Neuroanatomy BSC 6936

Jupiter Neuroscience Journal Club, BSC 6905

H. Community Engagement at FAU

2014 – date Board of Directors, Angel Forum of South Florida

ABBREVIATED FACULTY CV
KEN DAWSON-SCULLY

A. Professional Preparation

Post-Doctoral Fellow University of Toronto (UTM), Mississauga, Ontario Completed 2008

Ph.D.	**University of Toronto** Department of Physiology	**Completed 2003**
M.Sc.	**Queen's University** Department of Biology	**Completed 1998**
B.Sc. (Hon.)	**Queen's University** Department of Biology	**Completed 1996**

B. Appointments

2014-present
Associate Professor, tenured
Florida Atlantic University
Department of Biological Sciences
Jupiter, FL 33458 USA

2008-2014
Assistant Professor, tenure track
Florida Atlantic University
Department of Biological Sciences
Jupiter, FL 33458 USA

C. Selected Peer-Reviewed Publications

(most recent five from the last 7 years)

1. Wang R, Palavicini JP, Wang H, Maiti P, Bianchi E, Xu S, Lloyd BN, Dawson-Scully K, Kang DE, Lakshmana MK, 2014 RanBP9 Overexpression Accelerates Loss of Dendritic Spines in a Mouse Model of Alzheimer's Disease. *Neurobiol Dis*. 2014 Sep;69:169-79.
Impact Factor (2010) 5.560

2.. Palavicini JP, Lloyd BN, Hayes CD, Bianchi EB, Kang DE, Dawson-Scully K, Lakshmana MK, 2013 RanBP9 plays a critical role in neonatal brain development in mice. *PLoS ONE* 8(6), e66908.
Impact Factor (2010) 4.411

3. Milton SL, Dawson-Scully K, 2013 (Peer Reviewed Review). Alleviating brain stress: what alternative animal models have revealed about therapeutic targets for hypoxia and anoxia. 8 (3), 287-301, Future Neurology

4. Caplan, SL, Milton, SL., Dawson-Scully K, 2013. cGMP-dependent protein kinase G (PKG) activity controls synaptic transmission tolerance during acute oxidative stress 109(3):649-58, J. Neurophys.
Impact Factor (2010) 3.1

5. Ayyanathan, K, Kesaraju, S, Dawson-Scully, K, and Weissbach, H, 2012. Combination of Sulindac and Dichloroacetate Kills Cancer Cells via Oxidative Damage. PLoS ONE 7(7): e39949.
Times Cited: 3; Impact Factor (2010) 4.411

D. Selected Other Publications or Products/Grants

(most recent five from the last 7 years)

Research Grants Received

Current:

Eco Neurologics Inc., Neuroprotection via the PKG Pathway (**2013-2018**)
$353,000

E. Synergistic Activities

Editorships and Editorial Boards

Review Editor: Frontiers in Genomic Physiology, 2012-2013

Journals

Genes, Brain and Behaviour
Integrative and Comparative Biology,
Journal of Comparative Physiology A
Journal of Insect Behavior
Journal of Neurogenetics
Journal of Neurophysiology
Journal of Neuroscience
Journal of Visual Experimentation
Neuroscience
PLoS ONE
Reproductive Toxicology

Agencies

Natural Science and Engineering Research Council of Canada **NSERC**, 2014
National Aeronautics and Space Administration **NASA**, 2013, 2014
Swiss National Science Foundation **SNSF**, 2012
Canadian Foundation for Innovation **CFI**, 2010
National Science Foundation **NSF**, 2008, 2009

F. Collaborators and Other Affiliations

2013-present	Affiliate Assistant Professor, Department of Chemistry and Biochemistry, FAU, Boca Raton, FL
2012-present	Visiting Investigator, The Scripps Research Institute, Dept. of Metabolism and Aging, Jupiter FL
2010-present	Affiliate Assistant Professor, Biomedical Sciences, College of Medicine, FAU, Boca Raton, FL

G. Courses Taught

BSC 6936: Advanced Neurophysiology, Spring 2012, 2013 (co-Instructor)
PSB 6345: Neuroscience 1, Fall 2010, Fall 2011, Fall 2012, Fall 2013 (co-Instructor)
PCB 4843C/BSC 6936: Practical Cell Neuroscience, Spring 2010, 2011, 2012, 2013, 2014 (Instructor)
BSC 6905: Neuroscience Journal Club, Summer 2010, Summer 2011 (co-Instructor)
BSC 6905: Neuroscience Seminar, Fall 2009, Fall 2010, Spring 2011 (co-Instructor)
BSC 4917/4918 Honors Research/Thesis Program: Spring 2009, Fall 2009, Spring 2010, Fall 2010, Spring 2011, Fall 2011 (co-Instructor)
BSC 4930/6936: Cellular Neuroscience and Disease, Fall 2008, Fall 2009 (co-Instructor)

H. Community Engagement or Out-reach

Community/Guest Non-Research Lectures

2013	Waterford Community Center, Jupiter, FL
2013	Academic Leadership Symposium, Scripps Research Institute, FL
2012	Choosing Academia over Industry, Scripps Research Institute, FL
2011	Protecting the effects of Stroke through the use of the fruit fly, Boca Raton Rotary Club.
2011	Protecting the effects of Stroke through the use of the fruit fly, The Boca Thinkers Club, Boca Raton FL.
2008-2012	Introduction to research in the Dawson-Scully lab, Biomedical Freshmen, FAU.
2008-2012	Introduction to research in the Dawson-Scully lab, Premedical Students, FAU.
2010	CMBB last minute class filler: Anoxia research and Drosophila, FAU.
2010	Cellular Neuroscience and Disease: 1 week of basic neurophysiology lectures, FAU.

Abbreviated Curriculum Vitae
Donna Jeanne Devlin
Florida Atlantic University
(772) 242-2206
ddevlin@fau.edu

A. Professional Preparation:

Ph.D.	2004	Biology. University of Louisiana at Lafayette, Lafayette, LA
B.S.	1993	Geology. University of South Florida, Tampa, FL

B. Appointments:

April 2005-Present. Research Associate Professor, Department of Biological Sciences, FAU

July 1996 – March 2005. Visiting Scientist conducting PhD research at the National Wetlands Research Center, Lafayette, LA

Jan. 1990 – 1995. Conservation Program Coordinator, Florida Office, Center for Marine Conservation, St. Petersburg, FL

1987-1990. Artificial Reef Program Coordinator. Collier County Natural Resources Management Department, Naples, FL

1984-1986. Associate Scientist - polychaete ecology and systematics, Mote Marine Laboratory, Sarasota, FL

C. Selected Peer-Reviewed Publications:

Ilka C. Feller, Emily M. Dangremond, Donna J. Devlin, and Catherine E. Lovelock, C. Edward Proffitt, and Wilfrid Rodriguez.Nutrient Enrichment Intensifies Hurricane Damage and Prolongs Recovery in Mangrove Ecosystems in the Indian River Lagooon. Submitted Ecology.

John Paul Kennedy, Maria W. Pil, C. Edward Proffitt, Walter A. Boeger, Alice M. Stanford and Donna J. Devlin.Postglacial Expansion of the red mangrove, *Rhizophora mangle* L., in the Caribbean Sea and Florida. In internal review.

Coldren G., C.E. Proffitt, D. J. Devlin Species Diversity And Life Stage Lead To Deviations From Predictions Of The Stress Gradient Hypothesis In A Mixed Mangrove - Salt Marsh System. In internal Review

Lin Y., U. Berger, D.J. Devlin, C. E. Proffitt, J. Bodart, and I. C. Feller.2013. Identity Recognition And Developmental Plasticity In Red Mangrove Saplings: Implications for Plant Cooperation. Submitted New Phytologist

KL McKee,, Beth A Middleton, CE Proffitt and DJ Devlin. 2009. Perspectives on mosquito impoundments in eastern Florida, USA: Reply to Rey et al. Mar Ecol Prog Ser, 2009 - int-res.com

D. Selected Other Publications/Products:

Middleton, B., Devlin, D., Proffitt, C.E., McKee, K.A.,and Foster, K. 2008. Characteristics of Mangrove Swamps Managed for Mosquito Control in Eastern Florida. Marine Ecology Progress Series 371:117-128.

Upland Plants, Ferns *In* Rookery Bay Field Guide, Rookery National Estuarine Research Reserve, Florida Department of Natural Resources and National Oceanic and Atmospheric Administration

National Science Foundation EPSCoR 2010 Genetic Structure of Two Mangrove Species in the Virgin Islands and Florida. Collaborators Drs. Alice Stafford, C Edward Proffitt.

U.S. Fish and Wildlife Service, Mangrove Restoration Study 2006. This project with collaborators Drs. Edward Proffitt, Beth Middleton, and Karen McKee involved studies of the success of different methodologies of mangrove restoration in two south Florida estuaries.

E. Synergistic Activities:

Reviewer: Climate Change, Hydrobiologia, Marine Environmental Research, Wetlands, Biological Journal of the Linnean Society, Journal of Tropical Plant Biology Mississippi-Alabama Sea Grant Consortium Grants, Louisiana Board of Regents Grants, National Science Foundation

Co-authored and promoted the Agreement of Cooperation between Florida Atlantic University and Research Institute for Tropical Forestry, China

Hosted two graduate students in 2012 supported by European Union Grants from Institute of Forest Growth and Computer Science, Technische Universitat Dresden at HBOI-FAU

Hosted one graduate student 2013 supported by a European Union Grant from Université Libre de Bruxelles – ULB, Campus du Solbosch at HBOI-FAU. .

Smithsonian Research Associate 2005-Present

Mentor Summer 2014 Miami Dade College STEM Summer Interns (8) in Forest Ecology at St. Thomas University

Treasurer, Southeastern Research Society (SEERS) (Affiliate Society of Coastal and Estuarine Research Federation: CERF) 2008-2010

Organized Special Session on Climate Change, SEERS Meeting 2009, Tampa Bay, Florida

Member, National Estuaries Program/Florida Department of Environmental Protection Indian River Lagoon Spoil Island Restoration Committee. This committee helps to guide restoration by DEP on spoil islands in the Indian River Lagoon.

Member, Environmental Protection Agency (EPA) Coastal Wetlands Review Team, SE Region

Experimental Design and Statistics Advisor to Indian River Lagoon Aquatic Preserve

Participated in COSEE Florida (NSF) Science Communication Boot Camp

F. Collaborations and Other Affiliations:

E. Proffitt, FAU, Uta Berger, Institute of Forest Growth and Computer Science, Technische Universitat Dresden, Ilka Feller, Smithsonian Environmental Research Center, Sven Wagner, Institute of Silviculture and Forest Production, Technische Universitat Dresden, Franka Huth, Institute of Silviculture and Forest Production, Technische Universitat Dresden, Yue Lin Helmholtz Centere for Environmental Research, UFZ Dept of Ecological Modeling, Alice Stafford, University of the Virgin Islands, K. McKee, USGS National Wetlands Research Center, B. Middleton, USGS National Wetlands Research Center, R. Shatters, USDA Horticulture Research Lab, J. Beal, FWC. Fleur Van Nedervelde, Université Libre de Bruxelles–ULB, Campus du Solbosch, Baowen Liao, Research Institute of Tropical Forestry,CAF, People's Republic of China, Emily Dangremond, NSF Post Doc, Smithsonian Ecological Research Center.

G. Courses Taught:

Ecology Seminar, Marine Invertebrate Zoology (Graduate and Undergraduate levels) Florida Atlantic University

Co-taught Marine Ecology (Graduate level) Florida Atlantic University

Co-taught Coastal Restoration and Conservation Ecology (Graduate level) Florida Atlantic University

Co-taught Community Genetics

Oceanography, Indian River State College

H. Community Engagement or Out-Reach:

Worked with teachers and students at Frances K. Sweet Elementary Magnet School, a predominantly **minority school** to teach students and teachers about mangrove ecology and research, including organizing field trips and teaching students to tag and measure plants and record data for field experiments.

Work with undergraduate students at Indian River State College instructing them in laboratory and field techniques.

Work with undergraduates from Miami Dade College

Work with undergraduates from St Thomas University

Teach Mangroves in the Indian River Lagoon, ORCA Outreach Program

Abbreviated Curriculum Vitae 2014

NATHAN J. DORN, Ph.D.

Associate Professor
Department of Biological Sciences
Florida Atlantic University
Davie, FL 33314

ndorn1@fau.edu

A. Professional Preparation:

Ph.D. 2003 Michigan State University, East Lansing, MI
Zoology and Ecology Evolution and Behavior (dual)

B.S. 1997 Calvin College, Grand Rapids, MI
Biology

B. Appointments:

2005-2011 ***Assistant Professor***
Department of Biological Sciences, Florida Atlantic University, Davie, FL

2004-2005 ***Visiting Research Associate***
Southeast Environmental Research Center, FIU, Miami, FL

2003-2004 Postdoctoral Researcher
Department of Biological Sciences, Florida International Univ. Miami, FL

C. Selected Peer-Reviewed Publications (*Student Authors)**:**

Knorp*, N. E. & **N. J. Dorn**. 2014. Dissimilar numerical responses of macroinvertebrates to disturbance from drying and predatory sunfish. *Freshwater Biology* 59: 1378-1388.

Boyle*, R. A., **N. J. Dorn** & M. I. Cook. 2014. Importance of crayfish prey to nesting White Ibis (*Eudocimus albus*) populations. *Waterbirds* 37: 19-29.

Dorn, N. J. 2013. Consumptive effects of crayfish limit snail populations. *Freshwater Science* 32: 1298-1308.

Bransky*, J. W. & **N. J. Dorn**. 2013. Prey use of three wetland sunfishes: effects of ontogeny, gape size and seasonal prey variation. *Environmental Biology of Fishes* 96: 1329-1340.

Boyle*, R. A. **N. J. Dorn** & M. I. Cook. 2012. Dietary niche relationships of three species of wading birds nesting together in the Florida Everglades. *Waterbirds* 35: 154-159.

D. Selected Other Publications/Products:

Kellogg*, C. M. & **N. J. Dorn**. 2012. Consumptive effects of fish reduce wetland crayfish recruitment and drive species turnover. *Oecologia* 168: 1111-1121.

Dorn, N. J., M. I. Cook, G. Herring, R. Boyle*, J. Nelson* & D. E. Gawlik. 2011. Diet variation among White Ibis (*Eudocimus albus*) chicks: prey composition depends on recent hydrologic conditions. *Ibis* 153: 323-335.

Dorn, NJ. *Primary Investigator* - Wildlife and Nutrient Cycling Review. $6,000.00. (Jan. 2013-June 2013 South Florida Water Management District)

Dorn, NJ *Primary Investigator* - Experimental Examination of the Predator-Release Hypothesis on Wading Bird Supercolony formation in the Florida Everglades. $149,966.00. (2010-2013, South Florida Water Management District)

Dorn, NJ *Primary Investigator* - Habitat suitability models for Everglades and Slough Crayfish. $10,000.00 (2009-2010, United States Geological Survey: Joint Ecological Modeling lab).

E. Synergistic Activites:

Research/Scientific Community:

- Editorial Board Member for *Southeastern Naturalist* (2013-*present*)
- Peer Reviewer: 25 manuscripts (2008-2014)
- External Reviewer: NSF full proposal (2014)
- External Reviewer Environmental Change Initiative: University of Notre Dame (2012).
- External Reviewer for Restoration of Federal Forests in the Pacific NW: Strategies and Management Implications (administered by *The Wildlife Society* 2011)

University and College

- Member of Institutional Animal Care and Use Committee (2011-2014)
- Member of IACUC subcommittee; Wildlife use protocol development (2013-2014)
- Member of search committee for University Attending Veterinarian (2012)
- Chair of Graduate Admissions for the Environmental Sciences Program (2009-*present*)
- Member for Behavioral Ecologist faculty Search Committee (2014)
- Poster evaluator for College Research Day and ES Retreat (2014)
- Internal Review of Faculty Promotion Package (2013)

F. Collaborations and Other Affiliations:

M. I. Cook, Ph.D. South Florida Water Management District; D. E. Gawlik, Ph.D. FAU

G. Courses Taught (2008-2014)

Undergraduate-level: Principles of Ecology (3 cr., 9X), Freshwater Ecology (3 cr., 1X), Freshwater Ecology lab (1 cr., 1X), Invertebrate Zoology (3 cr., 1X), Invertebrate Zoology lab (1 cr., 1X).

Graduate-level: Advanced Ecology (3 cr., 7X), Ecological Research Seminar (1 cr., 12X; co-led).

H. Community Engagement or Out-Reach:

- Presentation/tour guide at the Loxahatchee Impoundment Landscape Assessment
- Constructed/edited Ecology questions for local Science Olympiad.

NWADIUTO ESIOBU Ph.D.
Professor of Microbiology and Biotechnology
Jefferson Science Fellow, US Department of State
Biological Sciences Department, Florida Atlantic University, Davie FL 33314; USA
Office: 954 236 1128 and 954 559 3369
Laboratory: 954 2361039; Fax: 954 236 1099
Email: nesiobu@fau.edu http://www.science.fau.edu/biology/faculty_staff/esiobu.htm

A. Professional Preparation

Post-Doctoral	Molecular biology and Biotechnology, Massachusetts Institute of Technology (MIT), Cambridge, MA USA. Boris Magasanik Laboratory.
Ph.D.	Microbiology, University of Louvain, Louvain-la-Neuve, Belgium. (Grand Distinction with Honors)
Post Grad Cert.	Agronomy (Tissue Culture & Plant pathology) University of Louvain, Belgium.
M.Sc.	Environmental Microbiology, University of Ife, Ile-Ife Nigeria. (Best graduating post-graduate student award)
B.Sc. (Hons.)	Microbiology, University of Benin, Benin City, Nigeria (Second Class Upper Division)

B. Appointments

Biotech Consultant	2013 Summer. National Biotechnology Development Agency (NABDA)
Professor	2013 - Microbiology and Biotechnology, Biological Sciences Department, Florida Atlantic University.
Senior Science Advisor	2011- Present, United States Department of State, Washington DC (Jefferson Science Fellow)
Director	2010 – Present, Microbial Biotechnology Lab., Florida Atlantic Univ.
Assoc. Professor	2003 – 2012, Dept. of Biological Sciences, Florida Atlantic University.
Professor	2009 – Present (Adjunct position) Nnamdi Azikiwe University, Nigeria
Chair	International Advisory Board, World Bank STEP B project in Nigeria.
Chair	2008 – 2012, Biological sciences department; Learning Assessment Committee, Florida Atlantic University.
Graduate Faculty	2005 – Present, Florida Atlantic University
Visiting Professor	Summer 2008, UNESCO / TWAS, Italy
Visiting Research Professor	2005-2006, Environmental Health Sciences Department, School of Public Health Dept., University of Georgia, Athens. (1 Term sabbatical)

C. Selected Peer-Reviewed Publications

Chakraborty, S. , Persaud, V. , Vanegas, S. , Gautier, G. and Esiobu, N. (2014), Analysis of the Human Oral Microbiome of Smokers and Non-Smokers Using PCR-RFLP and Ribotyping. *Advances in Microbiology*, **4**, 681-691. doi: 10.4236/aim.2014.410073.

Igwe Enerst C., N **Esiobu**, P. C. Ojimelukwe (2014) Variations in the Traditional Starter Culture for Production of a Nigerian Fermented Milk Product- (Kindirmo) Focusing on Modern Food Industry (FMFI) Volume 3 Issue 1, February 2014 www.fmfi-journal.org doi: 10.14355/fmfi.2014.0301.05

Esiobu N., Green M., Echeverry A., Bonilla T.D., Stinson C.M., Hartz A., Rogerson A. and McCorquodale D.S. (2013) High numbers of Staphylococcus aureus at three bathing beaches in South Florida. Int J Environ Health Res. 2013; 23 (1): 46 – 57. , DOI**:** 10.1080/09603123.2012.699027.

Mohammed R. L., Echeverry A., Stinson C.M., Green M., Bonilla T.D. Hartz A., McCorquodale D. S, Rogerson A. and N. **Esiobu** (2012) Survival trends of S*taphylococcus aureus*, *Pseudomonas aeruginosa*, and *Clostridium perfringens* in a sandy South Florida beach. Marine Pollution Bulletin 64 (2012) 1201–1209.

Yamazaki Koske and **Esiobu** Nwadiuto (2012) Environmental Predictors of Pathogenic Vibrios in South Florida Coastal Waters. The Open Epidemiology Journal, 2012, 5, 9-12

D. Selected Other Publications or Products/Grants

$1,478,514.00	2014 – 2016 (Co-PI) COMESA. Promotion and Improvement of Climate Smart Agriculture in Zambia through Optimized Legume-Based Agroforestry
$ 3000.00	2013- 2014 (PI) FAU Broward Undergraduate Research Grant and Faculty development (with Sarah Kudman undergraduate)
$ 50,000.00	2012 – 2013 (PI) World Bank through MAUTECH. Research skills in molecular biology, plant tissue culture and environmental biotechnology A World Bank Funded Training for Scientists from the Center of Excellence forEnvironmental Biotech, University of Maiduguri and its affiliates.
$3000.00	2012 – 2013 (PI) FAU Broward Undergraduate Research Grant and Faculty development (with Hedson Desir)
$1000.00	2013 – 2014 Broward Mentor Professional Development Award: In recognition of of efforts to promote and mentor undergraduate research
$17,500.00	2012- 2014 (Co-PI) MAUTECH (World Bank), Nigeria. Enhancement of desirable agricultural traits through plant biotechnology. Zhang X. (PI): A collaboration between FAU and MAUTECH.

Project Reports

Esiobu N. 2008 Evaluation of sporicidal properties of novel antimicrobial formulations (A Report)

Esiobu N. 2008. Lab Manual on Molecular Biology and Applied Biotech Techniques, Covenant Univ.

Rogerson A., Esiobu N., and McCoquerdale D (2003). Prevalence and survival of microorganisms in shoreline interstitial waters: Final Report submitted to the USEPA.

Esiobu N. and Rosenkranz H. (2003) Hospital Hygiene Practices for Dealing with Biowarfare agents. Final report of funded research submitted t the CBD, Tampa. 40pp

E. Synergistic Activities

* World Bank funded Centre of Excellence for Sustainable Environmental University of Maiduguri, Nigeria
* COMACO, Zambia – Agroforestry and soil conservation
* Ebonyi State University – Multi-disciplinary research skill training

F. Collaborators and Other Affiliations

National Biotech Devt Agency, NABDA; University of Maiduguri, University of Ebonyi State etc

G. Courses Taught

BSC 6390	Integrative Biology (Co-Teach as needed)
BSC 6905	Directed Independent studies
BSC 6936	Advanced Microbiology
BSC 5936	Environment and Health
BSC 4905	Directed Independent Studies
BSC 4403L	Biotechnology Labs 1
MCB 4203	Medical Bacteriology
MCB 4603	Microbial Ecology
MCB 4503	Virology
BSC 4303	Intermediate Microbiology Labs (now replaced by Biotech Lab 1)
MCB 3020(L)	General Microbiology and Labs

H. Community Engagement or Out-reach

* Jefferson Science Fellow --- US State Department
* Senior Vice President, Palm Beach-Broward Chapter of US National Committee on UN Women
* American Society for Microbiology
* Faculty mentor
* Intl. Advisory Board member, FUTY and Technical Advisory Board, Biotech Center Ebonyi
* Editorial Board member and reviewer for grants and journal articles

Evelyn Marques Frazier, Ph.D.
Department of Biological Sciences Phone: (561) 297-4472
Florida Atlantic University FAX: (561) 297-2749
777 Glades Road E-mail: efrazier@fau.edu
Boca Raton, Fl 33431

A. Profesional Preparation

Post-Doctoral	1997-1999	Universidade Federal de Minas Gearis
Ph.D. (1996)		Northern Arizona University. USA
M.S. (1991)		State University of Campinas, Brazil
B.S. (1987)		State University of Campinas, Brazil

B. Appointments

2013- present	Senior Instructor, Florida Atlantic University
2001- 2012	Instructor, Florida Atlantic University
2009 – present	Director of the Introduction to Honors and Biology Honors Thesis Progras
2000 – 2001	Visiting Professor, Florida Atlantic University
1999-2000	Adjunct Lecturer, Miami-Dade Community College

C. Selected Peer Reviewed Publications (Undergraduate Students *)

Under current name: Evelyn Frazier

Lauck, M ***.,** Owen, D. and **Frazier, E**. 2013. An analysis of the vegetation within the FAU preserve as a basis for management of scrub habitat for *Gopherus polyphemus*. Florida Atlantic University Undergraduate Research Journal. 2 (1): 7-14.

Scholl, J*.,T.Hindle and **E. Frazier**. 2012. Population structure and burrow placement of Gopherus polyphemus in a small, declining southeast Florida conservation area. FAU Journal Of Undergradaute Research, Volume 1 (1): 23-26

Maiden name: Evelyn S. A. Marques)(undergraduate students *))

Fernandes, GW., F.M.C. Castro* , M.L.Faria, **E.S.A. Marques** and M.B. Grego. 2004. Effects of Hygrothermal Stress, Plant Richness, and Architecture on Mining Insect Diversity. Biotropica 36 (2): 240-247

Riberio-Mendes, H.Nt*., **E.S.A.Marques**, I.M.Silva and G.W.Fernandes. 2002. Influence of host-plant sex and habitat on survivorship of insect galls within the geographical range of the host-plant. Tropical Zoology 15:5-15.

Marques, E.S.A., N. Cobb and P.W. Price. 2000. Resource Abundance and Insect Herbivore Diversity on Woody Fabaceous Desert Plants. Environmental Entomology 29 (4): 696-703.

D. Selected Other Publications (Undergraduate Students*)/Products

Marques, E.S.A. and P.W. Price. 1998. Altitudinal Gradients in Insect Herbivore Communities on Tropical Legumes. Brazilian Journal of Ecology 2: 66-73.

Marques, E.S.A., J. Vasconcelos-Netto and M.B. Mello*. 1998. Life History and Social Behavior of *Anelosimus jabaquara* and *Anelosimus dubiosus* (Theriddidae: Araneae). Journal of Arachnology 26: 66-76.

Price, P.W., I.R. Diniz, H.C. Morais and **E.S.A.Marques**. 1995. The Abundance of Insect Herbivore Species in the Tropics: The High Local Richness of Rare Species. Biotropica 27: 468-478.

NSF-Undergraduate Research and Mentoring Program "Integrative Biology for Future Researchers", $700,000.00, September 2008-August 2013; Co-Principal Investigator.

Small World Initiative from the Center for Scientific Teaching at Yale University 2014 – present. PI Dr. Joseph Caruso and Co Pi Evelyn Frazier. This is a program that fosters the interest of undergraduate student in research at the freshman level and is being implemented by Doctor Caruso this semester with the Non Biology majors course.

E. Synergistic Activities

Graduate Students Trained:

Ryan Ebanks Master Student in Anthropology. Forensic study on decomposition of the carrion of Sus scrofa and insect colonization. Expected graduation date Summer 2015.

Jessica Huffman – Biology Master student – 2014-2016.

Undergraduate Students Trained:

Jessica Huffman _ Undergraduate research grant 2013 – Master in Biology at FAU
Ryan Ebanks - Undergraduate research grant 2012 _ Master in Anthorpology at FAU
Dana Elhassani – Undergraduate research grant 2012
Arafat Bari Undergraduate research grant 2012
Anthony Planas Undergraduate research grant -2012 Ph.D. in Geography at FAU
Marina Lauck Undergraduate research grant – 2011 Master at Florida State University
Ariel Zeiger Undergraduate research grant 2011
Johsua Scholl - Undergraduate research grant 2010 – Phd.at Arizona State University
Angela Nenkova - Undergraduate research grant -2012
Daniela Paul - Undergraduate research grant 2012

Awards:

National Academies Summer Institute Leadership Committee (2012)
National Academies Education Fellow in the Life Sciences (2006-2008)
National Academies Education Mentor in the Life Sciences

Professional Development:

Summer Institute Leadership Committee on Undergraduate Education in Biology sponsored by the National Academies of Science and Howard Hughes Medical Institute Committee – Summer 2012

Facilitator for the Summer Institute on Undergraduate Education in Biology sponsored by the National Academies of Science and Howard Hughes Medical Institute for the Summer 2007.

Participation in the Summer Institute on Undergraduate Education in Biology sponsored by the National Academies of Science and Howard Hughes Medical Institute – Summer 2006.

Workshop on Teaching Biology to Undergraduates. Pearson/Benjamin Cummings – November 2006

F. Collaborations and Other Affiliations:

G. W. Fernandes , Federal University of Minas Gerais, Brazil
Janet Branchaw, Department of Biology Education, University of Wisconsin, Madison.

G. Courses Taught:

BSC 1010 – Biological Principles**;** BSC 1011- Biodiversity; PCB-4674 – Evolution; BSC 4905 - Introduction to Honors 1 and 2; BSC 4917- Honors Research; BSC 4918 - Honors Thesis; DIS 4905 – Life of a Scientist**;** Vascular plants (lecture and lab); Invertebrate zoology (lecture and lab); Plant Physiology (lecture and lab); Principles of Ecology

H. Community Engagement And Out-Reach

Faculty Advisor to FAU student clubs: SEEDS (Strategies for Ecology Education, Diversity and Sustainability –Chapter of the Ecological Society of America) and Council for Student Inquiry.

Participation in the FAU Quality Enhancement Plan Pilot Sudy and Faculty Learning Community.

Development and Implementation of seminar " Teaching Strategies and Mentoring Seminar" in collaboration with Geri Mayor, Laboratory Coordinator, and The Wisconsin Scientific Teaching Program.

Restructuring of Introductory Biology Courses –BSC 1010 and BSC 1011, and Evolution to include principles of Scientific Teaching as well as, active learning activities, peer discussions and problem-solving activities.

Attendance at several teaching workshops promoted by publishers.

Textbook reviewer: Pearson/Benjamin Cummings and Thompson

BioBlitz – survey of fungi, lichens, plants and animals in the FAU preserve

BIOGRAPHICAL SKETCH

Dale E. Gawlik

Professional Preparation

University of Wisconsin Stevens Point	B.S.	1984
Winthrop College	M.S.	1988
Texas A&M University	Ph.D.	1994

Appointments

2007-present	Director, Environmental Science Program, Florida Atlantic University
2013-present	Professor, Department of Biological Sciences, Florida Atlantic University
2008-2013	Associate Professor, Department of Biological Sciences, Florida Atlantic University
2003-2008	Assistant Professor, Department of Biological Sciences, Florida Atlantic University
1994-2003	Senior Environmental Scientist, Everglades Division, South Florida Water Management District
1994	Tom Slick Senior Graduate Fellow, Texas A&M University
1993-1994	Postdoctoral Research Associate, Texas A&M University
1990-1993	Graduate Research Assistant, Texas A&M University
1990	Research Supervisor, Environmental Labs Inc.
1988-1989	Biologist, Environmental Labs Inc.
1987-1988	Biological Consultant, Savannah River Ecology Laboratory
1985-1987	Graduate Research Assistant, Winthrop College
1985	Wildlife Technician, U.S. Fish & Wildlife Service, Northern Prairie Wildlife Research Center

Selected Peer-Reviewed Publications (five recent)

- Herring, G., H. K. Herring, and D. E. Gawlik. *In press*. Social cues and environmental conditions influence foraging flight distances of breeding wood storks (*Mycteria Americana*). Waterbirds
- Herring, G., C. A. Eagles-Smith, D. E. Gawlik, J. M. Beerens, and J. T Ackerman. 2014. Physiological condition of juvenile wading birds in relation to multiple landscape stressors in the Florida Everglades: effects of hydrology, prey availability, and mercury bioaccumulation. PLoS ONE 9: e106447.
- Beck, T. J, D. E. Gawlik, and E. V. Pearlstine. 2013. Community patterns in treatment wetlands, natural wetlands, and croplands in Florida. Wilson Journal of Ornithology 125: 329-341.
- Lantz, S. M, D. E. Gawlik, and M. I. Cook. 2011. The effects of water depth and emergent vegetation on foraging success and habitat selection of wading birds in the Everglades. Waterbirds 34:439-447.
- Beerens, J. M., D. E. Gawlik, G. Herring, and M. I. Cook. 2011. Dynamic habitat selection by two wading bird species with divergent foraging strategies in a seasonally fluctuating wetland. Auk 128:651-662.

Other publications or grants (five recent)

- Everglades Fellowship Program at Florida Atlantic University. Dale E. Gawlik, funded $100,000 by National Park Service, 2013-2016.
- Wood stork use of roadway corridor features in South Florida. D. E. Gawlik, funded $462,855 by Florida Department of Transportation, 2013-2016
- Feasibility of modeling impacts of sea level rise on foraging habitat of the Little Blue Heron in the Great White Heron National Wildlife Refuge, Phase II: factors affecting habitat D. E. Gawlik and B. Lapointe, funded $50,000 by U.S. Fish and Wildlife Service, 2012-2013.

- Postdoctoral investigator program in marine science, engineering and technology: effects of nutrient enrichment on wading bird habitat in the Great White Heron National Wildlife Refuge, lower Florida Keys. B. Lapointe and D. E. Gawlik, funded $112,640 by Harbor Branch Oceanographic Institute at Florida Atlantic University, 2012-2014.
- Dry season prey concentrations. D. E. Gawlik, funded $608,064 by U.S. Army Engineer Corp of Engineers Research and Development Center, 2012-2015.

Synergistic Activities

- Program Committee, 2015 Greater Everglades Ecosystem Restoration Conference, 2013-2015.
- Panelist for evaluation of Society of Ecological Restoration International Primer on Ecological Restoration. Conference on Ecological and Ecosystem Restoration, New Orleans, 2014.
- Councilor, Association of Field Ornithologists, 2013-2016.
- Science Advisory Committee, Gulf Coast Bird Observatory, Lake Jackson, Texas, 2012 – present.
- Science Advisory Committee for the Whooping Crane Eastern Partnership, U.S. Fish and Wildlife Service, 2011-present.
- President, Florida Chapter of The Wildlife Society, 2011 – 2013.
- Reviewer, Biological Status Review of Florida's Threatened Species Program, Florida Fish and Wildlife Conservation Commission, 2010.
- Dissertation Reviewer, University of New South Wales, Sydney, Australia, 2010.
- Dissertation Reviewer, University of New England, Armidale, Australia, 2010.
- Co-organized symposium entitled System-wide Science: Translating a Trophic Hypothesis Foundation for Restoration. Greater Everglades Ecosystem Restoration Conference, 2010, Naples, FL.
- Panelist, Oil and Gas Impacts in the Big Cypress Ecosystem. The Everglades Foundation, 2009-2010.

Collaborators and other affiliations

- Peter Frederick, University of Florida, Gainesville, FL
- Frank Mazzotti, University of Florida, Davie, FL
- Arnold van der Valk, Iowa State University, Ames, IA
- Joel Trexler, Florida International University, Miami, FL

Courses Taught

- Conservation Biology (PCB 6045) Developed new graduate course on the principles of Conservation Biology. Format is lecture, team projects, guest speakers, paper discussions, and a field trip.
- Seminar in Emerging Topics in Avian Ecology (Zoo 6544C) Developed new graduate course focusing on recent topics in the literature. Format is student-led discussion with introductory and synthesis lectures by the instructor.
- Principles of Ecology (PCB 4043). Taught this existing large enrollment undergraduate course required for biology majors. Format is lecture with three simulation model exercises done in teams.

Outreach

- Gawlik, D.E. 2014. Wading birds in the Everglades: graduate student research shaping the restoration of a global treasure. Jupiter High School Environmental Academy.
- Gawlik, D.E. 2013. Wading birds in Florida: cream skimmers and crumb pickers. Coastal Lecture Series, Florida Oceanographic Society, Fort Pierce, FL
- Gawlik, D.E. 2012. Habitat selection and behavior of Wood Storks and their kin in South Florida. Meeting of the South Florida Association of Environmental Professionals, Fort Lauderdale, FL.
- Gawlik, D.E. 2012. Wading birds in Florida: cream skimmers and crumb pickers. Treasure Coast Birding Festival, Vero Beach, FL.
- Gawlik, D.E. 2012. Wading birds in the Everglades: cream skimmers and crumb pickers. Pelican Island Audubon Society, Vero Beach, FL.

ABBREVIATED FACULTY CV
Tanja A. Godenschwege, Ph.D.

A. Professional Preparation

09/2004-08/2006 Research Assistant Professor, Pioneer Valley Life Sciences Institute, MA
10/1999-08/2006 Post-doctoral research fellow at the University of Massachusetts Amherst.
5/1999-9/1999 Post-doctoral research fellow & group leader at the Bayerische Julius-Maximilians Universität Würzburg.
3/1995-5/1999 Doktor der Naturwissenschaften, Department of Genetics and Neurobiology, Bayerische Julius-Maximilians-Universität Würzburg.
9/1989-2/1995 Diploma in Biology, Department of Genetics and Neurobiology, Bayerische Julius-Maximilians-Universität Würzburg.

B. Appointments

08/2011-present Associate Professor
08/2006-07/2011 Assistant Professor, Florida Atlantic University, Department of Biological Sciences, Boca Raton, Florida
Associate Director, Integrative Biology PhD Program
Faculty of the Center of Molecular Biology and Biotechnology
Affiliated Faculty, Charles E Schmidt College of Biomedical Sciences
Member of the Florida Bioinformatics Research Consortium

C. Selected Peer-Reviewed Publications

Heghinian, M. D., Mejia, M.; Adams, D.J.; Godenschwege, T. A., Mari, F. (2014), Inhibition of Cholinergic Pathways in Drosophila melanogaster by a-Conotoxins, The FASEB Journal MS ID: FASEBJ/2014/262733, *in press.*

Ermanoska B, Motley WW, LeitaoGoncaves R, Asselbergh B, Lee LH, De Rijk P, Sleegers K, Ooms T, Godenschwege TA, Timmerman V, Fischbeck KH, Jordanova A (2014) CMT-associated mutations in glycyl- and tyrosyl-tRNA synthetases exhibit similar pattern of toxicity and share common genetic modifiers in Drosophila. Neurobiol Dis. pii: S0969-9961(14)00109-0. doi: 10.1016/j.nbd.2014.04.020.

Kudumala S., Freund J., Hortsch M., Godenschwege TA (2013): Differential effects of human L1CAM mutations on complementing guidance and synaptic defects in *Drosophila melanogaster.* PLoS One. 2013 Oct 14;8(10), Impact factor 4.092

Mejia, M.; Heghinian, M. D., Busch, A.; Mari, F., Godenschwege, T. A. (2013): New tools for targeted disruption of cholinergic synaptic transmission in Drosophila melanogaster. PLoS ONE, PLoS ONE, 30;8(5).

Enneking E-M*, Kudumala SR*, Moreno E, Stephan R, Boerner J, Godenschwege TA#, Pielage J# (2013) Transsynaptic Coordination of Synaptic Growth, Function, and Stability by the L1-Type CAM Neuroglian. PLoS Biol 11(4): e1001537 doi:10.1371/journal.pbio.1001537. *** equal contribution, # corresponding authors**

D. Selected Other Publications or Products/Grants

01/03/2008-30/11/2014, National Institute of Health/NICHD (R01HD050725): "FUNCTIONAL ANALYSES OF NEUROGLIAN/L1 IN SYNAPTOGENESIS", PI: Godenschwege
07/01/2009–02/28/2014, NIH/NICHD (R01HD050725-02S1): Research Supplements to Promote Diversity in Health-Related Research, PI: Godenschwege
01/07/2009-06/30/2011, National Institute of Health/NINDS (1R21NS066371): "Efficacious Screening of Peptidic Natural Products Using Drosophila", PI: Frank Mari, Co-PI: Godenschwege
04/2013-06/2016, 2013 FAU DOR SEED Grant. "Investigation of common mechanisms of L1-type CAMs and Semaphorins interactions in cancer and neurological disorders" PI's: Vijaya Iragavarapu (Biomedical Sciences), Tanja A Godenschwege (Biological Sciences)
05/2014-06/2015, 2014 College of Science SEED Grant. Analyses of the role of full-length L1-type CAM neuroglian in the nucleus. PI: Godenschwege

E. Synergistic Activities

Course lecturer, "Neurobiology of Drosophila" summer course, Cold Spring Harbor Laboratories, 2000-2006
Graduate Student Mentor Award of the Graduate Student Association, FAU Owl Awards (2009)
Faculty mentor in the NSF Undergraduate Research and Mentoring (URM) program at Florida Atlantic University

Faculty Advisor to the Graduate and Professional Student Association in organization of GSA Research Day Spring, 2012-present

Poster judge at the Graduate and Professional Student Association Research Day Spring, 2010-2014

Owl Awards Selection Committee for the Graduate Student Association, Fall 2011

Poster judge at the College of Science Research day, 2007, 2008

F. Collaborators and Other Affiliations

Vijaya Iragavarapu (Biomedical Sciences, FAU), Jan Pielage (Friedrich Mieschner Institute, Basel), Albena Jordanova (VIB, University Antwerp), Frank Mari (Chemistry, FAU), Michael Hortsch (University of Michigan)

G. Courses Taught

Graduate Courses

PCB 6840 Cellular Neuroscience & Disease

BSC 6936 Advanced Biotechnology lab II

BSC 6846 Scientific Communication

BSC 6905 Neuroscience Colloquium and Seminar

BSC 6905 Neuroscience Journal Club

BSC 6905 Research Seminar in Neuroscience & Development

Undergraduate Courses

PCB 4842 Cellular Neuroscience & Disease

PCB 4023 Molecular and Cellular Biology

H. Community Engagement or Out-reach

Course Instructor for the "Neurobiology of *Drosophila*" summer course at the Cold Spring Harbor Laboratories, NY, (2001-2006, 2008).

Grant reviewer National Institute of Health (ad hoc panel reviewer Synapses, Cytoskeleton and Trafficking Study Section [SYN] 2011 &2012) & *National Science Foundation* (IOS – Modulation, IOS - Animal Developmental Mechanisms, MCB – Cellular Systems, IOB – Developmental Systems cluster), The Wellcome Trust-Career Re-Entry Fellowship, Parkinson's UK

Ad hoc Reviewer for Nature, Current Biology, FLY, Journal of Neurobiology, Biochimica Et Biophysica Acta (BBA), PLos Genetics, Developmental Neurobiology, Journal of Comparative Neurology, Oxford University Press, Journal Of Neurogenetics, Journal of Visual Experiments

Organizer of the "1st South Florida Drosophila Research Consortium Meeting", Senate Chamber at Florida Atlantic University (2009). "FAU/MPFI Neuroscience Symposium", Grand Palm, Florida Atlantic University (2010).

Faculty mentor in the NSF Undergraduate Research and Mentoring (URM) program at Florida Atlantic University

Session chair of the "2nd South Florida Drosophila Research Consortium Meeting", University of Miami, Florida (2010).

Poster judge at the Graduate and Professional Student Association Research Day Spring, 2010, 2011, 2012, 2013

Faculty Advisor to the Graduate and Professional Student Association in organization of GSA Research Day Spring, 2012 & 2013

Member, Owl Awards Selection Committee for the Graduate Student Association, Fall 2011

NSF MRI proposal reviewer for the Division of Research at FAU Fall 2011

Poster judge at the College of Science Research day, 2007, 2008

Abbreviated Faculty CV

James X. Hartmann, Ph.D.

A. Professional Preparation

Aquinas College, Grand Rapids, MI	B.S.	1964	Zoology
Michigan State University, E. Lansing, MI	M.S.	1967	Microbiology Immunology
Michigan State University, E. Lansing, MI	Ph.D.	1971	Virology

B. Appointments

Florida Atlantic University, Assistant Professor, Immunology/Virology1972-1977.
Florida Atlantic University, Associate Professor, Immunology, 1977-1982
Florida Atlantic University, Professor, Immunology, 1983-present.

C. Selected Peer-reviewed Publications

Keating P, Munim A, **Hartmann JX**. Effect of Vitamin D on Th9 polarized human memory cells in chronic persistent asthma. Annals of Allergy, Asthma and Immunology. 2014 Feb;112(2):154-162 PMID: 2446825

Zhang XH, Keating P, Wang XW, Huang YH, Martin J, **Hartmann JX**, Liu A. Production of Functional Native Human Interleukin-2 in Tobacco Chloroplasts. Mol Biotechnol. 2013 Oct 22. PMID: 24146433

Cavallo MF, Kats AM, Chen R, **Hartmann JX**, Pavlovic M. 2012. A Novel Method for Real-Time, Continuous, Fluorescence-Based Analysis of Anti-DNA Abzyme Activity in Systemic Lupus.
Autoimmune Dis. 2012:814048. doi: 10.1155/2012/814048. Epub 2012 Dec 5.
PMID: 23251791

Pavlovic M, Kats A, Cavallo M, Chen R, **Hartmann JX**, Shoenfeld Y. Pathogenic and Epiphenomenal Anti-DNA Antibodies in SLE. Autoimmune Dis. 2010 Jul 20; 2011:462841. PMID: 21152217

Draughon LD, Scarpa J, **Hartmann JX**. Are filtration rates for the rough tunicate Styela plicata independent of weight or size? J Environ Sci Health A Tox Hazard Subst Environ Eng. 2010;45(2):168-76. doi: 10.1080/10934520903429816. PMID: 20390856

D. Selected Other Publications/Products

Draughon, L., J. Scarpa, **P.** Keating, & **J. Hartmann**. (2008). Potential estuarine water quality improvement via marine invertebrate bioremediation. In M. Theophanides & T. Theophanides (Eds.), *Environmental* Awareness and Management (pp. 97 - 112). Athens: ATINER.

Pavlovic M, Chen R, Kats A, Cavallo M, Saccoccio S, Keating P, **Hartmann JX**. Highly Specific Novel Method for Isolation and Purification of Lupus Anti-DNA Antibody via Oligo-(dT) Magnetic Beads**.** 2007. Annals of the New York Academy of Sciences. 1108:203-217. PMID: 1789398

Ongoing Research Support: *In vitro* Study of the Immune Response to Calcifying Nanoparticles. 2012-present FAU Foundation. The goals of the project are to co-cultivate human peripheral blood cells with calcifying nanoparticles from calcinosis in lupus patients. Using gene

microarray, enzyme linked immunoassay and flow cytometry discover a means to activate dissolution of the particles. PI

Completed Research Support: Studies on the Use of Vitamin D in Asthma Patients 2006-2013 FAU Foundation. We achieved the goal of providing evidence that vitamin D down regulates an inflammatory T lymphocyte (Th9) cell that plays a key role in asthma. (see recent 2014 publication) PI

In Vitro Activation of Macrophage in Chronic Lymphocytic Leukemia 2010-2011 FAU Foundation. We sought the use of a macrophage activating factor called Gc-MAF in activating the tumoricidal properties of monocyte derived macrophages obtained from leukemia patients. PI

Lupus Research 2009-2011 FAU Foundation. We developed a real time assay for the activity of specific anti-DNA abzyme activity present in the serum of lupus patients. PI

Generation of Monocyte Derived Dendritic Cells Specific for the Idiotype of a Systemic Lupus Erythematosus Anti-DNA Antibody. 2009-2012 FAU Foundation. We sought to develop a vaccine that would selectively target the B cells producing anti-DNA antibodies in lupus patients by loading dendritic cells with the specific antibody idiotype. PI

E. Synergistic Activities
FAU, Center for Molecular Biology and Biotechnology, Member, 1998-present.

FAU, Department of Biomedical Sciences, Associate Faculty and member of the Integrative Biology Ph.D. program, 1998-present.

Master Teacher Designation, Department of Biological Sciences, FAU 2005-2010.

FAU Foundation Award, 1989.

FAU Faculty Summer Research Fellowship Award, 1989.

Fellowship from Applied Biomaterials Technologies, 1993

Fellowship from Innovative Technologies, 1993

Matching Equipment Program from IBM, Boca Raton, FL 1993

Foundation Donation for Cancer Research on the Immunotherapy of Melanoma, 1993.

The Fason Foundation Award, 1994-1996.

F. Collaborators and Other Affiliations
Dr. Amjad Munim (Pulmonologist) and Dr. Ira Pardo (Rheumatologist).

G. Courses Taught
PCB 4233 Immunology
PCB 6236 Advanced Immunology
BSC 4806 Biology of Cancer
SLS 1503 Strategies in learning success

H. Community Engagement or Out-Reach
I have been active in contacting the south Florida community to contribute significant research monies to the FAU Foundation for a number of research projects. I spent two summers in Capetown South Africa working on leukemia research.

ABBREVIATED FACULTY *CV*
Colin R. Hughes, Ph.D.

A. Professional Preparation

St. Johns College, Cambridge, B.A., 1979 Natural Sciences, Honors Degree.
Rice University, Ph.D., 1987. Major professor: Joan E. Strassmann.

B. Appointments

Research Associate with Drs J. Strassmann and D. Queller, Rice University,
July 1986 to February 1992.
Lecturer during fall semester 1989.
Research Associate with Dr. E. Bryant, University of Houston,
March 1992 to August 1992.
Assistant Professor, Biology Department, University of North Dakota,
August 1992 to August 1997.
Associate Professor, Biology Department, University of North Dakota,
August 1997 to August 1998.
Associate Professor, Department of Biology, University of Miami,
August 1998 to 2004.
Associate Professor, Department of Biological Sciences, Florida Atlantic University,
August 2004 to present.

C. Selected Peer-Reviewed Publications

Purcell, JFH; Cowen, RK; Hughes, CR, Williams DA. 2009 Population structure in a common Caribbean coral-reef fish: implications for larval dispersal and early life-history traits. Journal of Fish Biology 74: 403-417

Hughes CR, Miles S, Walbroehl JM. 2008 Support for the minimal MHC hypothesis: a parrot with a single, highly polymorphic, MHC class II *B* gene. Immunogenetics 60: 219-231.

Sachs JL, Hughes CR, Nuechterlein GL, Buitron, D 2007. Evolution of coloniality in birds: A test of hypotheses with the red-necked grebe (Podiceps grisegena) Auk 124: 628-642.

Purcell JFH, Cowen RK, Hughes CR, Williams, DA. 2006 Weak genetic structure indicates strong dispersal limits: a tale of two coral reef fish Proc. Royal Soc. Lond, Ser B.273 (1593): 1483-1490

Williams DA, Overholt WA, Cuda JP, Hughes CR. 2005. Chloroplast and microsatellite DNA diversities reveal the introduction history of Brazilian peppertree (*Schinus terebinthifolius*) in Florida Molecular Ecology 14 3643-3656

D. Selected Other Publications or Products/Grants

Szczys P, Hughes CR, Kesseli RV 2005 Novel microsatellite markers used to determine the population genetic structure of the endangered Roseate Tern, *Sterna dougallii*, in Northwest Atlantic and Western Australia Conservation Genetics 6: 461-466 2005

Sandercock BK, Beissinger SR, Stoleson SH, Melland RR, Hughes CR. 2000. Survival rates of a Neotropical parrot: implications for latitudinal comparisons of avian demography. Ecology, 81, 1351-1370.

Sachs JL, Hughes CR. 1999 Characterization of microsatellite loci for a colonially breeding population of red-necked grebes, *Podiceps grisegena.* Molecular Ecology 8, 687-688
Hughes CR, Moralez Deloach, D. 1997. Developing microsatellite loci when they are rare: trinucleotide repeat loci in the northern mockingbird *Mimus polyglottos.* Molecular Ecology 6, 1099-1102.
Strassmann JE, Gastreich KR, Queller DC, Hughes CR. 1992. Demographic and genetic evidence for cyclical changes in queen number in a neotropical wasp*Polybia emaciata.* American Naturalist 140, 363-372.
Strassmann JE, Queller DC, Solís CR, Hughes CR. 1991. Relatedness and queen number in the neo-tropical wasp *Parachartergus colobopterus.* Animal Behaviour 42, 461-470.
Queller DC, Hughes CR, Strassmann JE. 1990. Wasps fail to make distinctions. Nature 344, 388.
Strassmann JE, Hughes CR, Queller DC. 1990. Colony defense in the social wasp *Parachartergus colobopterus.* Biotropica 22,324-327.
Gastreich KR, Queller DC, Hughes CR, Strassmann JE. 1990. Kin descrimination in the tropical swarm-founding wasp, *Parachartergus colobopterus.* Animal Behaviour 40, 598-601.
Davis SK, Strassmann JE, Hughes CR, Pletscher LS, Templeton AR. 1990. Population structure and kinship in *Polistes* (Hymenoptera: Vespidae): an analysis using Ribosomal DNA. Evolution 44, 1242-1253.
Strassmann JE, Hughes CR, Queller DC, Turillazzi S, Cervo R, Davis SK, Goodnight KF. 1989. Genetic relatedness in primitively eusocial wasps. Nature 342, 268-269
Strassmann JE, Queller DC, Hughes CR. 1988. Predation and the evolution of sociality in the paper wasp, *Polistes bellicosus*. Ecology 69, 1497-1505.
Queller DC, Strassmann JE, Hughes CR. 1988. Genetic relatedness in colonies of tropical wasps with multiple queens. Science 242, 1155-1157

F. Synergistic Activities

Participant National Academies Summer Institute 2011

F. Collaborations and Other Affiliations

G. Courses Taught

Genetics, Evolution, Integrative Biology 1, Ornithology, Conservation Biology.

H. Community Engagement or Out-reach

Member Broward County Climate Change Task Force 2011-2013

ABBREVIATED FACULTY CV

Kailiang Jia, Ph.D., M.D.

A. Professional Preparation

2001	Ph.D.	Genetics	University of Missouri
1996	MSc	Medical Genetics	Chinese Academy of Medical Sciences
1993	M.D.		School of Medicine, Qingdao University

B. Appointments

2009 – present	Assistant Professor, Department of Biological Sciences, Florida Atlantic University, Boca Raton, Florida
2007 – 2009	Instructor, Department of Internal Medicine, UT Southwestern Medical Center, Dallas, Texas
2004 – 2007	Research Scientist, Department of Internal Medicine, UT Southwestern Medical Center, Dallas, Texas
2001 – 2004	Postdoctoral Associate, Division of Biological Sciences, University of Missouri, Columbia, Missouri

C. Selected Peer-Reviewed Publications

(most recent five from the last 7 years)

2014. Di Chen∗, Jiuli Zhang, Justin Minnerly, Tiffany Kaul, Donald Riddle and **Kailiang Jia**∗. *daf-31* Encodes the Catalytic Subunit of N Alpha-Acetyltransferase that Regulates *Caenorhabditis elegans* Development, Metabolism and Adult Lifespan. PLoS Genetics 10(10): e1004699. doi:10.1371/journal.pgen.1004699.
∗Corresponding authors

2014. Jiuli Zhang and **Kailiang Jia**∗. A protocol to infect *Caenorhabditis elegans* with *Salmonella typhimurium*. Journal of Visualized Experiments. (88):e51703.
∗Corresponding author

2014. Tomoyuki Sasaki, Shanshan Lian, Jie Qi, Peter Bayliss, Christopher Carr, Jennifer Johnson, Sujay Guha, Patrick Kobler, Sergio Catz, Matthew Gill, **Kailiang Jia**, Daniel J. Klionsky, and Shuji Kishi. (2014). Aberrant Autolysosomal Regulation Is Linked to The Induction of Embryonic Senescence: Differential Roles of Beclin 1 and p53 in Vertebrate Spns1 Deficiency. PLoS Genetics 10(6): e1004409. doi:10.1371/journal.pgen.1004409

2014. Alexander Curt, Jiuli Zhang, Justin Minnerly and **Kailiang Jia**∗. Intestinal autophagy activity is essential for host defense against *Salmonella typhimurium* infection in *Caenorhabditis elegans*. Developmental and Comparative Immunology. 45, 214 - 218.
∗Corresponding author

2013. Shuyi Huang, **Kailiang Jia**, Ying Wang, Zheng Zhou and Beth Levine. Autophagy genes function in apoptotic corpse clearance during *C. elegans* embryonic development. Autophagy. 9(2):138-49.

D. Selected Other Publications or Products/Grants

(most recent five from the last 7 years)

2014 – 2017	NIH, The novel role of autophagy in controlling *C. elegans* dauer recovery PI: **Kailiang Jia**
2014 – 2015	FAU College of Science Seed Grant, The novel role of autophagy in controlling *C. elegans* dauer recovery PI: **Kailiang Jia**, Co-PI Matt Gill

2012 – 2013 FAU College of Science Seed Grant, Characterize the function of *C. elegans* Arrest-defective 1 protein (ARD1) and develop an assay for drug screening of ARD1 activators
PI: **Kailiang Jia**, Co-PI Matt Gill

2010 – 2011 American Cancer Society, Characterize the function of autophagy suppressors in tumorigenesis
PI: **Kailiang Jia**, Co-PIs Michael Lu and Matt Gill

2007 – 2011 Ellison Medical Foundation, Role of autophagy in regulation of *C. elegans* life span
PI: **Kailiang Jia**

E. Synergistic Activities

- Journal Paper Reviewer: Aging Cells, Age
- Grant reviewer: AFAR
- Journal Editor: SpringerPlus
- Member of the National Scientific Advisory Council for the American Federation of Aging Research (AFAR)
- Ellison Medical Foundation New Scholar in Aging Program
- Glenn Foundation/American Federation of Aging Research Scholar
- Member of the Genetics Society of America

F. Collaborators and Other Affiliations

Collaborators: Matt Gill, The Scripps Research Institute; Anne Hart, Brown University; Shuji Kishi, The Scripps Research Institute; Beth Levine, UT Southwestern Medical Center; Donald Riddle, University of British Columbia, Canada; Zheng Zhou, Baylor College of Medicine; Predrag Cudic, Torrey Pines Institute for Molecular Studies; Herb Weissbach, FAU; Ken Dawson-Scully, FAU; Rebeca Aldunate, University Santo Tomas, Chile; Di Chen, Nanjing University, Nanjing, China

Other Affiliations

2013 – present Visiting Investigator, The Scripps Research Institute
2010 – present Center for Molecular Biology and Biotechnology, FAU

G. Courses Taught

- Molecular Genetics of Aging BSC4930, BSC6936
- Methods in Genetics BSC6936
- Genetics Lab BSC4930
- Advanced Research in Integrative Biology BSC7978
- Directed Independent Study BSC4905
- Honors Research in Biology BSC4915
- Honors Internship: Science, Math ISC4947

H. Community Engagement or Out-Reach

- Supervise students from local high and middle schools
- Annual Public Science Festival, Palm Beach Garden, FL
- Palm Beach County Science Fair and Florida State Science Fair
- Masters Broadcom Competition, *Siemens Competition* in Math, *Science* & Technology and The Intel Science Talent Search

ABBREVIATED FACULTY CV

Stephen M. Kajiura, Ph.D. Associate Professor

Biological Sciences, Florida Atlantic University, Boca Raton, FL 33431 USA

www.science.fau.edu/sharklab

A. Professional preparation

University of California at Irvine	*Ecology & Evolution*	Postdoc, 2002-2003
University of Hawaii at Manoa	*Zoology*	PhD, 2001
Florida Institute of Technology	*Marine Biology*	MS, 1994
University of Guelph	*Marine Biology*	Honours BSc, 1991

B. Appointments

2010-present Associate professor, Biological Sciences, Florida Atlantic University

2003-2010 Assistant professor, Biological Sciences, Florida Atlantic University

C. Selected Peer-Reviewed Publications (5 most recent)

Macesic, LJ & SM Kajiura. 2014. Pelvic girdle shape predicts locomotion and phylogeny in batoids. Journal of Morphology, 275: 100-110.

Siciliano*, AM, SM Kajiura, JH Long & ME Porter. 2013. Are you positive? Electric dipole polarity discrimination in the yellow stingray, Urobatis jamaciensis. Biological Bulletin, 225: 85-91. (with cover).

Bedore, CN, ER Loew, TM Frank, RE Hueter, DM McComb & SM Kajiura. 2013. A physiological analysis of color vision in batoid elasmobranchs. Journal of Comparative Physiology-A, 199: 1129-1141.

McCutcheon, SM & SM Kajiura. 2013. Electrochemical properties of lanthanide metals in relation to their application as shark repellents. Fisheries Research, 147: 47-54.

Bedore, CN & SM Kajiura. 2013. Bioelectric fields of marine organisms. Physiological and Biochemical Zoology 86(3): 298-311. (with cover).

D. Selected Other Publications

Meredith, TL & SM Kajiura. 2010. Olfactory morphology and physiology of elasmobranchs. Journal of Experimental Biology 213: 3449-3456.

McComb, DM, TC Tricas & SM Kajiura. 2009. Enhanced visual fields of hammerhead sharks. Journal of Experimental Biology 212: 4010-4018.

McGowan, DA & SM Kajiura. 2009. Electroreception in the euryhaline stingray, Dasyatis sabina. Journal of Experimental Biology 212: 1544-1552.

Kajiura, SM & KN Holland. 2002. Electroreception in juvenile scalloped hammerhead and sandbar sharks. Journal of Experimental Biology 205(23): 3609-3621.

Kajiura, SM & TC Tricas. 1996. Seasonal dynamics of dental sexual dimorphism in the Atlantic stingray, Dasyatis sabina. Journal of Experimental Biology 199(10): 2297-9306.

E. Synergistic Activities (past 5 years)

Supervised 5 PhD students, 3 MS students, 2 non-thesis MS students, 2 post-doctoral researchers, 8 undergraduate DIS students. Served on 6 MS committees, 4 PhD committees. Presented 22 invited seminars, 9 conference presentations, 26 co-authored conference presentations. Peer-reviewed 61 journal manuscripts, invited to participate in 4 scientific workshops, have 1 patent pending.

F. Collaborators and Other Affiliations (past 5 years)

CN Bedore	Duke University	JH Long	Vassar College
J Caprio	Lousiana State University	LJ Macesic	Wheaton College
SP Collin	University of Western Australia	JW Mandelman	New England Aquarium
TP Fitzgerald	Environmental Defense Fund	DM McComb	Ocean First Institute
TM Frank	Nova Southeastern University	DA McGowan	University of Washington
MS Gordon	UCLA	TL Meredith	Florida Atlantic University
A Hansen	University of Colorado	ME Porter	Florida Atlantic University
LL Harris	Florida FWCC	AM Siciliano	Duke University
NS Hart	University of Western Australia	AP Summers	University of Washington
AZ Horodysky	Hampton University	IR Tibbetts	University of Queensland
RE Hueter	Mote Marine Laboratory	TC Tricas	University of Hawaii
LK Jordan	UCLA	BE Wueringer	University of Western Australia
ER Loew	Cornell University		

G. Courses Taught

Undergraduate	Graduate
Evolution	Sensory Biology & Behavior of Fishes
Evolution in Society	Computer Graphics for Biologists
Human Anatomy	Elasmobiology
Directed Independent Study	Integrative Biology I

H. Community Engagement or Out-reach (past 5 years)

Provided on-camera appearances or technical consultation for 8 television documentaries. Provided interviews for numerous print and online media outlets locally, nationally, and internationally.

CURRICULUM VITA MARGUERITE KOCH-ROSE
Florida Atlantic University; Department of Biological Sciences
Aquatic Plant Ecology Laboratory (APEL)
777 Glades Road, Boca Raton, FL 33431-0991
Phone: (561) 297-3325; Fax: (561) 297-2749; email: mkoch@fau.edu
http://www.science.fau.edu/biology/koch/
https://www.facebook.com/FauAquaticPlantEcologyLab

A. Professional Preparation

Ph. D., Marine Biology and Fisheries, 1996. Rosenstiel School of Marine and Atmospheric Sciences, University of Miami, Miami, Florida.

Graduate Exchange Scholar, 1988-1989. Geography Department, University of Exeter, Exeter, England.

M.S., Marine Sciences, 1988. Marine Sciences Department, Center for Wetland Resources, Louisiana State University, Baton Rouge, Louisiana.

Marine/Estuarine Ecology and Fisheries, 1985. University of Washington, Seattle, WA.

Coral reef ecology, 1983. West Indies Laboratory, Fairleigh Dickinson University, St. Croix, West Indies.

B.S., Biology, 1981. Biology Department, Tulane University, New Orleans, LA.

B. Appointments

C. 2008-present **Professor:** Biological Sciences Department, Florida Atlantic University, Boca Raton, FL.

D. 2001-2008 **Associate Professor:** Biological Sciences Department, Florida Atlantic University, Boca Raton, FL.

E. 1996-2000 **Assistant Professor:** Biological Sciences Department, Florida Atlantic University, Boca Raton, FL.

F. 1993-1996 **Research Associate:** Rosenstiel School of Marine and Atmospheric Sciences (RSMAS), University of Miami, Miami, FL.

G. 1989-1992 **Senior Research Scientist:** Everglades Systems Research Division, Research Department, South Florida Water Management District, West Palm Beach, FL.

H. 1988-1989 **Research Associate:** University of Exeter, England.

I. 1985-1988 **Research Assistant:** Center for Wetland Resources, Louisiana State University, Baton Rouge, LA.

J. 1985 **Research Assistant:** University of Washington, Seattle, WA.

K. 1984 **Biologist:** National Marine Fisheries Service, Bering Sea, AK.

C. Selected Peer-Reviewed Publications

Koch, M.S., C. Coronado, M.W. Miller, D.T. Rudnick, E. Stabenau, R.B. Halley, F.H. Sklar (2014) Climate Change Projected Effects on Coastal Foundation Communities of the Greater Everglades using a 2060 Scenario: Need for a New Management Paradigm. Journal of Environmental Management. DOI: 10.1007/s00267-014-0375-y

Strazisar, T., **Koch**, M., Madden, C. Seagrass (*Ruppia maritima* L.) (2014) Life history transitions in response to salinity dynamics along the Everglades-Florida Bay ecotone Estuaries and Coasts DOI 10.1007/s12237-014-9807-4.

Koch, M., Bowes, G., Ross, C., Zhang, Xing-Hai. (2013 electronic; 2014 print) Climate change and ocean acidification effects on seagrasses and marine macroalgae. Review paper: Global Change Biology 19, 103–132, doi: 10.1111/j.1365-2486.2012.02791.x

Koch, M.S., Kletou, D.C., Tursi, R. (2009) Alkaline phosphatase activity of water column fractions and seagrass in a tropical carbonate estuary, Florida Bay. *Coastal Estuarine and Shelf Science*. 83: 403‑413.

Koch, M.S., Schopmeyer, S.A., Nielsen, O.I., Kyhn-Hansen, C., Madden, C.J (2007) Conceptual model of seagrass die-off in Florida Bay: Links to biogeochemical processes. 350:73-88. *Journal of Experimental Marine Biology and Ecology*.

D. Selected Other Publications or Products/Grants

Ocean acidification, temperature and light effects on carbon-use mechanisms, calcification, and growth of tropical macroalgae: Drivers of winners and losers. National Science Foundation (NSF**). PI: $423,000.** 2014-2018.

Ruppia maritima Seed Bank Reassessment Following Large Reproductive Events in the Mangrove Transition Zone and Florida Bay. SFWMD **PI: $20,000**. 2014.

Seagrass Studies in the Mangrove Transition Zone and Florida Bay in Support of Minimum Flows and Levels and Ecosystem Restoration. SFWMD. **PI:$140,000.** 2012-2014.

FAU Climate Change Initiative Priority Theme: Research, Engineering and Adaptation to a Changing Climate: FAU. **PI: $500,000**. 2009-2014.

Seagrass research in Florida Bay in support of ecosystem models and restoration: 2009. SFWMD. **PI: $300,000**.

Germination Response of *Ruppia* seeds in Florida Bay: 2007. SFWMD. **PI: $49,600**.

Salinity, temperature, and light effects on germination success of *Ruppia maritima* in Florida Bay: 2007. A mesocosm and field study. SFWMD. **PI: $49,000**.

E. Synergistic Activities

Developing seagrass ecosystem model with colleagues at South Florida Water Management District to define water regulation schedules to Florida Bay

F. Collaborators and Other Affiliations

Collaborating with the Central Caribbean Research Center (CCMI) to develop their ocean acidification coral reef research program.

G. Courses Taught

Undergraduate: Ecology, Marine Botany Graduate: Climate Change, Marine Ecosystem Management, Coastal Plant Ecology

H. Community Engagement or Out-reach

Actively giving oral presentations and seminars to local community organizations and educational institutions on Climate Change and Ocean Acidification to promote a greater awareness of this topic.

JAMES KWASI KUMI-DIAKA DVM, PhD, DSc.(Hon)

A. Professional Preparation:

DSc. (Hon)	2013	U Science, Arts and Technology College of Medicine Montserrat, British WI	Honoris Causa
PhD	1981	A. B. U Zaria – KSU	Repro pathophysiology
MSc	1976	A. B. U Zaria – KSU	Repro pathophysiology
DVM	1974	A. B. University, Zaria, Nigeria	Veterinary Medicine
BSc	1969	U Guelph, Guelph, ON, Canada	Biology-Biochemistry
	1969/7	U Guelph, Guelph, ON, Canada	Pre-Clinical-Vet Med
Certificate	1983	A. B. U/ U Redding	Vet Economic & Epidem
	1987/90	U Guelph-OVC, ON, Canada	Post-doc/ Res. Associate
Certificate	1994	Madison Area Tech Coll Madison WI	Biotechnology

B. Appointments:

1994 – Present	Tenured Associate Professor-Biol Sciences	FAU
2007 – Present	Faculty Associate - College of Medicine	FAU
2003 – 2010	Adjunct Professor- Biomedical Program	Barry University
1990 – 1994	Visiting Associate Professor; Head of Theriogenology Div. Sch. Vet Medicine, Univ. Wisconsin, Madison WI	
1989 - 1990	Consultant - Intervet Co. Canada	Intervet Pharmaceuticals, Toronto
1987 – 1990	Post-Doc & Clinical Research Associate	Dept. of Population Medicine-OVC University of Guelph Canada
1981-1987	Assoc. Professor of Theriogenology Chair - Theriogenology Unit	A. B. University, Zaria, Nigeria
1976 – 1981	Assistant Professor of Theriogenology	A. B. University, Zaria, Nigeria

C. Selected Peer-Review Publications:

Oseni S.O*, **J Kumi-Diaka**, R Branly, J. Jebelli*, J Warrick*, H Goldsmith*. Pyroelectrically Generated Very Low Dose Ionizing Radiation Enhances Chemopreventive and Chemotherapeutic Effects of Genistein Isoflavone in Human Prostate Cancer Cells.. *J Cancer Prev Curr Res 1(2): 2014*

Shreyasee Chakraborty*, Bibiana Sandoval-Bernal, **James Kumi-Diaka**. Therapeutic Efficacy of Genistein-Topotecan Combination Compared to Vitamin D3-Topotecan Combination in LNCaP Prostate Cancer Cells. *Cell Bio*, 2013, 2, 97-104 .http://dx.doi.org/10.4236/cellbio.2013.23011

Horman V*, Dhandayuthapani S, **Kumi-Diaka J**, Rathinavelu A. Activation of the intrinsic pathway in LNCaP prostate cancer cells by genistein-topotecan combination treatment. Functional Foods in Health and Disease (FFHD), Vol. 3(3), **2013**

Dhandayuthapani Sivanesan*, Marimuthu Palanisamy*, Hormann Vanessa*; **Kumi-Diaka James**; Rathinavelu Appu. Induction of Apoptosis in HeLa cells via Caspase activation by Resveratrol and Genistein. Journal of Medicinal Food. J. Med. Food 16(2) 139-146, **2013**

Johnson M*, **Kumi-Diaka J**, Zoeller R, Graves BS, Merchant KT, Hormann V, Hassanhi M. Therapeutic efficacy of genistein-cytoreg combination in breast cancer cells. J. FFHD 2 (5):137-150, **2012**

D. Selected Other Publications or Products/Grants:

External Reviewer for National/International Journals: (21 journals)
Editorial Boards (Member, Editor, Associate Editor - eight journals)

E. Synergistic Activities:

Evaluator of Academic Curriculum in Reproduction & Physiol for Nigerian universities
Member & Consultant- IACUC: Rambaugh-Goodwin Institute of Cancer Res. 1999 to date
Member: Science Advisory Board – Int. Grp of Scientist & Medical Professionals.
Member - Network of Healthcare Advisors 2006-to date
Reviewer-Consultant Proposed Cancer Biology Text Book –Jones & Bartlett Learning/Acquisition Editor

F. Collaborators and Other Affiliations:

Apu Rathinaveli - Rambaugh-Goodwin Cancer Research Institute/ Nova Southeastern University
Manzur Hassanhi - University of Zulia, Maracaibo, Venezuela
Carlos García - Cytorex Biochemicals, Weston FL
Ephraim Linsky - Rimonest Inc./University of Haifa Haifa Israel
Leonard Girsh, MD - Immunopath Profile Inc. Naples, FL
Alberto Haces - Department of Chemistry, Florida Atlantic University

G. Courses Taught/Teaching - Currently

Cancer Biology - upper level undergraduate [APB 4594]
Immunology - upper level undergraduate [PCB 4233]
Comparative Vertebrate Morphogenesis/Embryology [ZOO 4690]
Reproductive Endocrinology - graduate course
Undergraduate Directed Independent Studies/Research [BSC 4905]
Undergraduate Honors Research [BSC 4917]
Graduate Directed Independent Studies/Research [BSC 6907]
MS Thesis Research [BSC 6905]
Graduate Seminar on Endocrinology and Phytotherapeutics

H. Community Engagement or Out-reach

1) Mentor-Broward Public School – Broward County
2) Guest speaker - Health, Science and Related Society (American Society for Cell Biology)
3) Participant/Member - Take a Stock Mentoring (Broward Public Schools Mentoring am)
4) Reviewer-Consultant for:
    a) Good Food ABC Book: - Mimi Morgenstern; published by Barnes and Noble,
    b) Good Book ABC-Read-along with Mimi: by Mimi Morgenstern: published by Barnes and Nobles.
    c) Immunology Text - by Tizard
    d) Immunology Text - by Nieto and Nieles- review for new text
    e) Immunology Text - by Peter Parham - review for 3rd edition
    f) Digital Laboratory Manual for Vertebrate Development -Wiley Publishers 2013

H. Jay Lyons, Ph.D.

Department of Biological Sciences
Charles E. Schmidt College of Science
Florida Atlantic University
2912 College Ave.
Davie, Florida 33314
Office - (954) 236-1117
Laboratory - (954)236-1189
FAX - (954) 236-1099
e-mail - hlyons@fau.edu

A. Professional Preparation

Ph.D., Medical Science, Aug, 1973. University of New Mexico, Albuquerque, NM
M.S., Zoology, Aug, 1968. Brigham Young University, Provo, UT
B.S., Zoology, June,1966. Brigham Young University, Provo, UT

B. Appointments (Since 1984)

2002 - Associate Chair, Department of Biological Sciences, Charles E. Schmidt College of Science, Florida Atlantic University, Boca Raton, FL
2000 - Associate Professor, Department of Biological Sciences, Charles E. Schmidt College of Science, Florida Atlantic University, Boca Raton, Fl
1998-00 Biology Program Coordinator - College of Liberal Arts, Florida Atlantic University, Davie, Fl.
1994-97 Biology Program Coordinator - College of Liberal Arts, Florida Atlantic University, Davie, Fl.
1994-20 Associate Professor, College of Liberal Arts, Florida Atlantic University, Davie, FL
1984-94 Professor and Chairman, Department of Physiology, Southeastern University of the Health Sciences, North Miami Beach, FL
1992-93 Adjunct Faculty, Florida International University, Bay Vista Campus, College of Liberal Arts, N. Miami Beach, FL
1981-84 Associate Professor and Chairman, Department of Physiology and Pharmacology, Southeastern College of Osteopathic Medicine, North Miami Beach, FL

C. Selected Peer Reviewed Publications

Churchill, P.C., H.J. Lyons, G. Murano and F.D. McDonald. Lack of inhibition of hog renin by heparin. Nephron 22:113-116, 1978.

Lyons, H.J. and P.C. Churchill. The effect of papaverine on in vitro renin secretion. Proc. Soc. Exper. Biol. Med. 160:237-240, 1979.

Lyons, H.J. Studies on the mechanism of renin release from rat kidney slices: calcium, sodium and metabolic inhibition. J. Physiol.(London) 304:99-108, 1980.

Lyons, H.J. and H.E. Laubach. Seminal vesicle and coagulating gland growth induced by intraperitoneal inoculation of fungi in mice. Am. J. Vet. Research 50(1):32-33, 1989.

Lyons, H.J., L. Lyons, P. S. Taraskevich. Potassium-induced secretion of melanotrophs of the neurointermediate lobe of the lizard, *Anolis carolinenesis*. Journal of General and Comparative Endocrinology 116: 396 - 402, 1999

E. Synergistic Activities

University

Environmental Initiative - 1995
Broward Senate - Ad Hoc "teaching delivery" committee - 1995
Broward Faculty Senate - Steering committee 1996 - 1999

University Promotion and Tenure Committee , 2000 - 1
University Faculty Council, 2000

Charles E. Schmidt College of Science
Deans Advisory Committee - 2004 - 2008
TIP committee, 2001 – 2002
College Tenure and Promotion Committee, 2009 -

College of Liberal Arts
Interdisciplinary Studies Committee - 1994 - 1997
M.S. in Liberal Studies - 1995 -1999
Search Committee, microbiology position (chair), 1995
Search Committee, botany, 1995
Search Committee, microbiology (chair), 1996
Search Committee, visiting professor, genetics, 1996
Search Committee, genetics, 1997
Search Committee, molecular biologist, 1998
Division of Science, personnel committee (chair), 1996 -97, 1999 -2000 (chair)
CLA Web Page Committee, 1996 - 2004
CLA promotion and tenure committee, 1995 - 98, 1999 - 2001
CLA promotion and tenure committee, chair, 2001
CLA Steering Committee, 1997 - 2001
CLA Steering Committee, Chair, 1999 - 2000

Department of Biological Sciences
Departmental Personnel Committee (Co-Chair) 2006 -
Search Committee, Biology Instructor (chair) 2001
Advisor, FAU-Broward Premedical Association, 2000 -
Departmental Computer Committee - 2003 - 2008

F. Collaborations and Other Affiliations

G. Courses Taught

2006 – 2015 (1X/YR)
PCB 3703 – Human Morphology and Function I
PCB 3703L – Human Morphology and Function I Laboratory
PCB 3704 – Human Morphology and Function II
PCB 3704L – Human Morphology and Function II Laboratory

1998 – 2007 (2X/YR)
PCB 4023 – Molecular and Cellular Biology

1997 – 2005 (1X/YR)
PCB 4702 – Human Physiology

1994 – 2002 (1X/YR)
PCB 4723 – Comparative Vertebrate Physiology
PCB 4723L - Comparative Vertebrate Physiology Laboratory

1994 – 2000
ZOO 2203 – Invertebrate Zoology
ZOO 2203L - Invertebrate Zoology Laboratory

2006 – 2014
BSC 5933 – Advanced Renal Physiology
BSC 5933 - Advanced Cardiovascular Physiology

H. Community Engagement or Out-Reach

GREGORY T. MACLEOD

A. Professional Preparation

PhD	University of Sydney	1995-99	Neuroscience
MBA	AGSM - University of New South Wales	1989-90	General Management
BS Hons.	University of Sydney	1986	Plant Physiology & Biophysics
BS	University of Sydney	1983-85	Cell Biology & Plant Physiology

B. Appointments

Associate Professor	2013-present	Florida Atlantic University, Biology Dept., Jupiter, FL.
Assistant Professor	2006-13	UTHSCSA, Physiology Dept., San Antonio, TX.
Postdoctoral Fellow	2004-06	University of Arizona, Neurobiology Div., Tucson, AZ
Postdoctoral Fellow	2000-04	University of Toronto, Physiology Dept., Toronto, Canada
Postdoctoral Fellow	1999-00	University of Sydney, Physiology Dept., Sydney, Australia

C. Selected Peer-Reviewed Publications (limited to 5)

1. Wong C-O., Lin Y-Q., Chen K., Chao Y., Duraine L., Lu Z., Yoon W-H., Sullivan J-M., Broadhead G.T., Sumner C.J., Lloyd T.E., Macleod G.T., Bellen H.J. & Venkatachalam K. (**2014**) A TRPV channel in *Drosophila* motor neurons regulates presynaptic resting Ca^{2+} levels, synapse growth, and synaptic transmission. **Neuron**, *DOI: 10.1016/j.neuron.2014.09.030*

2. Ivannikov M.V. & Macleod G.T. (**2013**) Mitochondrial free Ca^{2+} levels and their effects on energy metabolism in *Drosophila* motor nerve terminals. **Biophysical Journal**, 104, 2353-2361.

3. Rossano, A.J., Chouhan A.K. & Macleod G.T. (**2013**) Genetically-encoded pH-indicators (GEpHIs) reveal activity-dependent cytosolic acidification of *Drosophila* motor nerve termini *in vivo*. **Journal of Physiology**, 591, 1691-1706.

4. Chouhan A.K., Ivannikov M.V., Lu Z., Sugimori M., Llinas R.R. & Macleod G.T. (**2012**) Cytosolic calcium coordinates mitochondrial energy metabolism with presynaptic activity. **Journal of Neuroscience**, 32, 1233–1243.

5. Chouhan A.K., Zhang J., Zinsmaier K.E. & Macleod G.T. (**2010**) Presynaptic mitochondria in functionally different motor neurons exhibit similar affinities for Ca^{2+} but exert little influence as Ca^{2+} buffers at nerve firing rates *in situ*. **Journal of Neuroscience**, 30, 1869-1881.

D. Selected Other Publications & Grants (limited to 5)

6. Sakellariou G.K., Davis C.S., Shi Y., Ivannikov M.V., Zhang Y., Vasilaki A., Macleod G.T., Richardson A., Van Remmen H., Jackson M.J., McArdle A. & Brooks S.V. (**2014**) Neuron-specific expression of CuZnSOD prevents the loss of muscle mass and function that occurs in homozygous CuZnSOD knockout mice. **FASEB Journal**, 28, 1666-1681.

7. Rawson, J.M., Kreko, T., Davidson, H., Mahoney, R., Bokov, A., Chang, L., Gelfond, J., Macleod G.T. & Eaton, E.A. (**2012**) Effects of diet on synaptic vesicle release in dynactin complex mutants: a mechanism for improved vitality during motor disease. **Aging Cell**, 11, 418-427.

8. Shakiryanova D., Morimoto T., Zhou C., Chouhan A.K., Sigrist S.J. Nose A., Macleod G.T., Deitcher D.L. & Levitan, E.S. (**2011**) Differential control of presynaptic CaMKII activation and translocation to active zones. **Journal of Neuroscience**, 31, 9093–9100.

Current Extramural Awards:

Title: The Multiple Roles of Mitochondria in Synaptic Transmission
Reference: NIH R01 NS061914
Date: 29/09/2008-06/30/2017
Granting Agency: National Institute of Neurological Disorders and Stroke (NINDS)

Title: Probing the Synapse for pH Microdomains
Reference: **NIH R21** NS083031
Date: 08/15/2013-08/31/2015
Granting Agency: National Institute of Neurological Disorders and Stroke (NINDS)

E. Synergistic Activities

Peer Review for Funding Agencies

National Institute of Health (NIH) – (CMND) 2012, 2013 (panel member)
National Science Foundation (NSF) – (IOS) 2008, 2009, 2010 (ad hoc)
– (IOS) 2011, 2012 (panel member)
American Heart Association (AHA) – (BRAIN 5) 2013 (panel member)
Italian Ministry of Health (MOH) – 2010, 2011 (ad hoc)

Peer review for Journals

Brain Research
Frontiers in Synaptic Neuroscience
Journal of Insect Physiology
Journal of Neurophysiology
Journal of Neuroscience
Neurochemistry International
Synapse

F. Collaborators and Other Affiliations

Current Collaborators and last 3 years (non-FAU only): Hugo Bellen – Baylor College of Medicine; Keith Brain – University of Birmingham, UK; Sue Brooks – University of Michigan; Ben Eaton – UTHSCSA; Barry Ganetzky – University of Wisconsin-Madison; David Krantz – UCLA; Ed Levitan – University of Pittsburgh; Rodolfo Llinas & Mutsuyuki Sugimori – NYU; Ian Meinertzhagen – University of Dalhousie, Canada; Kate O'Connor-Giles – University of Wisconsin-Madison; Shane Rea – UTHSCSA; Michael Romero - The Mayo Clinic Rochester; Thomas Schikorski – University of the Central Caribbean; Holly van Remmen – OMRF; Kartik Venkatachalam– UTHSCH; Harold Zakon – UT Austin.

Affiliated through membership with the Genetics Society of America, and the Society for Neuroscience.

G. Courses Taught

All of my teaching and supervising is at the Wilkes Honors College on the MacArthur campus at Jupiter:
- Honors Cell Biology (PCB4102) (4 credit hours)
- Honors Research in Biology (BSC4915) (1 credit hour)
- Honors Thesis in Biology (BSC4970) (3 credit hours)
- Mentoring of IB and IBAN graduate students (2 currently)

H. Community Engagement or Out-reach

Co-Director and Instructor of the 3 week *Drosophila* Neurobiology summer course at the **Cold Spring Harbor Laboratory** (CSHL): 2012, 2013, 2014.

ABBREVIATED FACULTY CV
Sarah L. Milton, Ph.D.

A. Professional Preparation

Post-doctoral Fellow: Florida Atlantic University 1995-1996: Anoxia and Physiology

Ph.D.(1994), University of Miami Rosenstiel School of Marine and Atmospheric Science, Miami, Florida; Marine Biology and Fisheries (Biological Oceanography).

B.A. Biology (1988), magna cum laude, Cornell University, Ithaca, New York; Honors: With Distinction in all Subjects.

B. Appointments

2011- Associate Professor, Biological Sciences, Florida Atlantic University
2006- 2011 Assistant Professor, Biological Sciences, Florida Atlantic University
2005- Joint appointment, Assistant Professor, Dept of Biomedical Science, FAU
2005-2006 Visiting Assistant Professor, Biological Sciences, Florida Atlantic University
1996-2005 Research Assistant Professor and Adjunct Lecturer, Florida Atlantic University
1996-1997 Adjunct Lecturer, Palm Beach Community College
1995-1996 Postdoctoral Fellow, Florida Atlantic University
1994-1995 Senior Biologist, Evans Environmental and Geological Science and Management, Inc, Miami FL
1992 – 1996 Adjunct Lecturer, Florida Atlantic University

C. Selected Peer-Reviewed Publications

Larson J, Drew KL, Folkow LP, **Milton SL**, Park TJ. 2014. No oxygen? No problem! Intrinsic brain tolerance to hypoxia in vertebrates. J Exp Biol, 217(Pt 7):1024-39.

Sifuentes-Romero, I, Merchant-Larios, M**, Milton, SL**, Moreno-Mendoza, N, Díaz-Hernández, V, and García-Gasca, A. 2013. RNAi-mediated gene silencing in a gonad organ culture to study sex determination mechanisms in sea turtle. Genes, 4(2): 293 - 305.

Caplan SL, **Milton SL**, Dawson-Scully K. A cGMP-dependent protein kinase (PKG) controls synaptic transmission tolerance to acute oxidative stress at the *Drosophila* larval neuromuscular junction. J Neurophysiol. 2013 Feb;109(3):649-58.

Milton, SL, and Dawson-Scully, K. 2013. Alleviating brain stress: what alternative animal models have revealed about therapeutic targets for hypoxia and anoxia. Future Neurology, 8(3):287-301.

Nayak G, Prentice HM, **Milton SL**. 2011. Neuroprotective signaling pathways are modulated by adenosine in the anoxia tolerant turtle. J Cereb Blood Flow Metab. Feb;31(2):467-75.

D. Selected Other Publications or Products/Grants

National Oceanic and Atmospheric Administration **Milton (PI)** 9/1/11 – 8-31/15
ECOHAB: Brevetoxin metabolism and physiology - a freshwater model of morbidity in endangered sea turtles $643,000

American Federation of Aging Research **Milton (PI)** 7/1/08 – 12/31/10
Methionine sulfoxide reductase A and resistance to oxidative damage in an animal model of aging without senescence $60,000

NIH – NIA **Milton (PI)** 8/01/09-7/31/11
Molecular mechanisms of oxidative stress resistance in an animal model of aging without senescence $213,413

Caribbean Conservation Corp **Milton (PI)** 6/1/10 – 5/31/11
Quantifying the energetic cost of disorientation in loggerhead (*Caretta caretta*) and green (*Chelonia mydas*) hatchlings $15,957

Morris Animal Foundation **Milton (PI)** 12/1/10 – 11/30/12
Determination of Innate Immune Function in the Loggerhead (*Caretta caretta*) and Green (*Chelonia mydas*) Sea Turtle by Flow Cytometry $25,202

E. Synergistic Activities

Symposium Chair: Anatomy, Physiology, and Health. 33rd, 34th, 35th Annual *Symposium* on Sea Turtle Biology, 2013, 2014, 2015

Reviewer: textbooks and numerous journals

2013 Univ. of Miami RSMAS: Coming Full Circle: Sea turtles to stroke research and back again. Invited talk

2012 Gordon Research Congress: Brain Energy Metabolism and Blood Flow, Colby College, ME (August 2012). Modulation of reactive oxygen species in the anoxia tolerant turtle. Invited talk

2011 Tenth International Congress of Neuroethology, University of Maryland, MD. Adaptations for long term anoxia tolerance reduce oxidative stress in the freshwater turtle *Trachemys scripta*. Invited talk

F. Collaborators and Other Affiliations

NOAA, Georgia Aquarium, Florida Fish and Wildlife Service, Mote Marine Laboratory

G. Courses Taught

Comparative Animal Physiology plus Lab (UG), Anatomy and Physiology (UG), Environmental Physiology (G), Marine Animal Physiology (G). Seminar in Marine Research (G), Seminar In Hypoxia (G). Respiratory Physiology (Med), Renal Physiology (Med)

H. Community Engagement or Out-Reach

Classroom presentations on sea turtle biology: Morikami Elementary School, Boca Raton, FL, 2011.

Invited speaker Eco-Watch Lecture Series, Gumbo Limbo Nature Center, Boca Raton, FL, October 2011.

Classroom presentation (x2) on sea turtle biology and anoxia tolerance: Palmer Trinity High School, Miami, FL March, 2014

ABBREVIATED FACULTY CV
Rodney K. Murphey, Ph.D.

A. Professional Preparation

University of Minnesota, Minneapolis	Zoology	B.S., 1965
University of Minnesota, Minneapolis	Zoology	M.S., 1967
University of Oregon, Eugene	Biology	Ph.D., 1970
University of California, Berkeley	Zoology	Postdoc, 1970-1971

B. Appointments

2013-present Director, The Jupiter Life Science Initiative, Florida Atlantic University, Jupiter, FL

2006-present Chairman, Department of Biological Sciences Florida Atlantic University, FL

1994-2005 Director, Molecular and Cellular Biology Program, University of Massachusetts, Amherst, MA

1989-1994 Director, Neuroscience and Behavior Program, University of Massachusetts, Amherst MA

1987-1989 Program Director, Developmental Neuroscience, National Science Foundation, Washington, DC

1985-1989 Director, Neurobiology Research Center, State University of New York Albany, NY

1983-1987 Professor, Department of Biology, State University of New York Albany, NY

1975-1983 Associate Professor, Department of Biology, State University of New York Albany, NY

1971-1974 Assistant Professor, Department of Zoology, University of Iowa, Iowa City, IA

C. Selected Peer-Reviewed Publications

Orr, BO, Borgen, MA, Caruccio, P, Murphey, RK. (2014) Netrin and frazzled regulate presynaptic gap junctions at a Drosophila giant synapse. J Neurosci **34**(16):5416-5430.

Godenschwege TA, Murphey RK. Genetic interaction of neuroglian and Semaphorin1a during guidance and synapse formation. (2009) J Neurogenet. **23**:147-155

Uthaman, SB, Godenschwege, TA, Murphey, RK. (2008) The Drosophila ubiquitin conjugase Bendless: a developmental switch required for synaptic growth and maturation. J Neurosci **28**:8615-8623.

Allen, MJ and Murphey, RK. (2007) The chemical component of the mixed GF-TTMn synapse in Drosophila melanogaster uses acetylcholine as its neurotransmitter. Eur J Neurosci. **26**(2):439-445.

Godenschwege, TA, Kristiansen, LV, Uthaman SB, Hortsch M and Murphey, RK. (2006) A conserved role for Drosophila Neuroglian and human L1-CAM in central synapse formation. Curr Biol **16**(1):12-23.

D. Selected Other Publications or Products/Grants

Murphey, RK, Froggett, SJ, Caruccio, P, Shan-Crofts, X, Kitamoto, T and Godenschwege, TA. (2003) Targeted expression of shibirets and semaphorin1a reveals critical periods for synapse formation in the giant fiber of Drosophila. Development **130**:3671-3682.

Murphey, RK and Godenschwege, TA. (2002). New roles for ubiquitin in the assembly and function of neuronal circuits. Neuron **36**:5-8.

Godenschwege, TA, Hu, H, Shan, X, Goodman, CS and Murphey, RK. (2002). Bi-directional signaling by semaphorin1a during central synapse formation in Drosophila. Nature Neuroscience **5**:1294-1301.

Godenschwege, TA, Simpson, JH, Shan, X, Bashaw, GJ, Goodman, CS and Murphey, RK. (2002), Ectopic expression in the giant fiber system of Drosophila reveals distinct roles for Robo, Robo2 and Robo3 in dendritic guidance and synaptic connectivity. J Neurosci **22**:3117-3129.

Allen, MJ, Shan, X and Murphey, RK. (2000). A role for Drosophila Drac1 in neurite outgrowth and synaptogenesis in the giant fiber system. Mol Cell Neurosci **16**:754-765.

E. Synergistic Activities

Established an Undergraduate Mentoring and Research Program at FAU funded by the NSF (NSF# 0829250, $700,570 awarded, entitled "URM: Integrative Biology for Future Researchers", 2008-2013) to serve underrepresented students with Evelyn Frazier (FAU) as co-PI.

Founded a neuroscience group on the FAU Jupiter campus in order to develop collaborative programs with Scripps Institute (TSRI) and Max Planck Florida Institute (MPFI). Both TSRI and MPFI are based in buildings adjacent to the newly renovated FAU neuroscience building.

Experienced in administration at academic and federal institutions: 1. Program Director/PI for two successive HHMI grants during my tenure at the University of Massachusetts Amherst: HHMI Undergraduate Initiative I, 1992-1997 (total direct cost $1.2 million), and HHMI Undergraduate Initiative II, 1994-2000 (total direct cost $1.0 million) and 2. Established a Summer Program in Neuroscience for undergraduates at the University of Massachusetts Amherst through an NSF-REU Site grant (1991-1994).

Provided service to numerous neuroscience groups: 1. Program Director for Developmental Neuroscience at NSF (1987-1989) and 2. Federal grant advisory panels including NSF panels on Developmental Neuroscience, the NSF Advisory Panel to examine the Neuroscience Programs (2000), the NIH Study Section MDCN1 (1999-2004).

Organized/Chaired: Society for Neuroscience as Symposium Organizer (2003), "Delivering the Signal: Stop and Go Traffic at the Synapse", Chairman of the Gordon Conference on Neural Plasticity (1995), the NSF Committee on a neuroanatomical data base (1994) and The East Coast Nerve Net (1985-1994), at the Marine Biology Labs in Woodshole MA.

F. Collaborators and Other Affiliations

Melissa Borgen (The Scripps Research Institute, Florida), Naomi Kamasawa (Max Planck Florida Institute)

G. Courses Taught

BSC 6936 Advanced Electrophysiology Laboratory.

H. Community Engagement or Out-Reach

In the past two years I have spent considerable effort building connections to the two Biotech institutes on the MacArthur campus; Scripps Institute and Max Planck Florida Institute. This includes establishing a joint graduate program, obtaining state funds to establish a joint teaching laboratory, promoting the joint operation with the local community and developing plans to further establish the collaborative neuroscience operation.

Ramaswamy Narayanan, Ph.D.

A. Professional Preparation

B.S. in Chemistry and Physics (1972), Bombay University, India
M.S. in Clinical Biochemistry (1974), Bombay University, India
Ph. D in Biochemistry (1980), National University of Ireland, Dublin

B. Appointments

1998-present	Professor, Department of Biological Sciences
2010-present	Assistant Director, Center for Molecular Biology and Biotechnology
2007-2012	Associate Dean for Research & Industrial Relations, Charles E. Schmidt College of Science
2009-2011	Assistant Vice President for Research, FAU Division of Research
2008-2010	Chair, Department of Chemistry and Biochemistry, Charles E. Schmidt College of Science
2007-2008	Senior Assistant Vice President for Science and Technology
2006-2007	Director, Integrative Biology Ph.D. Program, Charles E. Schmidt College of Science

C. Selected Peer-Reviewed Publications

1. **Narayanan R** (2014) The Next Horizon in Proteomics and Genomics Research. MOJ Proteomics Bioinform 1(1): 00006.
2. Delgado AP, Hamid S, Brandao P, and **Narayanan R** (2014a). A Novel Transmembrane Glycoprotein Cancer Biomarker Present in the X Chromosome. Cancer Genomics Proteomics. Mar-Apr; 11 (2):81-92
3. Delgado AP, Brandao P, Chapado M, Hamid S and **Narayanan R** (2014b). Open reading frame associated with cancer in the dark matter of the human genome. Cancer Genomics and Proteomics. 11: 201-214
4. Delgado AP, Brandao P and **Narayanan R** (2014 c)**.** Diabetes Associated Genes from the Dark Matter of the Human Proteome. MOJ Proteomics Bioinform 1(4) :00020
5. Delgado AP, Brandao P and **Narayanan R** (2013). Mining the dark matter of the cancer proteome for novel biomarkers. Current Cancer Therapy Reviews, 9, 1-13 1W

D. Selected Other Publications or Products/Grants

Narayanan R. (2014) Healthy Genome: A Myth or A Paradigm Shift in Bioinformatics Research? MOJ Proteomics Bioinform.1(4): 00023
Narayanan, R. and Van De Ven W im JM. Transcriptome and Proteome Analysis: A Perspective on Correlation. MOJ Proteomics Bioinform 1 (5): 00027

Patents:
1. Methods of detecting a colon cancer cell. US patent approved **(6,677,119).**

2. Association of ***SIM2*** with cancer. US patent approved (6,780,642)

Grants:

1. **MBRS Support of Continuous Research Excellence at FAU**

Grant Number: 5S06GM073621-04 REVISED, Project Period: 06/08/2005 – 05/31/2009. No cost extension 5/31/2009-6/31/2010|Direct costs: $4M|Agency: NIGMS | Role: **PI**

2. Agency: **American Cancer Society Institutional Grant, IRG 08-063-01:** Period, direct costs: 1/2008-12/31,2011, $180,000| Role: **PI**

E. Synergistic Activities

Editorial Board:

1994-present: Antisense Research & Development; In Vivo
1995-present: Anticancer Research
2004-present: Current Cancer Therapy Reviews
2004- present: The Open cancer Journal
2014- present: MOJ Proteomics and Bioinformatics (Editor)

Reviewer: Cancer Research, Cancer, Experimental Cell Research, Science, Nature Medicine, Nature Biotechnology, Bioinformatics, Journal of Immunology, Antisense Research and Development, Proceedings of the National Academy of Sciences, Journal of Biological Chemistry, Molecular and Cellular Biology, BioMed Central, EMBO Journal.

F. Collaborators and Other Affiliations

Dr. John Delinasios, International Institute of Anticancer Research (IIAR), Attiki, Greece
Dr. W.J.M. Van de Ven, University of Leuven, Belgium
Dr. Pranela Rameshwar, UMDNJ-New Jersey Medical School
Dr. Tsippi Iny Stein, Weizmann Institute of Science, Israel

G. Courses Taught

BSC6458C Applied Bioinformatics (4 Credits)
BSC4930 Concepts in Bioinformatics (2 Credits)
BSC6905 Directed Independent Study (3 Credits)
Masters Thesis (3-6 credits)
BSC 6946 Advanced Research in Bioinformatics (3 Credits)
BSC 6936 Molecular Perturbations in cancer (3 Credits)
BSC6936 Cancer Proteomics (3 Credits)
BSC6936 R- Programming and Bioinformatics (3 Credits)

H. Community Engagement or Out-Reach

FAU Representative to BioFlorida (Board Member)
Life Sciences Steering Committee of the Palm Beach County Business Development Board
Steering Committee of the South Florida I-95 Life Science Corridor Initiative

Erik G. Noonburg, Ph.D.
ABBREVIATED FACULTY CV

A. Professional Preparation

A.B.	1994	University of Chicago. Biology (with honors).
Ph.D.	2000	University of California, Santa Barbara. Department of Biological Sciences.
2000-2003		Postdoctoral Fellow, University of Toronto, Dept. of Zoology.
2003-2005		Postdoctoral Fellow, University of Alberta, Centre for Mathematical Biology.
2005-2006		Research Associate, University of California, Santa Barbara, Dept. of Ecology, Evolution, and Marine Biology.

B. Appointments

2006-2012. Assistant Professor, Dept. of Biological Sciences, FAU.
2012-present. Associate Professor, Dept. of Biological Sciences, FAU.

C. Selected Peer-Reviewed Publications

Naudot, V., Noonburg, E.G. 2013. Predator-prey systems with a general non-monotonic functional response. *Physica* D, 253: 1-11.

Welicky, R.L., Wyneken, J., and Noonburg, E.G. 2011. A retrospective analysis of sea turtle nest depredation patterns. *Journal of Wildlife Management*, 76:278-284.

Noonburg, E.G., Nisbet, R.M., and Klanjscek, T. 2010. Effects of life history variation on vertical transfer of toxicants in marine mammals. *Journal of Theoretical Biology*, 264: 479-489.

Shima, J.S., Noonburg, E.G., and Phillips, N.E. 2010. Life history and matrix heterogeneity interact to shape metapopulation connectivity in spatially structured environments. *Ecology*, 91: 1215-1224.

Byers, J.E., and Noonburg, E.G. 2007. Poaching, enforcement, and the efficacy of marine reserves. *Ecological Applications*, 17:1851-1856.

D. Selected Other Publications or Products/Grants

Beerens, J., Noonburg, E.G., and Gawlik, D.E. 2013. Wading Bird Evaluation Team/Assessment Team Model Integration and Development. Final report to the U.S. Army Corps of Engineers.

Van der Heiden, S., Owen, D., and Noonburg, E.G. 2010. Tree Islands – Surrounding Marsh Eco-Hydrologic Relationship: Soil Thickness and Plant Species Composition on Tree Islands in the Central Everglades. Final Report to the South Florida Water Management District.

Volin, J., Noonburg, E.G., Volin, V. and Owen, D. 2008. Development of a Sampling Prioritization Model to Optimize the Selection of Tree Islands in WCA-3A and 3B for Surveying of *Lygodium microphyllum*. Final Report to the Florida Fish and Wildlife Conservation Commission.

E. Synergistic Activities

Reviewer for: American Naturalist, Conservation Biology, Ecological Applications, Ecology, Ecology Letters, Journal of Animal Ecology, Oecologia, PLoS Biology, Proceedings of the Royal Society B, Theoretical Ecology, Theoretical Population Biology.

F. Collaborators and Other Affiliations

Recent collaborators:
V. Naudot, Dept. of Mathematical Sciences, FAU
J. Byers, Odum School of Ecology, U. of Georgia
J. Shima, School of Biological Sciences, Victoria University of Wellington, New Zealand
S. Swearer, Dept. of Zoology, U. of Melbourne, Australia

G. Courses Taught

EVS 6920 Environmental Sciences Colloquium
PCB 6406 Ecological Theory
BSC 6937 Ecology Research Seminar
STA 3173 Introduction to Biological Statistics

H. Community Engagement or Out-Reach

Science Communication Fellow, Patricia & Phillip Frost Museum of Science

MARIANNE EVELYN PORTER
CURRICULUM VITAE

Department of Biology
Florida Atlantic University
777 Glades Rd.
Boca Raton, FL 33431

Cell: 714-308-4634
me.porter@fau.edu
https://porterbiomechanics.wordpress.com

A. Professional Preparation

2007	PhD, Ecology and Evolutionary Biology, University of California, Irvine
2002	MS, Biology, Northern Arizona University
2000	BS, Zoology, Northern Arizona University

B. Appointments

2014 – present	Assistant Professor, Biology, Florida Atlantic University
2013 Fall	Visiting Assistant Professor, Florida Atlantic University
2012 Fall	Visiting Lecturer, Friday Harbor Labs, University of Washington
2011 - 2013	Affiliate Research Assistant Professor, Department of Biological Sciences, Florida Atlantic University
2009 – 2013	Faculty Research Associate, Department of Biology, Vassar College
2008 – 2009	Postdoctoral Research Associate and Visiting Assistant Professor, Vassar College

C. Selected Publications

Undergraduate collaborators are underlined

– Porter, M.E., C. Diaz Jr., J.J. Sturm, S. Grotmol, A.P. Summers, and J.H. Long Jr. 2014. Built for speed: Strain in the cartilaginous vertebral columns of sharks. Zoology. 117: 19-27.

– Siciliano, A.M. ,J.H. Long Jr., S.M. Kajiura, and **M.E. Porter**. 2013. Are you positive? Electric dipole polarity discrimination in the yellow stingray, *Urobatis jamaicensis*. Biological Bulletin. 25: 85-91.

– Porter, M.E., C.M. Roque, and J.H. Long Jr. 2011. Body form and posture predict the performance of leopard sharks (*Triakis semifasciata*) in yaw turning. Zoology. 114: 348-359.

– Long, J.H., Jr., T.J. Koob, J.T. Schaefer, A.P. Summers, K. Bantilan, S. Grotmol, and **M.E. Porter**. 2011. Inspired by sharks: a biomimetic skeleton for the flapping, propulsive tail of an aquatic robot. Marine Technology Society Journal. 45(4): 119-129.

– Rosenblum, H.G., J.H. Long Jr, and **M.E. Porter**. 2011. Sink and swim: kinematic evidence for axial undulatory and lifting-body mechanisms in negatively-buoyant electric rays (*Narcine brasiliensis*). The Journal of Experimental Biology. 214: 2935-2948.

D. Other Publications or Grants

– NSF. (IOS-0922605, 9/1/2009 – 8/31/2013). Computational and Experimental Biomechanics: Modeling the Non-linear Viscoelastic Behavior of the Vertebral Column of Swimming Elasmobranchs. John Long (PI), **Marianne Porter** (co-PI) and Robert Root (co-PI). $400,000

– Porter, M.E. and J.H. Long Jr. 2010. Vertebrae in Compression: Mechanical Behavior of Arches and Centra in the Gray Smooth-hound (*Mustelus californicus*). Journal of Morphology. 271 (3): 366-375.

– Porter, M.E., C.M. Roque, and J.H. Long Jr. 2009. Turning maneuvers in sharks: predicting body curvature from vertebral morphology. Journal of Morphology. 270: 954-965.

– Porter, M.E., T.J. Koob, and A.P. Summers. 2007. The contribution of mineral to the material properties of vertebral cartilage from the smooth-hound shark *Mustelus californicus*. The Journal of Experimental Biology. 210: 3319-3327. Featured article in *Inside JEB.*

– Porter, M.E., J.L. Beltrán, T.J. Koob, and A.P. Summers. 2006. Material properties and biochemical composition of mineralized vertebral cartilage in seven elasmobranch species (Chondrichthyes). The Journal of Experimental Biology. 209:2920-2928.

E. Courses Taught

BSC 2086	Anatomy and Physiology 2, Florida Atlantic University
BSC 2085	Anatomy and Physiology 1, Florida Atlantic University
Marine Biology Quarter	Marine Biology Research Experience, fall quarter, Friday Harbor Labs, University of Washington
Bio Sci 136	Human Anatomy Lecture, five week summer course, UC, Irvine, taught three summers
Bio Sci 281	Comparative and Functional Anatomy of Vertebrates Lecture and Lab, Vassar College, taught one semester
Bio Sci 106	Introduction to Biological Investigations Lecture and Lab, Vassar College, taught one semester

F. Synergistic Activities

University

2012	Student research day. Florida Atlantic University. Poster judge
2009	Robotics Competition Judge, Vassar College

Society

2013	Society of Integrative and Comparative Biology, judge of student papers for Division of Comparative Biomechanics and Division of Vertebrate Morphology at annual meeting
2013	Society of Integrative and Comparative Biology, session moderator at annual meeting
2012 - 2015	Society of Integrative and Comparative Biology, Student Support Committee
2010-2012	Society of Integrative and Comparative Biology, Division of Comparative Biomechanics graduate student / postdoc representative
2011	Society of Integrative and Comparative Biology, Symposium Organizer for annual meeting, sponsored by three society divisions

H. Community Engagement or Outreach

2010-2011	Vassar Science Scholars Program for Poughkeepsie High School science students
2010	Vassar Science Scholars Program for Poughkeepsie High School science students
2008	Duchess County Science Fair, Judge
2007	Costa Mesa High School, Ask a Scientist Afternoon
2004-2007	Irvine Unified School District Science Fair, Judge
2004-2007	Irvine Unified School District, Ask a Scientist Night
2004	James Irvine Intermediate School Career Exploration Day

PEER REVIEW

2007-2014	18 journals

REFERENCES

Available upon request.

Michael Salmon, Ph.D.
Research Professor

A. Professional Preparation

Earlham College	1955-1959	A. B. 1959
Univ. of Maryland	1959-1964	M. S. 1962
		Ph.D. 1964 (H.E. Winn, thesis advisor)

B. Appointments

NIH Postdoctoral Fellow, 1964-65, University of Hawaii
Assistant Professor, 1965-1967, De Paul University, Chicago Ill.
Assistant to Full Professor, 1967-1989, University of Illinois, Urbana-Champaign
Professor and Chair, Biological Sciences, 1990-1992, Florida Atlantic University, Boca Raton
Professor, Biological Sciences, 1992 – 2002, Florida Atlantic University, Boca Raton
Research Professor, 2003-present, Florida Atlantic University, Boca Raton

C. Selected Peer-Reviewed Publications

Salmon, M., Carthy, R.R., Lohmann, C.M.F., Lohmann, K.J., & Wyneken, J. 2012. Collecting a sample of loggerhead sea turtle hatchlings before a natural emergence does not reduce nest productivity. Endangered Species Research 16:295-299.

Salmon, M. & Scholl, J. 2014. Allometric growth in juvenile marine turtles: possible role as an antipredatory adaptation. Zoology 117:131-138.

Reintsma N., Young, M., & Salmon, M. 2014. Do lighthouses disrupt the orientation of sea turtle hatchlings? Hypothesis testing with arena assays at Hillsboro Beach, Florida, U.S.A. Marine Turtle Newsletter 140:1-3.

Stadler M., Salmon, M., & Roberts, C. 2014. **Ecological correlates of green turtle (*Chelonia mydas*) abundance on the nearshore worm reefs of southeastern Florida (*in press,* Journal of Coastal Research)**

Salmon, M. & M. Reising*. 2014. (Commentary) Emergence rhythms of marine turtles: Is a time sense involved? (*in press,* Chelonian Conservation and Biology)

D. Selected Other Publications or Products/Grants

Chung, F.C., Pilcher, N. J., Salmon, M. & Wyneken, J. 2009. Offshore migratory activity of hawksbill *(Eretmochelys imbricata* L) hatchlings. I. Quantitative analysis of activity, with comparisons to green turtles (*Chelonia mydas* L). Chelonian Conservation and Biology 8:28-34.

Chung, F. C., Pilcher, N. J., Salmon, M. & Wyneken, J. 2009. Offshore migratory activity of hawksbill *(Eretmochelys imbricata* L) hatchlings. II. Swimming gaits, swimming speed, and morphological comparisons. Chelonian Conservation and Biology 8:35-42.

Smith, M.M. & Salmon, M. 2009. A Comparison between the habitat choices made by hatchling and juvenile green turtles (*Chelonia mydas*) and loggerheads (*Caretta caretta*). Marine Turtle Newsletter 126:9-13.

Salmon, M., Hamann, M., Wyneken, J. & Schuable, C. 2009. Early swimming activity by hatchling flatback sea turtles (*Natator depressus*): A test of the "predation risk" hypothesis. Endangered Species Research 9:41-47.

Salmon, M., Hamann, M., & Wyneken, J. 2010. The development of early diving behavior by juvenile flatback sea turtles (*Natator depressus*). Chelonian Conservation and Biology 9:8-17.

Merrill, M.M. & Salmon, M. 2010. Magnetic orientation by hatchling loggerhead sea turtles (*Caretta caretta*) from the Gulf of Mexico. Marine Biology 158:101-112.

Mott, C.M & Salmon, M. 2011. Sun compass orientation by juvenile green sea turtles (*Chelonia mydas*). Chelonian Conservation and Biology 10:73-81.

Young, M., Salmon, M., & Forward, R. 2012. Visual wavelength discrimination by the loggerhead turtle, *Caretta caretta*. Biological Bulletin (Woods Hole) 222:46-55.

E. Synergistic Activities

I serve on the Master's committees of several graduate students working with other faculty; I am chair of the Scholarship Committee and try to match student projects with sources of outside funding.

F. Collaborators and Other Affiliations

Collaborations with faculty at Duke University, University of Malaysia, James Cook University (Australia)

G. Courses Taught

I no longer teach courses but give guest lectures in classes taught by colleagues.

H. Community Engagement or Out-Reach

I work closely with personnel at the Gumbo Limbo Nature Center, and the National Save the Sea Turtle Foundation (NSTSTF), where I also serve as science editor for their natural history magazine, *Environmental Outreach.* I am a frequent contributor to that magazine and actively recruit other scientists who also write articles of interest to its readership.

Thanks to my efforts, the NSTSTF recently contributed $85,000 to the renovation of the FAU Marine Laboratory, with more funding to come next year.

MARY JANE SAUNDERS, Ph.D.

A. Professional Preparation

B.A. Biology	Boston University	1972
M.S. Botany	University of Massachusetts	1980
Ph.D. Botany	University of Massachusetts	1982
Postdoctoral	University of Georgia	1982-1983

B. Appointments

Florida Atlantic University	Professor	2010-
	President	2010-2013
Cleveland State University	Provost	2007-2010
	Interim Provost	2006-2007
College of Science	Interim Dean and Dean	2004-2006
Biomedical and Heath Institute	Director	2003-2004
Department of Biological, Geological and Environmental Sciences	Professor	2003-2010
National Science Foundation	Deputy Division Director	2000-2001
	Program Officer	1999-2000
University of South Florida		
Institute of Biomolecular Science	Director	1993-2001
Biology Department	Asst., Assoc. Professor	1986-2003
Louisiana State University		
Botany Department	Assistant Professor	1983-1986

C. Selected Peer-Reviewed Publications

Ludlow III, J. M.; Xie, T.; Guo, Z.; Guo, K.; Saunders, M. J.; Moorefield, C. N.; Wesdemiotis, C.; Newkome, G. R. Part 257*. "Self-assembly of a hexa*kis*terpyridinyl-functionalized tribenzo-27-crown-9 ether into a novel expanded tetrahedral construct", TBD, 2014.

Sarkar, R.; Kai, G.; Moorefield, C. N.; Saunders, M. J.; Wesdemiotis, C.; Newkome, G. R. Part 252*. "One-step, Multicomponent, Self-assembly of a First-Generation Sierpiński Triangle: From a Fractal Design to Chemical Reality," *Angew. Chem. Int. Ed*., 2014, accepted, in press; DOI 10.1002/anie201407285.

D. Selected Other Publications or Products/Grants and E. Synergistic Activities

Administrative Experience

President Florida Atlantic University

A large public, comprehensive institution, FAU is currently serving more than 30,000 undergraduate and graduate students on seven campuses along more than 100 miles of Florida's southeastern coastline in Broward, Palm Beach and St. Lucie counties. Established in 1961 as a member of Florida's State University System, FAU offers more than 180 degree programs through10 colleges. FAU has an annual budget of $600 million and 4,000 full and part time employees. Personal accomplishments include:

- Led the process of creating the 2012-17 Strategic Plan, which establishes Florida Atlantic University's three signature themes: Marine and Coastal Issues, Biotechnology, and Contemporary Societal Issues.
- Doubled "first-time-in-college" applications from 12,000 to 24,000 in 2011; incoming

class in Fall 2012 was the largest in FAU history and had highly competitive SAT and ACT scores; FAU became the most selective institution in the SUS. The student body reached an all-time high of 30,000-plus in Fall 2012.

- Led the Southern Association of Colleges and Schools (SACS) reaffirmation process, which earned the University the highest possible overall evaluation and special praise for our Quality Enhancement Plan, "Distinction through Discovery."
- Launched the Charles E. Schmidt College of Medicine, including establishing preceptorships with 900 physicians, partnerships with 8 hospitals for Med 3+4 clinical rotations, and a consortium with 5 hospitals for 340 new post-graduate residencies.
- Opened the following new academic facilities in 2011 and 2012 (on time, under cost and LEED-certified):
    - Engineering East Building; LEED Platinum; $46.4 million
    - Culture & Society Building; LEED Gold; $25.6 million
    - Henderson School Expansion; LEED Gold; $6 million
    - Davie West; LEED Gold; $36.2 million
    - HBOI Link Building Renovation; LEED Gold; $9.5 million
    - Innovation Village Student Residence Complex, Phase I; LEED Silver; $99 million (Occupancy 100%)
    - FAU Stadium; LEED Silver; $63.5 million
    - Harbor Branch Research Lab II: LEED Silver; $19.3 million
- Initiated the construction of the following facilities in:
    - Freshman Residence Hall; $41.7 million
    - Expansion of Louis & Anne Green Memory & Wellness Center; $1.8 million
    - Parking Garage III; $13.3 million
    - Expansion of Centre Marketplace; $4 million
    - Expansion of Recreation Center; $1 million
- Grew sponsored research funding from $37.5 million in 2009-10 to $43.2 million in 2010-11 to $48 million in 2011-12, for a three-year total of $128.7 million.
- Balanced budgets of $600 million every year.
- Created the Center for eLearning to increase the University's competitiveness in the rapidly expanding online education arena.
- Established the Center for Teaching and Learning, a multi-departmental initiative to ensure the academic success of every student and provide faculty with teaching tools and resources.
- With university and business partners, launched Life Sciences South Florida and MedUTech, two promising new high-tech industry/university economic development initiatives.

G. Courses Taught

BSC 1005 Life Sciences Fall 2014

BSC 4930 Plant Cell Biology Spring 2015

BSC 6930 Plant Cell Biology Spring 2015

H. Community Engagement or Out-Reach

Increased outreach to the business community through creation of the Division of Community Engagement as FAU President.

Abbreviated Curriculum Vitae 2014

Timothy Charles Theisen, Ph.D.

Faculty Instructor, Department of Biological Sciences
Florida Atlantic University
3200 College Avenue • Davie, Florida 33314
954-236-1061 • ttheisen@fau.edu
http://www.science.fau.edu/biology/faculty_staff/Theisen.htm

A. Professional Preparation:

- Ph.D. (2007) FAU, Davie, Florida Atlantic University, Integrative Biology (fisheries and marine science)
- B.S. (2000) FAU, Davie, Florida, Biology (marine)

B. Appointments:

- **2007 - Present:** Faculty Instructor, FAU, Department of Biological Sciences
- **2003 - 2007:** Research Assistant, FAU
- **2001 - 2007**: Teaching Assistant, FAU

C. Selected Peer-Reviewed Publications:

- **Theisen TC** and Baldwin JB (2012) Movements and depth/temperature distribution of the ectothermic Scombrid, *Acanthocybium solandri* (wahoo), in the western North Atlantic. Marine Biology **157**(10), 2249-2258.
- **Theisen TC** (2009) Report on the status of walleye pollock (*Theragra chalcogramma*) and its fisheries in the eastern Bering Sea and Gulf of Alaska. Seafood Watch seafood report, Monterey Bay Aquarium, San Francisco.
- **Theisen TC**, Bowen B, Lanier W and Baldwin JB (2008) High connectivity on a global scale in the pelagic wahoo, *Acanthocybium solandri* (tuna family Scombridae). Molecular Ecology **17**, 4233-4247.
- **Theisen TC** (2008) Report on the status of Pacific cod (*Gadus macrocephalus*) and its fisheries. Seafood Watch seafood report, Monterey Bay Aquarium, San Francisco.

D. Selected Other Publications or Products/Grants:

- Bowen B and **Theisen TC** (2008) Global population structure of the wahoo. Pelagic Fisheries Research Program Principal Investigators Workshop, Waikiki, Hawaii. Presentation by Bowen B.
- **Theisen TC** and Baldwin JB (2006) Movement patterns and environmental preferences of wahoo, *Acanthocybium solandri.* 59th Annual Meeting, Gulf and Caribbean Fisheries Institute, Belize City, Belize. Presentation by Theisen TC.
- **Theisen TC (PI)** and Whitehurst M (Co-PI). Validation of a new protocol for field measurements of standard metabolic rate in fish. Charles E Schmidt College of Science Faculty Seed Grant, $4,850.00. 2014–2015.
- Baldwin JB (PI) **and Theisen TC (Co-PI).** Movements and depth/temperature distribution of wahoo (*Acanthocybium solandri*) in the western North Atlantic. Institute for Wildlife Science Foundation, $15,000.00. 2009-2011.
- Baldwin JB (PI) and **Theisen TC**. Optimization of a satellite tagging protocol to describe movement patterns and habitat utilization of wahoo, *Acanthocybium solandri*, $15,000.00. 2007-2009.

- **Theisen TC**. Palm Beach County Fishing Foundation Award, $3,000.00. 2006.
- **Theisen TC**. FAU Graduate Scholarship in Marine Science Award, $5,000.00. 2006.
- **Theisen TC**. FAU Graduate Scholarship in Conservation Biology Award, $3,000.00. 2005.

E. Synergistic Activities:

Service:

- Personnel Review Committee
- Bylaws Review Committee
- Promotion and Tenure Policies Review Committee
- Committee to Review Changes to Molecular Genetics and Molecular Biology Courses
- Hiring Committee, Lab Manager and Assistant Lab Manager

Professional Associations:

- American Fisheries Society
- Gulf and Caribbean Fisheries Institute
- Jupiter Inlet Offshore Fishing Club (honorary)

Research Experience:

- Deployment of pop-up satellite tags (PSAT's) onto marine fish; implementation of a program utilizing PSAT's to investigate movement patterns and temperature / depth profiles of marine fish
- Collection of DNA from tissues, generation and analyses of DNA sequence data to describe population genetic structure and phylogeography of highly mobile, pelagic marine fish
- Collection of DNA from tissues, generation and analyses of DNA sequence data and wildlife tag data to investigate distribution of terrapins within Florida Bay
- Analyses of factors affecting growth rates in cultured coral species to be used for regeneration of damaged natural coral reefs

Field Experience:

- Collection of live fish, reptiles, and invertebrate specimens for preservation and for tag and release
- Collection of tissue samples for DNA analyses from a variety of organisms
- Removal of otoliths and other hard parts from marine fish for age and growth studies
- Removal of gonads from marine fish for reproductive studies

F. Collaborations and Other Affiliations:

G. Courses Taught:

Lecture Courses: BSC 5931 Genetic Sequencing and Analyses; PCB 4723 Comparative Animal Physiology; OCB 4043 Marine Biology; PCB 4023 Molecular and Cell Biology; PCB 3063 Genetics

Laboratory and Field Courses: ZOO 6456L Natural History of Fishes; BSC 4403L Biotechnology Laboratory I; BSC 4428L Biotechnology Laboratory II; OCB 4043L Marine Biology Lab; MCB 3023L Microbiology Lab; ZOO 2203L Invertebrate Zoology Lab

Seminar Courses: ZOO 6459 Graduate Seminar in Ichthyology

Guest Lectures: BSC 6936 Ecosystem Based Management; BSC 6390 Integrative Biology

H. Community Engagement or Out-Reach:

ABBREVIATED FACULTY CV

Herbert Weissbach, Ph.D.

A. Professional Preparation

June 1953 B.S., College of the City of New York

Feb. 1955 M.S., (Biochemistry), George Washington University

Feb. 1957 Ph.D., George Washington University (Thesis: Studies on 5-Hydroxyindole Metabolism)

1958 Postdoctoral, University of California, Berkeley, California

B. Appointments

1997-present Director, Center for Molecular Biology and Biotechnology and Distinguished Research Professor, Dept. of Biological Sciences, Florida Atlantic University, Boca Raton, FL

1983-1996 Vice President Hoffmann-La Roche Inc.

1983-1996 Director Roche Institute of Molecular Biology

1969-1983 Associate Director Roche Institute of Molecular Biology

1968-1969 Acting Chief, Laboratory of Clinical Biochemistry, National Institutes of Health, Bethesda, Md.

1953-1968 Chemist, National Heart Institute, Bethesda, MD

C. Selected Recent Peer-Reviewed Publications

Moench, I., Prentice, H., Rickaway, Z., Weissbach, H. Sulindac confers high level ischemic protection to the heart through late preconditioning mechanisms. Proc. Natl. Acad. Sci. USA. (2009) **106 (46)**, 19611-19616.

Brunell, D., Weissbach, H., Hodder P., Brot, N. A High Throughput Screening Compatible Assay for Activators and Inhibitors of Methionine Sulfoxide Reductase A. Assay Drug Dev Technol. (2010) **8 (5)**, 615-620.

Brunell, D., Sagher, D., Kesaraju, S., Brot, N., Weissbach, H. Studies on the metabolism and biological activity of the epimers of sulindac. Drug Metab Dispos. (2011) **39(6),** 1014-1021.

Prentice, H. M. & Weissbach, H. Two novel approaches providing cardiac protection against oxidative stress. In: Novel Stategies in Ischemic Heart Disease. (Ed. Lakshmanadoss, U.), (2012) Pp, 229-246, InTech.

Ayyanathan, K., Kesaraju, S., Dawson-Scully, K., Weissbach, H. (2012) Combination of Sulindac and Dichloroacetate Kills Cancer Cells via Oxidative Damage. PLoS One 7(7): e39949.

Minnerly J, Zhang J, Aldunate R, Weissbach H, Jia K (2013) Methionine Sulfoxide Reductase A Mediates Dietary Restriction-Induced Lifespan Extension in Caenorhabditis elegans. Aging Sci 1: 110.

Sur, A., Kesaraju, S., Prentice, H., Ayyanathan, K., Baronas-Lowell, D., Zhue, D., Hintone, D. R., Blanks, J., and Weissbach, H. Pharmacological protection of retinal pigmented epithelial cells by sulindac involves PPARα. Proc. Natl. Acad. Sci. USA. (2014) (In Press).

D. Selected Other Publications or Products/Grants

Weissbach, H., Brot, N. Catalytic antioxidants and methods of use. Florida Atlantic University October 2006: US Patent 7,129,374.

Weissbach, H., Brot, N. Catalytic antioxidants and methods of use. Florida Atlantic University August 2008: US Patent: 7,414,139.

Weissbach, H., Resnick, L., Binninger, D. Treatment or prevention of cancer and precancerous disorders. Florida Atlantic University September 2012: US Patent: 8,258,181.

Weissbach, H., Resnick, L., Binninger, D. Treatment or prevention of cancer and precancerous disorders. Florida Atlantic University January 2013: US Patent: 8,357,720.

Weissbach, H., Brot, N. Protection of normal cells. CHS Pharma, Inc. July 2013: US Patent: 8,487,128

Weissbach, H., Resnick, L., Binninger, D. Treatment or prevention of cancer and precancerous disorders. CHS Pharma, Inc. December 2013: US Patent: 8,603,985.

Ongoing Research Support

State of Florida - State Appropriation Grant. Weissbach (PI). 07/01/14. **CMBB-Jupiter Instrument Facility**

NIH-1R03DA32473-1. Weissbach (PI). 04/01/11-03/31/14. **Studies on peptide methionine sulfoxide reductases: High Throughput Assay for Activators and inhibitors of MsrA**

FAU Foundation. Weissbach (PI). 01/01/97 to present. **Studies on MsrA and sulindac**

Completed Research Support

FAU- President's Award. Weissbach (PI). 01/01/10-12/31/12. **Elucidate the mechanism by which sulindac selectively enhances the killing of cancer cells under oxidative stress**

NIH-1R15CA122001-01A1. Weissbach (PI). 04/01/07-03/31/10. **Sulindac enhances the killing of cancer cells but protects normal cells under oxidative stress**

SURECAG State Grant. Weissbach (PI). 06/01/08-04/30/10. **Attempts to further the commercialization of sulindac as a therapeutic agent**

Selected Honors and Awards

Member (Governor's appointment) - Biomedical Research Advisory Council (BRAC), State of Florida

Elected Member, National Academy of Sciences

Elected Member, American Academy of Microbiology

Elected Member, National Academy of Inventors

E. Synergistic Activities

Training Programs Developed:

Biotechnology Certificate Program

The Professional Science Masters Degree (PSM) in Biotechnology

University Committees

Member - Institutional Biosafety Committee

Member - Ph.D. Admission Committee, Integrative Biology and IBAN Program

Member – Executive Committee of the Charles E. Schmidt College of Science,

Member – NTE Promotion Committee, Charles E. Schmidt College of Science

F. Collaborators and Other Affiliations

G. Courses Taught

H. Community Engagement or Out-Reach

Recent Invited Lectures

2010 Invited Speaker, 2010 Julius Schultz Visiting Professor Lectures, University of Miami, School of Medicine, Miami, Florida

2011 Invited Speaker @ the 2011 Distinguished Speaker Series, Torrey Pines Institute, Port St Lucie, Florida

2012 Invited Speaker, Lifelong Learning @Florida Atlantic University, Jupiter, FL

2013 Invited Speaker, USDA Port St. Lucie FL

2014 Invited Speaker, 2014 Vaccine & Gene Therapy Institute of Florida, Port St Lucie, Florida

JEANETTE WYNEKEN, Ph.D. ABBREVIATED FACULTY CV

A. Professional Preparation

1988 Ph.D. in Biology, Dept. of Ecology, Ethology and Evolution, Univ. of Illinois
1978 B.A. in Biology (minors: Chemistry, Philosophy), Illinois Wesleyan Univ.

B. Appointments 2000-present

2014(August)-	Professor, Department of Biological Sciences, Florida Atlantic University, Boca Raton, Florida
2006-2014 (through July)	Associate Professor, Department of Biological Sciences, Florida Atlantic University, Boca Raton, Florida
2008-2011	Graduate faculty, Clemson Univ. (Ph.D. committee)
2007-2009	Graduate faculty, Univ. Alabama Birmingham (Ph.D. committee)
2000-2006	Assistant Professor, Department of Biological Sciences, Florida Atlantic University, Boca Raton, Florida
1995-2007	Instructor, Harbor Branch Oceanographic Inst., Fort Pierce, Florida
1995-2009 (summer term)	Adjunct Assist. Professor, Florida Institute of Technology, Melbourne, Florida
1998-2003	Instructor, Graduate faculty, Duke University Marine Laboratory, Beaufort, North Carolina
1996-2000	Research Assistant Professor, Florida Atlantic University, Boca Raton, Florida

C. Selected Peer-Reviewed Publications

Stacy BA, CJ Innis, P-Y Daoust, J Wyneken, M Miller, H Harris, MC James, EF Christiansen, A Foley. Solitary Large Intestinal Diverticulitis in Leatherback Turtles (*Dermochelys coriacea*). Vet Pathol doi: 10.1177/0300985814549211

Mansfield KL, Wyneken J, Porter WP, Luo J. 2014 First satellite tracks of neonate sea turtles redefine the 'lost years' oceanic niche. Proc. R. Soc. B 281: 20133039. http://dx.doi.org/10.1098/rspb.2013.3039

Bovery CM, J Wyneken. 2013. Sea Turtles in Florida's Atlantic Waters. Marine Fisheries Review.75(3):1-12.

Perrault JR, DL Miller, J Garner, J Wyneken. 2013. Mercury and selenium in leatherback sea turtles (*Dermochelys coriacea*): hazard quotients, population comparisons, implications for hatching success and directions for future research. Science of the Total Environment 463–464 (2013):61–71

Mansfield KL, J Wyneken, D Rittschof, M Walsh†, CW Lim†, P Richards, 2012. Satellite tag attachment methods for tracking neonate sea turtles. Marine Ecology Progress Series. 457: 181–192

D. Selected Other Publications or Products/Grants

Conrad, JR, J Wyneken, JA Garner and S. A. Garner. 2011. Experimental assessment of aggressive dune vegetation impact and its control on leatherback sea turtle (*Dermochelys coriacea*) nest success. Endangered Species Research. 15: 13–27.

Rivera ARV, J. Wyneken, R W. Blob. 2011. Forelimb kinematics and motor patterns of swimming loggerhead sea turtles (*Caretta caretta*): are motor patterns conserved in the evolution of new locomotor strategies? Journal of Experimental Biology 214:3314-3323

Wyneken. J. 2013. Contemporary Computed Tomography and Magnetic Resonance Imaging of Reptile Anatomy. Chapter 9. *In*. Current Therapy in Reptile Medicine and Surgery. D.R. Mader and S. Divers, eds. Elsevier Health Sciences. St. Louis. Pp 93-106.

Wyneken J, KJ Lohmann & J Musick eds. 2013. *The Biology of Sea Turtles* Volume III. CRC Press/Taylor and Frances Group. Boca Raton, 457 pp.

Wyneken, J., M. Godfrey, & V. Bels, eds. 2008. *The Biology of Turtles*. CRC Press/Taylor and Frances Group. 389 pp.

Grants and contracts: I received more than $350,000 in external funding 2007-2014

E. Synergistic Activities

I have more than a decade of experience as advisor to graduate students (Masters and doctoral advisor) in Biological Sciences, and have served on graduate committees of students in Biological sciences, Integrative Biology, and Environmental Sciences at FAU; I served on a number of thesis and dissertation committees at other major US and foreign institutions, occasionally as co-advisor. I have more than 25 years of experience studying the morphology, ecology, behavior, and physiology of reptiles and particularly, marine turtles. These studies resulted in a number of very successful collaborations.

I integrate my research into my classes including Biology of Sea Turtles, Comparative Vertebrate Morphogenesis, Research in Marine Biology seminar and Marine Conservation Biology.

F. Collaborators and Other Affiliations

I have collaborated with 72 different professionals on peer-reviewed publications since coming to FAU, 53 in the past 5 years.

Ph.D. External Committee Memberships:
Anthony Rafferty (Monash University, Australia) external reviewer of Ph.D. 2012
Carla M. L. Pereira (Univ. of Queensland, Australia) external reviewer of Ph.D. 2013
Angela Rivera (Clemson University) 2011
Anne Marie LaBlanc (University of Alabama-Birmingham) 2009

G. Courses Taught 2009-2014

Comparative Vertebrate Morphogenesis, Lecture Zoo4690
Adv. Comparative Vertebrate Morphogenesis Lecture (new course) Bsc6936-003
Comparative Vertebrate Morphogenesis Lab Zoo4690L
Adv. Comparative Vertebrate Morphogenesis Lab (new course) Bsc6936-004
Directed Independent Study - Sea Turtle Research –BSC4905
Directed Independent Study – Reptile Anatomy –BSC4905
Marine Conservation Biology (new course) Bsc6936-013, -014, -015
Environmental Sex Determination (new course) BSC 6936
Ecological Development (new course) BSC 6936-005
Research Seminar in Marine Science BSC6905-032, -033 -034
Environmental Change/Marine Organisms & Ecosystems in Changing Climates (co-taught with M. Koch) (new course) BSC6936-016/ BSC6905-016

H. Community Engagement or Out-Reach

Each year I give 4-8 general and professional lectures in reptile anatomy and physiology, sea turtle biology, oceans and climate, marine animal dispersal, and conservation. In the past 5 years provided my expertise as science advisor National Geographic Magazine's feature on leatherback turtles, (TV4, UK) *Inside Nature's Giants* (python anatomy, and sea turtle anatomy). Locally I have given three lectures for the Loggerhead Marinelife Center's volunteers, 3 lectures to Gumbo Limbo Nature Center, three lectures to local Rotary Clubs and three general talks to lectures to Harbor Branch Oceanographic Institution.

ABBREVIATED FACULTY CV

Xing-Hai Zhang

A. PROFESSIONAL PREPARATION

University of Calgary, Canada	Plant Molecular biology	Ph.D.	1994
Michigan Technological University, USA	Plant Molecular biology	Post-doctoral	1994-1996

B. APPOINTMENTS

2009-present Associate professor, Department of Biological Sciences, Florida Atlantic University, FL.
2003-2009 Assistant professor, Department of Biological Sciences, Florida Atlantic University, FL.
1997-2003 Research associate, USDA, Photosynthesis Unit/University of Illinois, Department of Crop Sciences, Urbana, IL.

C. SELECTED PEER-REVIEWED PUBLICATIONS

Zhang X.-H., Keating P., Wang X.-W., Huang Y.-H., Martin J., Hartmann J.X. and Liu A. (2014) Production of functional native human interleukin-2 in tobacco chloroplasts. **Molecular Biotechnology**, 56: 369–379.

Barone P., **Zhang X.-H.** and Widholm J.M. (2014) Tryptophan and Indole Analog Mediated Plastid Transformation. In *Chloroplast Biotechnology: Methods and Protocols* (Maliga P., ed). Methods in Molecular Biology, vol. 1132, Springer Science+Business Media New York, pp 187–203.

Webb J. and **Zhang X.-H**. (2013) Organ disparate allocation of plasticity in phosphorus response as an underlying mechanism for the sawgrass-to-cattail habitat shift in Florida Everglades wetlands. **International Journal of Plant Sciences**, 174: 779–790.

Koch M., Bowes G., Ross C. and **Zhang X.-H.** (2013) Climate change and ocean acidification effects on seagrasses and marine macroalgae. **Global Change Biology**, 19: 103–132.

Li Q., Lin Y.-C., Sun Y.-H., Song J., Chen H., **Zhang X.-H.**, Sederoff R.R. and Chiang V.L. (2012) Splice variant of the SND1 transcription factor is a dominant negative of SND1 members and their regulation in *Populus trichocarpa*. **Proceedings of the National Academy of Sciences, USA**. 109: 14699–14704.

Shi R., Sun Y.-H., **Zhang X.-H**. and Chiang V.L. (2012) Poly(T) adaptor RT-PCR. In *Next-Generation MicroRNA Expression Profiling Technology: Methods and Protocols* (Fan J.-B., ed). Methods in Molecular Biology, vol. 822, Humana Press, New York, pp 53–66.

D. SELECTED OTHER PUBLICATIONS OR PRODUCTS/GRANTS

*Sun Y.-H., *Shi R., ***Zhang X.-H.**, Chiang V.L. and Sederoff R. (2012) MicroRNAs in trees. **Plant Molecular Biology**, 80: 37–53. (*equal contribution)

Lin L., Webb J. and **Zhang X.-H.** (2011) Involvement of arbuscular mycorrhizal symbiosis in the distribution of sawgrass and cattail in Florida Everglades. **Wetlands**, 31: 263–272.

Zhang X.-H., Webb J., Huang Y.-H., Lin L., Tang R.-S. and Liu A. (2011) Hybrid Rubisco of tomato large subunits and tobacco small subunits is functional in tobacco plants. **Plant Science**, 180: 480–488.

Tsai F.-Y., **Zhang X.-H**., Ulanov A. and Widholm J.M. (2010) The application of the yeast N-acetyltransferase *MPR*1 gene and the proline analog L-1 azetidine-2-carboxylic acid as a selectable marker system for plant transformation. **Journal of Experimental Botany**, 61: 2561–2573.

Patent Widholm J.M., Barone P. and **Zhang X.-H.** (December 7, 2010) Use of Tryptophan Indole and Anthranilate Analogs as Plant Transformation Selection Agents, US Patent number 7,847,152 B2.

Grant PI: Koch M., Co-PIs: **Zhang X.-H.** and Bowes G., Ocean acidification, temperature and light effects on carbon-use mechanisms, calcification, and growth of tropical macroalgae: Drivers of winners and losers., National Science Foundation, $422,788; 2014-2017.

E. SYNERGISTIC ACTIVITIES

2007-present	Mentor, NSF Undergraduate Research and Mentoring program at FAU.
2009	Judge, Science Olympiad (cell biology), regional, South Florida.
2007	Mentor, High School eCybermission Internship (US Army).

F. COLLABORATORS AND OTHER AFFILIATIONS

George Bowes, University of Florida, Gainesville, FL.
Vincent L. Chiang, North Carolina State University, Raleigh, NC.
C.C. Chinnappa, University of Calgary, Calgary, Canada.
Nwadiuto Esiobu, Florida Atlantic University, Davie, FL.
Marguerite Koch, Florida Atlantic University, Boca Raton, FL.
Shili Miao, South Florida Water Management District, West Palm Beach, FL.
Archie R. Portis, USDA, Urbana.
Cliff Ross, University of North Florida, Jacksonville, FL.
Ronald Sederoff, North Carolina State University, Raleigh, NC.
Herbert Weissbach, Florida Atlantic University, Jupiter, FL.
Jack Widholm, University of Illinois, Urbana, IL.

G. COURSES TAUGHT

Genetics (PCB 3603), 2014

Principle of Plant Physiology (BOT 4503/BSC 6936), 2004-2014

Plant Physiology Laboratory (BOT 4503L/BSC 6936), 2004-2014

Plant Biotechnology (BOT 4734C/BSC 6936), 2005, 2007, 2009, 2011-2014

H. COMMUNITY ENGAGEMENT OR OUT-REACH

2012-present Adviser, Biotechnology program, Spanish River High School, Boca Raton, FL.

Reviewer for “Plant Molecular Biology Reporter”, “Applied Biochemistry and Biotechnology”, “Molecular Biotechnology”, “Plant Growth Regulation”, “Archives of Biochemistry and Biophysics”, “International Journal of Plant Sciences”, “Biological Invasions” and other journals.

Florida Atlantic University

Biological Sciences Department

Program Review

March 22, 2015

Review Team:

Donald Edwards (Georgia State University)

Lynne Fieber (University of Miami)

Michael Horswell (Florida Atlantic University)

OVERVIEW

The team of Dr. Lynne Fieber, Dr. Donald Edwards, and Dr. Michael Horswell reviewed FAU's Department of Biological Sciences on March 15-17, 2015. Ms. Lynn Sargent, Executive Assistant to the Dean of the College of Science provided the reviewers with a self-study and a detailed itinerary. Ms. Marjorie Cazeau provided logistical support. Additionally the review team met (in approximate order) with:

- Rod Murphey, Chair of Biological Sciences
- Russ Ivey, Interim Dean, College of Science and Associate Provost
- Several small groups of the Department faculty over meals
- Charles Roberts, Associate Dean for Graduate Studies
- Ingrid Johanson, Senior Associate Dean for Student Affairs
- Evonne Rezler, Assistant Dean for Assessment
- Ed Pratt, Dean of Undergraduate Studies
- A group of senior (tenured) faculty
- A group of non-tenure track faculty and junior faculty
- Michele Hawkins, Associate Provost for Planning and Budget
- Deborah Floyd, Dean of the Graduate College
- Daniel Flynn, Vice President for Research
- Graduate students in Biological Sciences
- Undergraduate majors in Biological Sciences.

For the names of all the individuals met, see "People Met list" in appendix.

More formally, the review team was asked to identify the steps needed for significant improvement in the department's effectiveness and recognition in research and instruction. We were also asked to respond to the points raised towards the end of the self-study, in the sections on Strengths and Opportunities, Weaknesses and Threats, and Resources, and Future Directions. We have attempted to address these in the context of the discussions we had on these issues with the students, faculty, and administrators whom we met.

Department and University Strengths

Collegiality. Progress in developing the strengths of the department and university depend on the character, vision and energy of the people involved. We were very happy to find that all of the people we met in our interviews, including students, faculty, and administrators, appeared to us to be friendly, thoughtful people who are keen to improve Biological Sciences at FAU. They all had very favorable views of the Department, its programs and accomplishments, but were aware of the challenges it faces. Both the strengths and the challenges they identified were those also identified in the self-study.

Emerging strengths in neuroscience and environmental studies. The satellite campuses at Jupiter, Davie, and Harbor Branch have provided the university opportunities to grow world-class research and teaching centers in neuroscience and environmental science.

Scripps Research Institute and Max Planck Florida Institute at the Jupiter campus amplify the neuroscience research and teaching opportunities and the visibility of neuroscience at FAU. The group of accomplished FAU neuroscience faculty and students at Jupiter interact daily with Scripps and Max Planck neuroscientists. This interaction is invaluable to both research and instruction, and dramatically enhances the international visibility of the neuroscience program.

Environmental sciences has a strong core of faculty and students working at the Davie campus. They are engaged both in advancing the discipline and addressing the environmental challenges facing Florida.

The research productivity of the Biological Sciences faculty as a whole has increased markedly over the last decade, doubling the numbers of scientific presentations, publications, and grant applications submitted. This is quite remarkable, especially in the face of a simultaneous doubling of the number of FTE students to teach and a national tightening of research support.

Undergraduate and graduate research. Undergraduates are actively engaged in research in faculty laboratories across the disciplines and campuses. Both Masters and Ph.D. students are engaged in rigorous programs and active in research on the Boca, Davie and Jupiter campuses. MS and PhD support models co-exist in the Department, and faculty's desire to train preferentially one or the other is respected.

Transparency in governance. We were told that departmental decisions were reached after open discussion among all stake-holders. This transparency extended to the faculty discussions of tenure applications, where only the votes were confidential. This transparency enables junior faculty to see how the P&T guidelines are interpreted by senior faculty, and thereby to understand what is actually required by them for tenure. One recently promoted faculty member said that this process was "invaluable" in helping to plan well before the tenure year.

It seems to us that this could only occur among faculty who had high confidence in each other and in their leaders and were well-accustomed to interacting in a friendly and professional manner.

Energy, enthusiasm and ambition. All of the faculty and students we met were enthusiastic and ambitious for the university and its research and teaching programs. They (and we) were also impressed by how much the research programs, particularly the neuroscience program, had developed in the last few years. They stated that this growth was the result of energetic, far-sighted leadership in the Department, College, University, and the state.

Faculty expressed enthusiasm about building the research programs on the Jupiter and Davie campuses while retaining close ties between all three campuses.

Challenges and Opportunities

Departmental cohesion across separate campuses. An essential characteristic of a dynamic, growing university is a high frequency of interaction of students and faculty both within and between units. Both planned and chance encounters lead to new insights, new projects, and new discoveries. However the discipline-specific separation of research and teaching on different FAU campuses creates significant challenges for continued growth and departmental cohesion. These challenges are exacerbated by the lack of frequent, efficient, and predictable transportation between the campuses. It increases the time and the energy needed to participate in any activity not located at one's home campus, causing everyone to think twice when contemplating activities at another campus. This barrier reduces the opportunities for learning, teaching, and collaborative research available to students and faculty on their own campus and on the other campuses. It slows all of these activities while it erodes the sense of community within the department that is necessary for them to occur.

If timely and efficient transportation between the campuses is not available as the faculty and student populations at Jupiter and Davie grow, community feeling will erode across the Department and bring pressures to split the department along geographic and disciplinary lines. Faculty who originated on the Boca campus and moved to Davie or Jupiter will retire and be replaced by new faculty without that experience and sense of involvement with the Boca campus. As the numbers of new faculty grow on those campuses, so will a sense of self-sufficiency, especially as they share a sub-discipline of biology with their local colleagues (e.g. neuroscience on the Jupiter/Scripps campus, environmental science at Davie). This will reduce each group's interest and willingness to participate in research, instruction, and service with their Biology colleagues on the other campuses and it will promote the fission of the department.

The University should develop an effective shuttle bus system that runs between the campuses as soon as possible. Ideally, it would run on a fixed schedule several times a day, in both directions, from Dania Beach in the south to Harbor Branch in the north, and vice-versa. Equipped with a down-loadable app that tracks the bus locations, students and faculty could minimize their wait times at bus stops.

This transportation system would enable faculty and students to move quickly and reliably between campuses for round trips that might last only one-half day. This would facilitate class scheduling, teaching schedules, research collaborations, and spontaneous interactions between campuses. It would also enable all faculty to share more easily in the teaching burden located primarily on the Boca campus. Sharing the burden, and being seen to share the burden, will maintain the department collegiality we observed.

We heard some discussion about the possible use of the Tri-rail if there were an adequate shuttle between the Boca Raton and Jupiter campuses. The undergraduate

students we interviewed indicated that this was impractical as the train trips took up to two hours for what should be a 1-hour trip.

Increasing intercampus interactions. Even with rapid, reliable transportation, a sense of departmental community across campuses will be a challenge to maintain and grow as the numbers of Biology faculty, students and staff on each campus grow. At present, this community sense is promoted both by the low numbers of faculty and students on each satellite campus and the dynamic leadership of the department. While it is strong, however, this sense of community should be reinforced by cultivating institutional habits and expectations that support it. These could include a monthly "Biology Day" on the Boca campus that would include a face-to-face all-department meeting, followed by a scientific talk by a distinguished guest and a departmental party/scientific exchange, with poster presentations by graduate and undergraduate students and a spread of refreshments. Inter-campus teaching might be incentivized and structured to encourage interactions and make it seem cost-effective to students and faculty to spend a day away from home-base.

The challenge of 2600 Biology majors for 31 faculty. It is remarkable that the 28 tenure-track Biology faculty and 3 instructors are able to teach 2600 undergraduate majors effectively while maintaining a vigorous graduate program and their individual research programs. Their success results not just from hard work, but also from efficient organization and leadership. We were told that this organization enables the tenure-track faculty to have a one-one teaching load: one large and one smaller class per year. That schedule enables the faculty to focus time and energy on their research while fulfilling the teaching needs of the department. We were also told that non-tenure track faculty have personal laboratories in which they perform their own research, often with the help of undergraduates. This arrangement ensures that, like the tenure-track faculty, the non-tenure track faculty see themselves as scientists as well as teachers, a view that is shared by their colleagues and their students. The morale-boosting effect of this arrangement enables them to be effective in instructing their many large classes and to share their research with students.

Despite these efforts, the large student/faculty ratio means that many students in the large classes have little opportunity for direct interaction with their instructor, whose assessments of their accomplishments are often confined to exams graded by machine. The large classes may or may not be assisted by a teaching assistant (TA), but TAs do teach the laboratory courses that are associated with the large classes. The laboratory courses seem to be extremely well organized and efficient at teaching the very large number of students who take them. The TAs are graduate students who are closer in age and culture to the students, which may facilitate finding solutions to problems that arise for the students. Nonetheless, every effort should be made to reduce the student/faculty ratios, which appear to be higher than the FAU norm. This will require hiring additional faculty, but changes in the way courses are organized may also help. One such change may be to break one session per week of a large lecture class into smaller "recitation" sections of at most 30 students, each taught by a faculty member or a senior graduate student. A 3-credit course in this model would divide into two lecture hours per week and one recitation hour, in which the recitation section would emphasize student-teacher interaction and problem solving.

Retention rates. A primary challenge facing the Department is the failure to retain Biology majors until graduation. According to Fig. 4 in the self-study, the number of Biology majors in 2013 was lowest among the second year students, and greatest among the fourth-year class. If these numbers reflect the trend of each student class over time, the data show that the number of Biology majors who start at FAU as freshmen falls by 50% over three years, while transfer students account for the later rise. We were told that many of the students who drop the major also leave the university; the university is then penalized by the state for the lower retention rate.

Two reasons for the loss of students who begin their career at FAU were suggested to us: failure to progress in the major and personal plans to spend only a year or two at FAU before transferring elsewhere. The undergraduates we interviewed told us that many students begin their career at FAU already planning to transfer to the University of Florida or Florida State University. There are many possible reasons for these plans, including the family tradition, and differences in campus life, reputation, and education and research opportunities.

We were told that many students may fail to progress in the major because they are either not prepared for or simply not enthusiastic about the series of chemistry, physics and mathematics courses required early in the career of a biology major. A large fraction of Biology majors declare their pre-med status, and the Biology curriculum is arranged to accommodate them. Premedical students are asked to take a set of demanding courses in chemistry, physics, and mathematics at the outset of their education. However, we were told that only 15% of students are able to graduate in four years and less than 50% graduate in six years, and a very small percentage are eventually able to matriculate in medical school. This suggests that many students are misplaced as pre-medical students and as Biology majors. We learned from both students and faculty that several factors contribute to this. The first is that the students are poorly prepared at entry, both in their knowledge, learning skills, and work habits. It is practical to urge such applicants to seek remedial education elsewhere, perhaps at the local community colleges.

A second factor is that the incoming freshmen are ignorant of all the possible careers in healthcare and in life sciences generally, including business and finance, law, and public policy. We suggest that freshmen be required to learn about these in a first semester, 1 credit course that introduces them to careers in the life sciences, broadly construed. Such a course, which could feature a variety of outside speakers from across the life sciences, may help students and their parents consider the possibility of "my son the hospital CFO" instead of only "my son the doctor". If the students are to pursue these alternate life science career paths, their undergraduate training must support them. Majors or major/minor combinations that support biology/business, biology/pre-law, or biology/public policy should be developed to give students alternatives to the traditional hard-science path. Faculty from the Medical and Business Colleges may contribute to these courses, a step that should appeal to students while also helping Biological Sciences. This will enable students to make positive choices among attractive alternatives before they ship-wreck on the shoals of organic chemistry. Those of us in public higher education would do well to remember that memories of their own shipwrecks may linger in the minds of the state legislators who sit on the committees that decide university budgets.

Enticing Biology majors and avoiding shipwrecks. Many beginning students are likely to be tentative in the commitment to a Biology major, or they are much more enthusiastic about aspects of biology that don't require an initial immersion in the hard sciences. They should be able to take a course as first-term freshmen that excites them about biology and the major. It should also motivate them for the hard science courses by showing how chemistry, physics and math help explain developments in the life sciences.

It is also likely that the chemistry, physics and math courses focus on subjects that are appropriate for their own majors but are not needed by biology majors. These courses are often set up for chemistry, physics and math majors and are staffed by young people who, having faced the rigors of undergraduate and graduate training in their discipline, want to make sure that biology majors appreciate the finer points of the subject. However, by working with the chemistry, physics, and math faculty to design courses that are appropriate for the biology students, the biology faculty would help their students learn these subjects in a biological context and enhance retention. For instance, calculus might be taught in a "Calculus for Life Sciences" course where the examples and motivations are relevant to the students' interests. Moreover, the ready availability of software for numerical integration and differentiation reduces the need to memorize analytical procedures, and also provides opportunities for students to understand and appreciate how models of biological populations or chemical reactions work.

We heard from faculty and students that the centralized advising and registration processes often do not serve either the students or the Biology department well. Problems in advisement may arise because the advisors and Biology department are not in touch or because the advisors have independent views of the appropriate sequence of courses students should take. We were told that pre-med students were advised to take the series of hard-science courses regardless of their level of preparedness for them. We also learned that students were advised away from certain courses because they were "too hard", and not alerted to new courses that the Biology department had developed.

Questions about course scheduling and registration drew many complaints from students. We were told that students must go online immediately at the opening of registration to have a chance to get into desired or required courses. Classes are said to fill up quickly, even when they are required for the major, so that students who miss the opening of registration may have to defer taking them. One student we interviewed reported that she had to postpone graduation and register for an additional semester to take a required course that had not been available for her earlier. Another student reported that it was only through his personal contacts and research that he was able to plan a sequence of courses that would satisfy both graduation requirements and his interests and still allow him to graduate in 4 years. We strongly recommend that advisement, especially for sophomores and upperclassmen, be brought back into the department. It is important that students learn about the offerings and opportunities in Biology from the department faculty, and that the department faculty learn quickly what the students find frustrating in pursuing the major. We also recommend that the department interview a group of their most successful students shortly before their graduation to learn from them what is and is not working for Biology majors. Like the students we interviewed, such a group will contain articulate, keen observers who will be eager to report what did and did not work for them and their peers.

Support and interventions. Failing students can often be helped by interventions that help them face reality and seek specific help. While the university may have a general program, Biology can help its own students by creation of student-run structures that provide peer support for specific courses and more general problems. One of these might be an undergraduate Biology Club that might serve several functions: (i) to bring life science professionals to campus to discuss careers; (ii) to help manage a peer-to-peer tutoring service for individual courses; (iii) to organize outreach activities, like school visits and demonstrations for events like Brain Awareness Week or Earth Day.

Data-driven answers. It is difficult to know the truth on the ground, and therefore what to recommend, from our brief interviews with administrators, faculty, and students. However, data should be available to help determine why Biology loses majors. Answers may be available from advisement interviews, from course evaluations and from student grades. These data may be supplemented by surveys that ask specific questions.

Graduate programs and Graduate Student support. Many faculty members mentioned that it was very hard to recruit graduate students from a national market given the non-competitive stipends and the lack of health insurance support. This has serious implications for the research program that GTAs often support by working in faculty labs and doing their own doctoral research projects. We recommend the University invest in more competitive GTA stipends and health insurance.

Faculty mentoring program. Though their faculty colleagues are generous with their time, some junior faculty mentioned a lack of a formal mentoring program meant that they often do not have clear and timely guidance for issues regarding research support, promotion and tenure issues, and other topics a former mentor might provide. We recommend that the College or Department establish a mentoring program, especially if the University invests in the many new lines in the strategic plan areas that Biological Sciences will have. As the department and college grows, informal mentoring may not be enough to ensure junior faculty success and retention.

Enhancement of research. Research activity in Biological Sciences is growing at an impressive rate and the policies that have led to that growth, including the development of the Jupiter and Davie campuses, should continue. The primary way in which that growth could be spurred would be to offer nationally competitive graduate fellowships (above). Although these might be limited in number at first, the first-rate students they would help attract would have an immediate impact on research productivity. A second step would be to enhance links on all campuses to other scientific and engineering disciplines. Electrical and mechanical engineers, computer scientists, physicists, and mathematicians may find much of interest on the Jupiter and Davie campuses, while biologists on those campuses may find the others' knowledge of measuring technology, data analysis, and modelling to be invaluable. Interdisciplinary "translational" and "transformative" projects that arise from these links are likely to be welcomed at funding agencies.

RECOMMENDATIONS

1. Continue to build research and instruction on the Boca, Jupiter and Davie campuses along the lines already established.

2. As soon as possible, develop a reliable, efficient transportation system between the different campuses for students and faculty.

3. Support the sense of community in the Biology department by developing institutional habits and traditions that support it, such as a monthly departmental day on the Boca campus that all are expected to attend.

4. Do not offer admission to under-prepared students. Consider limiting future University growth in the largest undergraduate major to enable the faculty to plan for orderly instruction in this discipline.

5. Develop a first semester, 1 credit course that introduces first year students to exciting developments in the life sciences, explains the need for tools and concepts from the hard sciences and mathematics, and identifies careers pathways in the life sciences other than pre-medicine.

6. Create course sequences and major/minor combinations that lead to degrees in Biology/public policy, Biology/law, Biology/business and finance and non-profits.

7. Hire additional faculty or non-tenure-track instructors to reduce the student/faculty ratio. Create a formal faculty mentoring program.

8. Consider course structures that increase the interaction of students and instructors; the 'recitation section' is one possible model.

9. Bring advisement for sophomores and upper class students back to the department.

10. Engage the better students in peer-support activities by developing an undergraduate interest/service club.

11. Consult the better graduating seniors about what did and did not work for them, and how it can be improved.

12. Supplement the anecdotal accounts of students with data from the university to identify the roadblocks to timely graduation and how they might be cleared.

13. Strengthen research productivity by encouraging more interdisciplinary ties with other departments and colleges and by improving the graduate student support package offered to PhD and MA/MS students.

CONCLUSION

The Department of Biology accomplishes remarkable feats of instruction, research, and external funding across campus distances with limited resources and little control over the growth of the undergraduate major. Our recommendations for the future are to promote a sense of inclusion for Biology faculty, staff and students on all campuses by regularly exercising their common bonds. We further urge The University to enable Biology to create ownership practices for early undergraduate enrollment, advising, and course content that may improve freshman retention and graduation rates.

APPENDIX

List of faculty and students with whom review team met. (attached excel spreadsheet)

May 7, 2015

Biological Sciences – Strategic Goals and Action Plans

Goal 1: To continue to build research and instruction on the Boca Raton, Jupiter and Davie campuses along the lines already established.

- We will continue to shift commuter students to the Davie and Jupiter campuses as described in the Program Review document, to re-distribute the teaching load and to maximize the use of space.
- FAU's president signed an agreement with Scripps Florida's CEO and Max Planck's CEO and Scientific Director in March 2015 fortifying our relationships, both in research and education on the Jupiter campus.
- A newly hired Director of the Center for Environmental Science is now established in Davie.
- Boca Raton faculty members are developing a new marine biology concentration for the Integrative Biology Ph.D. Program.

Goal 2: To develop a reliable, efficient transportation system between the different campuses for students and faculty as soon as possible.

This is a University-wide priority and the President has proposed a bus link from Boca Raton to Jupiter campuses.

Goal 3: To support the sense of community in the Biology Department by developing institutional habits and traditions that support it, such as a monthly departmental day on the Boca Raton campus that all are expected to attend.

We will continue biannual retreats with improved consistency. These events will rotate between FAU's three main sites and be programmed around curriculum discussions or seminars. In Fall 2015 we will use a retreat format to discuss some of the items in this report such as enhancing the quality of the biology majors (Goal #4), or how best to modify the advising operation (Goal #10). We have scheduled a seminar by Alex Keene (our newest faculty member) followed by a welcome reception for Spring 2016, since his recruiting seminar was inaccessible due to technical glitches during Spring 2014.

Goal 4: To raise the threshold for entry into the B.S. in Biology Program (by considering limiting future University growth in the largest undergraduate major to enable the faculty to plan for orderly instruction in this discipline).

The Biology Department has discussed this issue many times. We think that there are a number of standards that could enhance the quality of the students in our classes. We will recommend to the College of Science Dean and Provost that in order to declare a major in Biology, students must meet a new threshold of requirements modeled after those required for declaring a major in FAU's Colleges of Nursing or Business. Biology faculty members will discuss and design the limits for these missing requirements at the biannual retreat in Fall 2015.

Ideally, students will declare a major in biology in the B.A. program, but must earn minimum grades in several courses before admittance to the B.S. program. Students who cannot pass the upper division courses for the B.A. in Biology can elect to choose the B.A. in General Studies as an alternative way to earn their undergraduate degree.

These requirements will enable faculty members to plan orderly instruction in the 2000 level and higher biology courses by allowing only the more capable and serious students to complete the major. The suggested requirements will be easily achieved within the student's first 60 credits.

Goal 5: To develop a first semester, one credit course that introduces first year students to exciting developments in the life sciences, explains the need for tools and concepts from the hard sciences and mathematics, and identifies career pathways in the life sciences other than pre-medicine.

Biology's Curriculum and Assessment committee, led by the Director of Undergraduate Research and Mentoring Program, will study Goal #5 and suggest potential implementation as a part of the required freshman majors' biology courses. We also need to find ways to work with freshmen to reduce attrition from the major in the first year of their undergraduate careers. This is a nation-wide issue and we will need to confront the trend. See also Goal #9

for novel course structures that the Biology Department will implement to increase the interaction of students and instructors by engaging the students in molecular and field research during teaching labs of introductory biology courses.

Goal 6. To create course sequences and major/minor combinations that lead to degrees in Biology/public policy, Biology/law, Biology/business and finance and non-profits.

We appreciate the concept but think it would be difficult to implement due to the very large student population in biology and the biology faculty workload.

Goal 7. To hire additional faculty or non-tenure-track instructors to reduce the student/faculty ratio.

Our departmental student to faculty ratio is **97:1** (note that this includes instructors); six years ago the ratio was 67:1. A survey of other programs throughout the state system shows a student to faculty ratio that ranges between 21:1 and 100:1. Of recent, we have received comments from external reviewers (including from University of Toronto Mississauga, Rutgers, Florida International University and University of Florida) during our promotion and tenure process that confirm the extraordinary teaching load of our faculty. One example, from Monica Driscoll (Rutgers), re: promotion to Associate Professor and tenure for Kialiang Jia, "Dr. Jia has pressed forward with his research program against a backdrop of outstanding contribution to teaching at the university. The workload involved in the new course development he has accomplished is staggering. … Just these exemplary accomplishments on behalf of the teaching mission of your Department should warrant promotion."

The number of faculty has grown recently due to hiring two junior faculty members and the return of the former President and the former Provost to their departmental status in Biology. This has helped our teaching ratios and strengthened areas that have long lacked critical mass like plant sciences. The Life Science Initiative, based primarily in Jupiter, has also facilitated hiring in the Biology Department and this will help reduce the overall student to teacher ratio.

However, to adjust to the growing student population and lighten the teaching load of tenure-track faculty members so that they might engage more in research and scholarly activities, we recommend the hiring of two new instructors. The current hiring of tenure-track faculty members at the rate of one to two per academic year will further sustain the department's productivity.

Goal 8: To create a formal faculty mentoring program.

The Biology Department has a faculty mentoring program in-place (see Insert from Bylaws). Our two most recent faculty hires have barely settled in their offices. One has a mentor, a senior member of the Biology Department, provided by a University wide program. The other has not settled into a routine full time schedule due to family leave.

From Our Departmental Bylaws: The Personnel Committee Will…(b) **assign mentors for newly-hired Assistant Professors**, monitor progress of Assistant Professors toward tenure, oversee the initiation and completion of the third year review for Assistant Professors, evaluate applications for promotion from Assistant Professor to Associate Professor and granting of tenure, and provide recommendations to the Faculty.

Under the departmental program, a tenured faculty member is assigned to each new faculty member to give one-on-one mentoring regarding the tenure process. There is also one Master Teacher and one Master Researcher designated in the Biology Department. The Master Teacher is responsible for giving workshops to new hires (and previous hires with low teaching evaluation scores) on teaching tips and pedagogies. The Master Researcher provides workshops on grant writing and various research concerns.

Now that our two newest hires have had adequate time to relocate and begin setting up their laboratories, they will be formally assigned tenured mentors within the department by our Personnel Committee.

Goal 9: To consider course structures that increase the interaction of students and instructors; the 'recitation section' is one possible model.

The proposed suggestion is challenging with our current departmental responsibilities. Annualized state fundable FTEs continue to increase, while our faculty numbers stay almost

constant. In addition to our research and other scholarly responsibilities, the department's faculty members are mentoring undergraduate and graduate researchers.

Approximately 10% of Biology undergraduate students are engaged in research and 85% of faculty members are acting as mentors. In the four semesters from (and including) Spring 2014 through and including Spring 2015, there were an average of 70 undergraduate students engaged in *Directed Independent Study* (DIS) alone per semester.

For the past fifteen years, peer-led Lifeline sessions (24 students maximum per session) have been used to achieve more individual (peer) interactions in the introductory *Biological Principles* (BSC 1010) and *Biodiversity* (BSC 1011) courses for majors.

Another course structure that increases the interaction of students and instructors is engaging the students in molecular and field research during teaching labs. The Biology Department is one of the sites for the Small World Initiative from Yale University, which aims at initiating freshmen in biological research at the molecular level. In next spring (2016), we will run a pilot study with one lab (24 students) for *Biological Principles* (BSC 1010) where students will collect soil samples at the FAU preserve and use basic molecular biology techniques to isolate bacterial DNA from soil samples, PCR amplify the DNA and send the isolated DNA to Yale University for DNA sequencing. Students will receive the DNA sequences back and learn how to conduct basic metagenomic analyses on computer databases. Upon successful results of these pilot studies, additional BSC1010 labs will be engaged in the same research data collection and analyses. It is hoped that over 1,000 BSC 1010 students will eventually take part in these molecular biology studies annually.

The Biology Department was also just awarded a university technology fee grant to allow undergraduate students to obtain real field data in introductory labs for *Biodiversity* (BSC 1011). The faculty and graduate students will spend one year planning the pilot lab. Pilot studies will be launched in Fall 2016 and will consist of one BSC 1011 lab (24 students) participating in collecting data for long-term studies on gopher tortoises at the FAU preserve. Students will collect data using receivers to monitor tortoise movement through local

burrows (tortoises will have been previously tagged by scientists and graduate students with transmitters). Undergraduates will then analyze the data and write up lab reports on how various conditions affect tortoise movement. Students will then develop their own research questions concerning different aspects of gopher tortoise biology and be asked to develop the methodology to address their questions. Upon successful results of these pilot studies, additional BSC 1011 labs will be engaged in the same long-term research data collection and analyses. It is hoped that over 1,000 BSC 1011 students will eventually take part in these field studies annually.

Goal 10: To bring advisement for sophomores and upper class students back to the department.

The chair and co-chairs agree with the reviewers that advising done within the Biology Department would be beneficial to all. However, as previously discussed in Goals #7 and #9, our current student to faculty ratio precludes this as a realistic goal. Financial backing will be discussed with the College of Science Dean and Provost to seek funding from the President's Office to establish staff lines, specifically designated for advising, in our department to bring some advising back to the department. Advising of the students pursuing a B.S. in Biology (according to the standards set forth in Goal #4) will be returned to the Biology Department. Alternatively, the advisors in the Charles E. Schmidt College of Science Student Services Department will be coached to advise the perspective students pursuing a B.S. in Biology according to the rules set forth in the Biology Department with the Dean's consent.

Goal 11: To engage the better students in peer-support activities by developing an undergraduate interest/service club.

Student organizations currently exist within the major, primarily among the students interested in clinical sciences: 1) Strategies for Ecology Education, Diversity & Sustainability (SEEDS) (https://fau.collegiatelink.net/organization/seeds) and 2) Scientific Mentoring for Academic Research Training (https://fau.collegiatelink.net/organization/smart).

Additionally, our students have volunteered in many projects to protect and improve our sensitive South Florida environment (which are initiated largely by field courses in marine and environmental biology).

Goal 12: To consult the better graduating seniors about what did and did not work for them, and how it can be improved.

Our assessment process of student baccalaureate outcomes is not possible within the current FAU infrastructure. FAU's Office of Institutional Effectiveness and Analysis (IEA) data is obtained through Biology graduating senior surveys, but an average of only 25% of graduating seniors with Bachelors degrees in Biology respond. This is an institution-wide issue that should be addressed by the College of Science Dean and Provost to establish staff lines within the Office of Student Affairs that will implement reliable methods to accomplish this student tracking.

The Biology Department will implement an exit interview program and utilize information gleaned to improve student retention. This program will occur near the end of the spring semester by inviting graduating DIS undergraduate students to a pizza party and having them fill out a survey and engage in a roundtable discussion with Biology's Exit Committee (consisting of faculty members and FAU graduate students that have completed FAU undergraduate studies) about their (positive and negative) FAU experiences.

Goal 13: To strengthen research productivity by encouraging more interdisciplinary ties with other departments and colleges.

We agree with the reviewers that it is in everyone's best interests to develop more interdisciplinary ties and we will continue to pursue these by hosting and attending interdepartmental seminars. One of our newest hires, Marianne Porter, is a biomechanist who is forging new collaborations with FAU's Engineering Department. Marguerite Koch-Rose is leading Boca Raton faculty members in developing a new marine biology concentration for the Integrative Biology Ph.D. Program to enhance cohesion between the marine biologists at Boca Raton and Fort Pierce.

Currently, there are four faculty members from other departments that share space in the biology departmental labs. We are hosting three faculty members from College of Engineering and Computer Science (Department of Electrical Engineering and Computer Science) and one from College of Arts and Letters (Department of Anthropology). Marianne Porter (an Assistant Professor in Biology) is working with the Department of Ocean and Mechanical Engineering (also within the College of Engineering and Computer Science). Edward Proffitt (Fort Pierce) has a student who is working with a faculty member in the College for Design and Social Inquiry (School of Architecture) on a coral reef restoration-related project. Our faculty members work with faculty members in the College of Medicine (who also participate in the IB Program) and in the Department of Chemistry and Biochemistry (Tanja Godenschwege and Frank Mari share students to look at neurological effects of conotoxins). Ram Narayanan has bioinformatics relationships with people in the Departments of Electrical Engineering and Computer Science, Math and Physics. The Electrical Engineering Department has created their own versions of Narayanan's *Bioinformatics* course for students within their relatively new "Bioengineering" graduate program (M.S.), titled *Bioinformatics: A bioengineering perspective and Datamining in Bioinformatics*.

Goal 14: To strengthen research productivity by improving the graduate student support package offered to Ph.D. and M.A./M.S. students.

One of the main resource issues for our department is the limited support for graduate assistants. FAU is at the bottom of the ranking for M.S. stipends and health care across the SUS. Only FIU pays a comparable stipend ($11,250 per nine months). Every other SUS institution surveyed pays a significantly larger stipend with UF paying double the salary for nine months. And every SUS institution surveyed pays most if not all of the student health care costs. Similar results are available for the Ph.D. students. These numbers can be directly linked to success in recruiting graduate students. Financial support is being discussed with the College of Science Dean and Provost to seek funding from the President's Office to establish more competitive graduate student support packages. This is an ongoing problem at FAU and all of the players involved are aware of the problem and are working to resolve it.

Biology - Strategic Goals and Action Plans (May 7, 2015)									
DEPARTMENT: Biological Sciences									
#	Goals and Objectives Action Item	Individual(s) Responsible	Resources Needed	Action Taken/ Status	Projected Start Date	Target Date for Completion	Progress Review Date (if needed)	Funding Request	Dean's Support
Goal 1: To continue to build research and instruction on the Boca Raton, Jupiter and Davie campuses along the lines already established.									
A	To continue to shift commuter students to the Davie and Jupiter campuses.	Department Chair and Co-Chairs		Ongoing					
B	To re-distribute the teaching load.	Department Chair and Co-Chairs		Ongoing					
C	To maximize the use of space.	Department Chair and Co-Chairs		Ongoing					
Goal 2: To develop a reliable, efficient transportation system between the different campuses for students and faculty as soon as possible.									
A	To implement a shuttle bus between the Boca Raton and Jupiter campuses.	This is a University-wide priority; the President has proposed a bus link from Boca Raton to Jupiter campuses.		Discussions with the College of Science Dean, Provost and President	August 2015				
Goal 3: To support the sense of community in the Biology department by developing institutional habits and traditions that support it, such as a monthly departmental day on the Boca Raton campus that all are expected to attend.									
A	To use a retreat format for a curriculum event to discuss items in this Program Review report [e.g. enhancing the quality of the biology majors (Goal #4), or how best to modify the advising operation (Goal #10)].	Chair of Biology's Curriculum and Assessment Committee and All Biology Faculty Members			September 2015				
Goal 4: To not offer admission to under-prepared students (by considering limiting future University growth in the largest undergraduate major to enable the faculty to plan for orderly instruction in this discipline).									
A	To raise the threshold of student requirements to qualify for the B.S. in Biology (modeled after those in FAU's Colleges of Nursing or Business) at the biannual retreat in Fall 2015.	Biology's Curriculum and Assessment Committee		Multiple discussions among the Biology faculty members are on-going	Spring 2016				
B	To pursue this plan through the normal channels, with approval by the faculty senate and the appropriate backing from FAU's administration.	Department Chair and Co-Chairs				August 2016			
Goal 5: To develop a first semester, one credit course that introduces first year students to exciting developments in the life sciences, explains the need for tools and concepts from the hard sciences and mathematics, and identifies career pathways in the life sciences other than pre-medicine.									
A	To organize a committee to study this recommendation and suggest potential implementation, potentially as a part of required freshman majors' biology courses.	Director of Undergraduate Research and Mentoring Program and Biology's Curriculum and Assessment Committee			August 2015	August 2016			

Biology - Strategic Goals and Action Plans (May 7, 2015)									
DEPARTMENT: Biological Sciences									
#	Goals and Objectives Action Item	Individual(s) Responsible	Resources Needed	Action Taken/ Status	Projected Start Date	Target Date for Completion	Progress Review Date (if needed)	Funding Request	Dean's Support
B	To reduce attrition from the major in the first year. See also Goal #9.	Director of Undergraduate Research and Mentoring Program and Biology's Curriculum and Assessment Committee			Spring 2016				
Goal 6: To create course sequences and major/minor combinations that lead to degrees in Biology/public policy, Biology/law, Biology/business and finance and non-profits.									
A	To create course sequences and major/minor combinations in Biology with public policy, law, business, finance and non-profits.				Will not be pursued at this time.				
Goal 7: To hire additional faculty or non-tenure-track instructors to reduce the student/faculty ratio.									
A	To adjust to the growing student population and lighten the teaching load of tenure-track faculty members so that they might engage more in research and scholarly activities, we recommend the hiring of two new instructors. The current hiring of tenure-track faculty members at the rate of one to two per academic year will further sustain the department's productivity.	Department Co-Chair and Biology's Personnel Committee		Discussions with the College of Science Dean, Provost and President	August 2015			Two new Instructors' salaries and benefits. One to two new Assistant Professor salaries, benefits and start-up funds per year as per the usual schedule.	
Goal 8: To create a formal faculty mentoring program.									
A	The Biology Department has a faculty mentoring program in-place.	Department Co-Chair and Biology's Personnel Committee			Ongoing				
Goal 9: To consider course structures that increase the interaction of students and instructors; the 'recitation section' is one possible model.									
A	To continue engaging undergraduate students in research and thus increasing the interactions between students and instructors. Approximately 10% of Biology undergraduate students are engaged in research and 85% of faculty members are acting as mentors.				Ongoing				
B	To continue peer-led Lifeline sessions that are used to achieve more individual (peer) interactions in BSC 1010 and BSC 1011.				Ongoing				
C	To initiate freshmen in biological research at the molecular level in introductory BSC 1010 labs.	Senior Instructor			Spring 2016: pilot study.				

Biology - Strategic Goals and Action Plans (May 7, 2015)									
DEPARTMENT: Biological Sciences									
#	Goals and Objectives Action Item	Individual(s) Responsible	Resources Needed	Action Taken/ Status	Projected Start Date	Target Date for Completion	Progress Review Date (if needed)	Funding Request	Dean's Support
D	To allow freshmen to obtain real field data in introductory BSC 1011 labs.	Director of Undergraduate Research and Mentoring Program			Fall 2016: pilot study.				
Goal 10: To bring advisement for sophomores and upper class students back to the department.									
A	To establish staff lines, specific for advising, in the department. Advising of the students pursuing a B.S. in Biology (according to standards set forth in Goal #4) will be returned to the department. Alternatively, advisors in the Charles E. Schmidt College of Science Student Services Department will be coached to advise the perspective students pursuing a B.S. in Biology according to rules set forth in the Biology Department with the Dean's consent.	Department Co-Chair and Chair of Biology's Curriculum and Assessment Committee		Discussions with the College of Science Dean, Provost and President	August 2015			A minimum of two advisor staff positions: salaries and benefits.	
Goal 11: To engage the better students in peer-support activities by developing an undergraduate interest/service club.									
A	Student organizations currently exist within the major: 1) Strategies for Ecology Education, Diversity & Sustainability (SEEDS) and 2) Scientific Mentoring for Academic Research Training. Our students also volunteer in many projects to protect/improve South Florida.	Department Coordinator, Academic Programs and Coordinator, Academic Support Servicers		Ongoing					
Goal 12: To consult the better graduating seniors about what did and did not work for them, and how it can be improved.									
A	To implement an exit interview program with roundtable discussion between students and faculty about students' FAU experiences. This is an institution-wide issue that should be farther addressed by the College of Science Dean and Provost to establish staff lines within the Office of Student Affairs that will implement reliable methods to accomplish this student tracking.	Biology's Exit Committee (includes Senior Faculty Members and FAU graduate students that have completed FAU undergraduate studies)			Spring 2016				
Goal 13: To strengthen research productivity by encouraging more interdisciplinary ties with other departments and colleges.									
A	To encourage more interdisciplinary ties with other departments and colleges by hosting and attending interdepartmental seminars.	Department Faculty		Ongoing					

Biology - Strategic Goals and Action Plans (May 7, 2015)									
DEPARTMENT: Biological Sciences									
#	Goals and Objectives Action Item	Individual(s) Responsible	Resources Needed	Action Taken/ Status	Projected Start Date	Target Date for Completion	Progress Review Date (if needed)	Funding Request	Dean's Support
Goal 14: To strengthen research productivity by improving the graduate student support package offered to Ph.D. and M.A./M.S. students.									
A	To improve the graduate student support package offered to Ph.D. and M.A./M.S. students.	Department Faculty		Discussions with the College of Science Dean, Provost and President	August 2015			More competitive graduate student support packages.	

Appendix I. Biology Mid-Program Review

Progress Report on Program Review Action Plans

The Florida Board of Governors mandates formal program reviews every 7 years to be conducted in a process approved by the institution's Board of Trustees. As part of the review process, FAU requires programs to file a post-review report on progress made on the individual action items that came out of the formal review. The unit is responsible for implementing the action plan and assessing its progress on key goals at the 4-year interim. This progress report is to be completed by the Department Chair/School Director in consultation with faculty and Dean of the College.

1. Department/School: Biological Sciences/Florida Atlantic University

2. Programs reviewed:

UNDERGRADUATE:

B.A., Biology

B.S., Biology

B.S., Neuroscience and Behavior

B.S./M.S. Biology Fast-Track

GRADUATE:

M.S., Biology (Thesis)

M.S., Biology (Non-Thesis Option #1)

M.S., Environmental Sciences

M.S. in Teaching Biology (Non-Thesis Option #2)

P.S.M., Business Biotechnology

Ph.D., Integrative Biology

Ph.D., Integrative Biology, Neuroscience

Ph.D., Integrative Biology, Environmental Science

3. Date of last BOG-mandated review of programs in your department/school:
March 15-17, 2015

4. In reviewing the items on the action plan that came about from the last formal review of programs in your department/school, please comment on EACH item where progress/success has been achieved. Give the timeline for implementation of those items and some assessment of the success of that implementation. If some progress has been made on the item, but more needs to occur, indicate so in the timeline.

Our last program review (in March 2015) was conducted by Dr. Donald Edwards (Georgia State University), Dr. Lynne Fieber (University of Miami) and Dr. Michael Horswell (Florida Atlantic University). The department and university strengths that were cited were "collegiality, emerging strengths in neuroscience and environmental science, undergraduate and graduate research, transparency in governance, energy, enthusiasm and ambition". Taken directly from the review: "The research productivity of the Biological Sciences faculty as a whole has increased markedly over the last decade, doubling the numbers of scientific presentations, publications, and grant applications submitted. This is quite remarkable, especially in the face of a simultaneous doubling of the number of FTE students to teach and a national tightening of research support."

The challenges and opportunities that were recognized by the review team were: "departmental cohesion across separate campuses, increasing intercampus interactions, the challenge of 2600 biology majors for 31 faculty members, retention rates, enticing biology majors and avoiding shipwrecks, support and interventions, data-driven answers, graduate programs and graduate student support, faculty mentoring program, enhancement of research".

The recommendations of the review team that we have made progress on and have success with are listed below (in bold font):

To continue to build research and instruction on the Boca Raton, Jupiter and Davie campuses along the lines already established.

- We have continued to shift commuter students to the Davie and Jupiter campuses to re-distribute the teaching load and to maximize the use of space. *Evolution*, *Principles of Ecology*, *Genetics* and *Genes and Development* courses are now offered on the Jupiter campus; students are only one course shy of completing their full junior and senior years in Jupiter. We are working on offering the final course there. Full junior and senior years are available on both Boca Raton and Davie campuses.
- FAU's president signed an agreement with Scripps Florida's CEO and the Max Planck Florida Institute for Neuroscience's (MPFI) CEO and Scientific Director in March 2015 fortifying our relationships, both in research and education on the Jupiter campus. "Part of the prestigious Max Planck Society based in Germany, MPFI is the first and only institute of its kind in North America. Situated in the new biosciences cluster in scenic Palm Beach County in South Florida, MPFI provides a vibrant, collaborative environment where scientists are provided generous ongoing support to conduct high impact research at the cutting edge."
- FAU was selected as the first International Max Planck Research School (IMPRS) in North America. IMPRS is a joint Ph.D. program between FAU, MPFI, University of Bonn and the associated Max Planck Institute in Bonn, Germany. Currently, ten FAU neuroscience faculty members in Jupiter are designated IMPRS faculty: Drs. Ken Dawson-Scully, Tanja Godenschwege, Greg Macleod, Rod Murphey, Bob Stackman, Alex Keene, Erik Duboue, and Henriette Van Praag. Dr. Murphey was also chosen to serve on the IMPRS Steering Committee. Students wishing to be considered for admission to IMPRS must apply and be accepted to both FAU's Integrative Biology and Neuroscience Ph.D. Program (IBNS) and IMPRS. IMPRS faculty members are from Florida Atlantic University (USA), the University of Bonn (Germany), MPFI (USA) and the Max Planck Institute Caesar (Bonn, Germany).

- FAU President John Kelly, Max Planck Society President Martin Stratmann and MPFI CEO David Fitzpatrick announced a new partnership between FAU and MPFI to establish an undergraduate honors program in neuroscience (with emphasis on physiology and genetics) that is the first of its kind across the globe on December 11, 2017. The FAU Max Planck Honors Program (FAU MPHP) started in Fall 2018 and attracts high-performing and talented students. FAU MPHP provides honors students with exclusive enrichment opportunities, including courses taught or co-taught with MPFI scientists. FAU MPHP empowers students to work with world-class faculty researchers (including Nobel Laureates) through a summer research program, directed independent research (DIR) and an honors thesis with program faculty. Cutting-edge neuroscience training courses include technologies such as 2-photon imaging, super resolution microscopy, electron microscopy, electrophysiology and optogenetic technology.
- Recently, there have been discussions on proposing a second FAU MPHP with emphasis on data science in neuroscience.
- Starting in the 2018-2019 academic year, we began an exciting pilot program with MPFI, FAU and FAU High School called the FAU MPFI Enrichment Program. Current students in the program are completing the second of two courses, where data science approaches such as deep neural networks and other machine learning techniques are used to analyze actual MPFI neuroscience imaging data. Current students are completing research projects with mentorship from premier MPFI and FAU faculty, and each student will receive an MPFI seal on their FAU High School diploma. Students in the initial pilot cohort are studying a variety of undergraduate majors, including Neuroscience and Behavior, Biological Sciences, Physics, Mathematics, Engineering and Computer Science, and no prior programming experience is required. Data science approaches learned through the program are extremely valuable to any academic direction and relate to exciting careers including self-driving cars, medical image analysis, big data, robotics medicine, bioinformatics and more.
- The newest partnership between FAU, MPFI and the Germany-based Max Planck Society, is the Max Planck Academy High School on the Jupiter campus. Six high-achieving FAU High students started in an Academy pilot program in the Fall 2018 semester. Nine more will join

the program in the Fall 2019 Semester. Students are selected based on the following criteria: National Merit Scholars, strong academic achievement as measured by a high grade point average and an expressed interest in data science. Students start in their junior year of high school and complete their High School diploma and an Associate's degree in enriched, honors academic pathways in STEM in two years. These students gain priority admission into the MPHP. Students learn directly from scientists in a number of ways, such as engaging in laboratory research, organizing and analyzing big data using machine learning and other advanced computational techniques, or assisting in MPFI's state-of-the-art Scientific Core facilities, such as electron microscopy, molecular biology, and the Imaging Center. The students benefit from the international presence of MPFI and the Max Planck Society, through extraordinary networking, mentorship and study abroad opportunities.

- Boca Raton faculty members developed two new concentrations for the Integrative Biology Ph.D. Program: A) Marine Science and Oceanography and B) Biomedical Science.
- A new M.S. degree program in Marine Science and Oceanography was developed between Boca Raton and Harbor Branch Oceanographic Institute (HBOI) faculty.
- We have implemented a third departmental Honors Program - "Honors in Biological Sciences – Research". This program distinguishes undergraduates with high grades, at least two semesters of DIR and a capstone project (grant application/poster/seminar) with Honors in Research. Members of the Honors Research Committee are Drs. Rindy Anderson, Diane Baronas-Lowell, Kailiang Jia, Murphey and Erik Noonberg.
- There is considerable on-going funding and our faculty have received numerous grants from federal agencies.
    - Dr. Ken Dawson-Scully, Associate Professor of Biology, along with co-PIs Dr. Dimitris Pados (College of Engineering) and Rhys Williams (Tech Runway) received a three-year NSF I-Corps grant ($254,997) to create an NSF I-Corps Site at FAU as a component of FAU Tech Runway®.
    - Drs. Dawson-Scully and Salvatore Lepore (Department of Chemistry and Biochemistry) were awarded an NIH grant titled "Selective manipulation of hippocampal PKG activity to modulate memory processes" for .

- Drs. Alex Keene (PI), Associate Professor of Biology in Jupiter, and Bob Stackman (co-PI), Associate Professor of Psychology, received an NSF REU grant *(bringing Dr. Keene's current funding to over $6.1 million)*.
- Dr. Greg Macleod, Neuroscience faculty in Jupiter, was awarded a National Institute for Neurological Disorders and Stroke R01 grant for over $1.2 million to study synaptic proteins.
- Dr. Kailiang Jia, Associate Professor of Biology in Boca Raton, in a collaboration with The Scripps Research Institute Florida (TSRI), received a National Institute on Aging grant worth over $500,000 to study the effects of autophagy on longevity.

- Drs. Duboue, Kowalko and Varela were hired into the Harriet L. Wilkes Honors College (WHC) with the help of Dr. Murphey and the Jupiter Life Science Initiative.
- Drs. Duboue (PI) and Kowalko (co-PI), both Assistant Professors of the WHC received a three-year NSF-BSF EDGE CT grant for over $1 million that starts in fall of 2019.
- Our only hire with a tenure-track position since the Program Review in 2015 was Dr. Keene in Jupiter.
- New (non tenure-track) hires in the past four years include Drs. Baronas-Lowell and Jennifer Krill and Mr. Matthew Lovelace.
- Unfortunately, we have lost Drs. John Nambu, Joe Caruso, Ed Profitt, Ram Narayanan and Murphey. By the end of 2019, Dr. Brenda Clairborne will also leave the department.

To develop a reliable, efficient transportation system between the different campuses for students and faculty as soon as possible.

- FAU now offers a free intercampus shuttle service between the Boca Raton and Jupiter campuses. This WiFi-enabled service operates Monday through Friday with four trips per day between the two campuses and is offered to students and staff free of charge. This shuttle service is widely used and expected to increase in the coming years.
- Transportation between the Boca Raton and Davie campuses, consisting of the South Florida Regional Transportation Authority's Tri-Rail train and FAU shuttles, was already in-place before the Program Review in 2015.

To support the sense of community in the Biology Department by developing institutional habits and traditions that support it, such as a monthly departmental day on the Boca Raton campus that all are expected to attend.

We have biannual retreats and faculty meetings that rotate between FAU's main campuses and are programmed around curriculum discussions or seminars.

- In Fall 2015 we used a retreat format to discuss enhancing the quality of the biology majors and how to best modify the advising operation.
- Dr. Keene (a new faculty member at the time) gave a seminar, followed by a welcome reception, in Spring 2016.
- In Fall 2016, the retreat focused on modifications to our curriculum, such as updating prerequisites and offering additional 2000 level courses, that were discussed in faculty focus groups.
- Enrollment requirements, teaching assignments, Honors Programs, policies within the curriculum, course changes and sustained performance evaluations were topics of the two faculty meetings held in Spring 2017. These meetings also were the venue for talks by the new dean and associate dean of the Charles E. Schmidt College of Science (CESCOS).
- The Fall 2017 Biology Retreat was held on the Davie campus. Curriculum matters were discussed in faculty break-out groups such as biology elective enrollment trends/re-distribution of electives, increasing Jupiter course offerings and an honors program for the Neuroscience and Behavior bachelor's degree. Two additional faculty meetings were held that semester to vote on changing the three out of four Biology course requirements to four out of five requirements (offering students a physiology course option), expansion of honors in the major and to host a Biology-Biomedicine Departments "Meet and Greet" reception.
- Our department also attended and presented at a CESCOS "Meet and Greet" reception with the Department of Psychology in November 2017.
- Adjusted faculty assignments considering headcounts and workload were discussed at the Spring 2018 retreat. A retirement reception for Dr. Narayanan (with a visit from the

Provost) followed. Two departmental faculty meetings were held in Spring 2018 on student enrollment numbers, teaching assignments and on developing a new B.S. directed at pre-medical students.

- Curricular items that predominated three faculty meetings during the Fall 2018 and Spring 2019 semesters were a new honors program in the major titled "Honors Research" that emphasizes team science and the new B.S. for pre-medical students.

To develop a first semester, one credit course that introduces first year students to exciting developments in the life sciences, explains the need for tools and concepts from the hard sciences and mathematics, and identifies career pathways in the life sciences other than pre-medicine.

- We are developing a course - *Introduction to Biology at FAU* (BSC 1013) that will be offered and recommended to incoming students. This course will work with freshmen to reduce attrition from the major in the first year of their undergraduate careers, an issue that also plagues our nation.
- Dr. Keene, with co-PIs Drs. Murphey and Evelyn Frazier, submitted an NIH U-RISE grant in May 2019. If funded, their proposed pre-U-RISE program will include a new introductory freshman course and specialized orientation for incoming students that will provide students early exposure to research opportunities at FAU. This one credit seminar course titled *Biomedical Research at FAU* will be open to all students, with freshmen receiving priority registration. The course will include different researchers every week, exposing students to a broad understanding of the various current biomedical research projects at FAU. Each class will begin with discussion of a major discovery in biomedical science focusing on the innovation behind the discovery, as well as the personal stories of the researchers that were involved.
- Additionally, our department has implemented novel course structures to increase the interaction of students and instructors, as well as, to enhance student learning and success. These are described next.

To consider course structures that increase the interaction of students and instructors; the 'recitation section' is one possible model.

- The proposed suggestion is challenging with our current departmental responsibilities. Annualized state fundable FTEs continue to increase, while our faculty numbers stay almost constant. In addition to our research and other scholarly responsibilities, the department's faculty members are mentoring undergraduate and graduate researchers. Our faculty and staff have made substantial modifications to their courses in attempt to enhance student learning and success.
- Approximately 10% of Biology undergraduate students are engaged in research and 85% of faculty members are acting as mentors. In the four semesters from Fall 2018 through and including Summer 2019 (and registration for the second half of Summer 2019 is on-going), there were 243 undergraduate students engaged in *Directed Independent Research* (DIR).
- For the past nineteen years, peer-led Lifeline sessions (24 students maximum per session) have been used to achieve more individual (peer) interactions in the introductory *Biological Principles* (BSC 1010) and *Biodiversity* (BSC 1011) courses for majors. This program is led by Ms. Geri Mayer and Drs. Randy Brooks and Frazier. New pedagogies have been implemented recently include:
    - With the help of Honors students, an inquiry-based activity is used in *Biological Principles* now as one of the experimental design labs, where students make observations, draw conclusions from historical data and present-day observations about the FAU Preserve, gopher tortoise habitat and invasive plant species.
    - A "Best Practices" activity was developed in which TAs and LifeLine leaders are filmed teaching in the Spring, and shortly after the Fall semester begins, we do mandatory Teaching Effectiveness training for TAs. This activity evolved after faculty members went to the Summer Institute in Madison. Our TAs love to see themselves in video, so we have their undivided attention, and they learn something, too. We do peer evaluations of each TA and LifeLine leader every semester, giving faculty members some feedback early in the semester.

- A bioethics unit was implemented in both *Biological Principles* and BSC 1005 *Life Science* labs about stem cell use to get students thinking critically about the viewpoints of other people as stakeholders versus their opponents. Adopted and edited from a Northwest Association for Biomedical Research activity, students assume different roles (such as a Catholic priest, a parent of a child with juvenile diabetes, a family member of someone with a severed spinal cord, a Muslim clergyman, a conservative congressman, a biotech CEO). After learning about the sources and variety of stem cells, students argue for or against their use (not as individuals influenced by their own beliefs) as whatever person they pull out of a hat, causing them to see things from other viewpoints. This is coupled with a pre-lab quiz on their prior knowledge stem cells.

- Our department is one of the sites for Tiny Earth (originated at Yale University) which initiates freshmen in biological research at the molecular level during teaching labs. Dr. Baronas-Lowell engages 192 non-STEM students in Tiny Earth every fall and spring semester in eight *Life Science* labs. The students have discovered and characterized hundreds of antibiotic-producing soil bacteria.
- Dr. David Binninger has designed his *Genetics* course (PCB 3063) lectures with extensive use of TopHat questions and encouragement of peer-to-peer discussions about those questions to keep students engaged. From fall 2015 (using the traditional iClicker) to fall 2018, the percentage of students passing (with a C- or better) increased from 78% to 86%. His videos/podcasts of the lectures are the most popular study aid for the course. Fewer than 5% of his class thought they were a waste of time and 35% said they were the single most valuable study aid and they wished they were available for other classes.
- Dr. Colin Hughes also uses TopHat as a substitute for iclicker in his *Conservation Biology* (BSC 3052) course. Dr. Hughes engages students in this course with the new Packback technology, an on-line tool based on Artificial Intelligence to increase student curiosity. He sees a significant increase in open-ended and insightful questions asked by students over the course of the semester on scientific news reports.
- Dr. Dale Gawlik has flipped his course *Principles in Ecology* (PCB 4043) with 200 students.

- Drs. Gawlik (in *Principles in Ecology*) and Sarah Milton [in *Comparative Animal Physiology* (PCB 4723), *Integrative Biology 1* (BSC 6390), *Environmental Physiology* (PCB 6749C) and *Marine Animal Physiology* (PCB 6775)] have adopted the "think-pair-share" technique in which students are allowed a few minutes to discuss a question with a neighbor prior to submitting an answer.
- Laboratory Coordinators, Ms. Sheryl van der Heiden and Ms. Cristina de la Rosa have implemented in-class iworx physiology stations measuring real-time data in our Davie *Anatomy and Physiology I and II* labs (BSC 2085L and 2086L).
- Drs. Jay Lyons and Milton have also developed new interactive lab activities using the iworx physiology stations in the *Human Morphology and Function I and II* labs (PCB 3703L and 3704L) and *Comparative Animal Physiology* (PCB 4723L) labs, respectively.
- Dr. Anderson introduced a new course titled *Topics in Behavioral Ecology* (under the Special Topics course number) in which she employs active learning strategies. The course format has students engaged in reading, writing and problem solving through group work and discussion.
- Dr. Tim Theisen implemented collaborative test-taking in his *Molecular and Cell Biology* Course (PCB 4023) and is evaluating the effect of this technique on student learning.
- Dr. Mary Jane Saunders increased the number of writing and speaking assignments in her *Plant Cell Biology* course (running under the Special Topics code) to address student weaknesses in these areas. All writing assignments and oral presentations are evaluated and used to provide students with constructive feedback. She has also incorporated support on grant writing and resume construction into her lectures.
- Dr. Jeanette Wyneken updated her *Comparative Animal Physiology* class (PCB 4723) to include more active learning and application of the material learned and assessed her students mid-semester to obtain feedback on the class format and her effectiveness for use in further course updates and modifications.
- Instructor Lovelace made modifications to his *Anatomy and Physiology* lectures (BSC 2085 and 2086) attempting to address DFW rates in this large service course. He restructured course contents to increase the amount of time spent on foundational chemical principles

early in the course, reduced the number of quizzes he administers, increased the number of homework assignments and modified his homework questions to include partial credit questions.

- Drs. Keene and Stackman currently serve as co-directors of the Neuroscience and Behavior B.S. program at FAU with over 500 undergraduate students.
- Dr. Keene has instituted curriculum that focuses on an interactive classroom, critical thinking and exposure to primary literature in his large *Comparative Animal Behavior* course (CBH 4024). His research program investigates genetic regulation of sleep and memory; undergraduates play a critical role in all major research projects. Dr. Keene teaches the large lecture in Boca and broadcasts to Jupiter and Davie campuses. A teaching assistant is placed in Jupiter and Davie to facilitate interactive breakout discussions. The flexibility allowed by the multi-campus format is particularly important for students engaged in research who want to spend most of their time on the campus that houses their research laboratory.

To create a formal faculty mentoring program.

- Our department has a faculty mentoring program in-place (see Insert from Bylaws).
- Under the departmental program, a tenured faculty member is assigned to each new faculty member to give one-on-one mentoring regarding the tenure process. There is also one Master Teacher and one Master Researcher designated in the department. The Master Teacher is responsible for giving workshops to new hires (and previous hires with low teaching evaluation scores) on teaching tips and pedagogies. The Master Researcher provides workshops on grant writing and various research concerns.

From Our Departmental Bylaws: The Personnel Committee Will...(b) **assign mentors for newly-hired Assistant Professors**, monitor progress of Assistant Professors toward tenure, oversee the initiation and completion of the third year review for Assistant Professors, evaluate applications for promotion from Assistant Professor to Associate Professor and granting of tenure, and provide recommendations to the Faculty.

To engage the better students in peer-support activities by developing an undergraduate interest/service club.

- Student organizations currently exist within the major, primarily among the students interested in clinical sciences: 1) Strategies for Ecology Education, Diversity & Sustainability (SEEDS) and 2) Scientific Mentoring for Academic Research Training. Dr. Frazier serves as the advisor for both organizations.
- Our students volunteer in many projects to protect and improve our sensitive South Florida environment. These projects are initiated largely by field courses in marine and environmental biology taught by Drs. Wyneken, Marianne Porter and Dianne Owen and include sea turtle conservation, biomechanics of elasmobranchs, study of invasive species and strategies for conserving, restoring and monitoring the diversity of natural habitats.
- Under the direction of Dr. Gawlik, the Environmental Science Program partnering with Florida Power & Light, sponsors the fruitful Manatee Masters Program at the Manatee Lagoon in Riviera Beach since 2015. This program recruits and coaches students to become manatee experts to educate the public about manatees and the Lake Worth Lagoon.

To supplement the anecdotal accounts of students with data from the university to identify the roadblocks to timely graduation and how they might be cleared.

- We have made the departmental web site extremely student-friendly, for instance, by offering tips on how to graduate on time, outlining research opportunities, undergraduate and graduate academic programs, associated forms and policies, biology elective offerings according to semester and campus, student resources and, especially, student accolades and achievements.
- Each faculty member presents a slide from our departmental web site with tips on saving time and money while pursuing an FAU undergraduate degree at least once per semester during their courses. There have been positive reports from faculty that students are very receptive to this information.
- We have introduced many curriculum changes allowing more flexibility for students to customize their degree program towards a career goal.

- Two new degrees have been designed since our last Program Review. Dr. Murphey sits on the steering committees for both new degrees:
  1. B.A. in Health Science, an interdisciplinary program within the CESCOS that offers fine-tuning of course curriculum to the student's career-orientation. This degree started accepting students in Fall 2017.
  2. B.S. in Medical Biology, a program with high rigor for pre-medical students. This has received approval from the state to proceed with submitting a full proposal to start the degree.
- The course requirements for a bachelor's degree in Biology are now offered at all three campuses, with just one course missing on the Jupiter campus (mentioned previously).

To strengthen research productivity by encouraging more interdisciplinary ties with other departments and colleges.

- We agree with the reviewers that it is in everyone's best interests to develop more interdisciplinary ties and we will continue to pursue these by hosting and attending interdepartmental seminars.
- Dr. Porter, a biomechanist, is forging new collaborations with FAU's Engineering Department. Dr. Porter is also working with the Department of Ocean and Mechanical Engineering (within the College of Engineering and Computer Science).
- There has been a recent increase in IB Ph.D. students working with Bioengineering faculty, allowing for co-PIs on research committees and publications in both our and the Engineering Colleges.
- Drs. Milton and Peter McCarthy (HBOI) led Boca Raton faculty members in developing a new marine biology and oceanography concentration for the IB Ph.D. Program to enhance cohesion between the marine biologists at Boca Raton and Fort Pierce.
- Our faculty members have worked with faculty members in the Charles E. Schmidt College of Medicine (CESCOM) to develop a new concentration for the IB Ph.D. Program in biomedical science.

- We are hosting a faculty member, Dr. Kate Detwiler, from the Department of Anthropology (College of Arts and Letters) in our building to enable her wet lab research.
- Dr. Dawson-Scully is collaborating with Dr. Dimitris Pados (College of Engineering) and Rhys Williams (Tech Runway).
- Drs. Dawson-Scully and Salvatore Lepore (Department of Chemistry and Biochemistry) are co-PIs on a funded NSF grant studying "Selective manipulation of hippocampal PKG activity to modulate memory processes".
- Dr. Milton has collaborations with researchers at HBOI (Drs. Annie Karjian and McCarthy), Geosciences (Dr. Tiffany Briggs), Urban Planning (Dr. Diana Mitsova) and the CESCOM (Drs. Howard Prentice and John Wu).
- Dr. Baronas-Lowell has a collaboration with Dr. Lyndon West (Department of Chemistry and Biochemistry) studying structures of novel antibiotic compounds found in bacteria isolated in the Tiny Earth Program.
- The afore-mentioned MPHP and Max Planck Academy are substantial collaborations between our department, the Psychology Department, the WHC and MPFI.

5. In reviewing the items on the action plan that came about from the last formal review of programs in your department/school, please comment on EACH item where progress has not been made. What have been the roadblocks in achieving success on those items? What steps is the department taking to overcome those roadblocks?

The recommendations of the review team that we have *not* made progress on are listed below (in bold font):

To raise the threshold for entry into the B.S. in Biology Program (by considering limiting future University growth in the largest undergraduate major to enable the faculty to plan for orderly instruction in this discipline).

- FAU increased the GPA requirement for early admission freshmen since the fall 2016 semester twice (from 3.5 to 3.8). We think that by increasing the overall caliber of students, an increase in the threshold for entry into our major won't be necessary.
- Our department has multiple tiers of degrees in place and our faculty members have been and continue to work closely with the advisors in the CESCOS Department of Student Services. These advisors are being coached to advise the perspective students pursuing the different degrees according to the rules set forth in the Biology Department with the Dean's consent. Departmental staff and faculty regularly attend meetings with the advisors to keep them up-to-date on course changes and new courses in the department.
- Once our B.S. in Medical Biology degree (our most rigorous degree for pre-medical students) is approved by the state, this program will recruit and retain our brightest students. The degree requires *Organic Chemistry Lab* (CHM 2211L), *Biochemistry 1* (BCH 3033) and a restricted elective pool consisting of the more difficult electives. Students that cannot pass these requirements will be advised to move to the B.S. in Biology degree (with less challenging requirements and electives). If students cannot earn the minimum grades in several courses in the B.S. in Biology program, they will be advised to pursue the B.A. in Biology. Students who cannot pass the upper division courses for the B.A. in Biology can elect to choose the B.A. in General Studies or the recently introduced B.A. in Pre-Health Professions as alternative ways to earn their undergraduate degree.
- These requirements will enable faculty members to plan orderly instruction in the 2000 level and higher biology courses by allowing only the more capable and serious students to complete the more difficult degrees in the major. The suggested requirements will be easily achieved within the student's first 60 credits.

To create course sequences and major/minor combinations that lead to degrees in Biology/public policy, Biology/law, Biology/business and finance and non-profits.

We appreciate the concept but think it would be difficult to implement due to the very large student population in biology and the biology faculty workload.

To hire additional faculty or non-tenure-track instructors to reduce the student/faculty ratio.

- The ratio of the headcount enrollments in our department to our full-time faculty is greater than 300:1. The ratio of our departmental undergraduate majors to our full-time faculty ratio is 100:1. A 2015 survey of other programs throughout the state system shows a student to faculty ratio that ranges between 21:1 and 100:1. Four years ago, we received comments from external reviewers (including from University of Toronto Mississauga, Rutgers, Florida International University and University of Florida) during our promotion and tenure process that confirm the extraordinary teaching load of our faculty. One example, from an outside reviewer from Rutgers, re: promotion to Associate Professor and tenure for Dr. Jia, "Dr. Jia has pressed forward with his research program against a backdrop of outstanding contribution to teaching at the university. The workload involved in the new course development he has accomplished is staggering.... Just these exemplary accomplishments on behalf of the teaching mission of your Department should warrant promotion."
- To adjust to the growing student population and lighten the teaching load of tenure-track faculty members so that they might engage more in research and scholarly activities, we filled three new non tenure-track positions (Dr. Baronas-Lowell, Mr. Lovelace and Dr. Krill).
- We have not hired a tenure-track faculty member since 2015 (Dr. Keene). Hiring of tenure-track faculty members at the rate of one to two per academic year would help sustain the department's productivity.

To bring advisement for sophomores and upper-class students back to the department.

- The chair and co-chairs agree with the reviewers that advising done by Biology faculty would be beneficial to all; however, our current student to faculty ratio precludes this as a realistic goal.
- We have secured a seasoned advisor, Mr. Glenn Malone, for specific advising in our department.
- Additionally, as described above, the advisors in the CESCOS Student Services Department are working closely with faculty and staff from our department on advising strategies for

the students pursuing the different degrees in Biology, including regular briefings on course changes and new courses.

To consult the better graduating seniors about what did and did not work for them, and how it can be improved.

- Our assessment process of student baccalaureate outcomes is not possible within the current FAU infrastructure. FAU's Office of Institutional Effectiveness and Analysis (IEA) data is obtained through Biology graduating senior surveys, but an average of only 25% of graduating seniors with Bachelor's degrees in Biology respond. This is an institution-wide issue that should be addressed by the CESCOS Dean and Provost to establish staff lines within the Office of Student Affairs that will implement reliable methods to accomplish this student tracking.
- If our pending NIH U-RISE grant (described above) is funded, the U-RISE staff will maintain correspondence with graduating undergraduates through LinkedIn and via emails. This will serve to continually provide a support network for the U-RISE students as they matriculate into graduate school.

To strengthen research productivity by improving the graduate student support package offered to Ph.D. and M.A./M.S. students.

- This is an ongoing problem at FAU and all of the players involved are aware of the problem and are working to resolve it. FAU is at the bottom of the ranking for M.S. stipends and health care across the SUS. Only FIU pays a comparable stipend ($11,250 per nine months). Every other SUS institution surveyed pays a significantly larger stipend with UF paying double the salary for nine months. And every SUS institution surveyed pays most if not all of the student health care costs. Similar results are available for the Ph.D. students. These numbers can be directly linked to success in recruiting graduate students.
- Financial support for graduate students is a top priority of FAU's new Provost that was recruited in July 2018, Dr. Bret Danilowicz. He is working closely with the President's Office to establish more competitive graduate student support packages. This issue was

mentioned in every interview for the Graduate Program Dean and Dr. Stackman was selected for this position. Dr. Stackman is a neuroscientist whose lab is housed on the Jupiter campus.

- MPFI has joined forces with the Jupiter Life Science Initiative (headed by Dr. Murphey) to increase the stipends of graduate students in the IBNS program, as well as, pay for their health insurance.
- Likewise, Dr. Randy Blakely, a neuroscientist that joined FAU's CESCOM in 2016 has arranged for graduate students in the Graduate Neuroscience Training Program (GNTP) to receive increased stipends and paid health insurance.
- We are hopeful that Drs. Danilowicz and Stackman will implement paying all graduate students health insurance within the next year, and shortly thereafter, will increase the graduate student stipends.

6. What other major changes have been made or have occurred in department/school programs that will likely impact (positively or negatively) the next BOG-mandated program review?

- Dr. Murphey left the chairmanship of our department on June 30, 2019. Dr. Murphey will continue to have the role of full professor in the Biology department, but will assume the Associate Vice President of Jupiter campus position as well. It is hoped that the interim chairperson will continue the programs that Dr. Murphey has started while sustaining the current momentum in productivity and success.
- Provost Danilowicz has demonstrated a novel transparency in sharing his budget with an open meeting to all FAU faculty during April 2019. He hopes to hold five more of these meetings within the next year. Dr. Danilowicz also shares the enthusiasm with building the Life Science Initiative and the other components of our department located on the Jupiter campus.

- FAU received an NSF ADVANCE grant in 2016, aimed at increasing underrepresented minorities and women in STEM fields. Within this initiative, FAU established an official chapter of the Association for Women in Science. Additionally, within the Diversity Platform, FAU established a Diversity Committee, including faculty in the CESCOM and CESCOS, which offers diversity training and resources for departments and faculty. These recent developments represent important steps in improving the climate and success of underrepresented students, particularly in STEM.
- Our pending NIH U-RISE grant addresses additional shortfalls for FAU underrepresented STEM students by providing pathways and essential support for these students to graduate with STEM degrees and matriculate into Ph.D. programs in the biomedical sciences. The U-RISE program would provide students the opportunity to engage in research within CESCOS (including Biology, Psychology and Chemistry departments), CESCOM, WHC, as well as TSRI and MPFI. It would provide a mentoring network designed to enhance retention and outcomes for underrepresented students, as well as, design sustainable introductory research and scientific communication curricula.
- Charged by the new Provost, Dr. Dawson-Scully is representing our department and leading the committee to develop a new B.S. degree in Data Science. The B.S. in Data Science will be an interdisciplinary degree that incorporates five colleges: CESCOS, College of Business, WHC, College of Design and Inquiry and College of Arts and Letters.
- Responding to the increasing high demand for health science-related degrees, Dr. Carl Hansen will join our department next year and increase our offerings and seats in foundational and advanced courses in anatomy and physiology. Dr. Hansen is a systems physiologist and has developed and taught anatomy and physiology courses and labs from the freshman to the graduate level, primarily catering to pre-medical, pre-physician assistant, pre-pharmacy, pre-physical therapy, medical imaging, nursing and exercise science majors.
    - Advances in genomics and precision medicine warrant immediate changes in Health Science curricula that provide our students with appropriate backgrounds in understanding and appreciating the impact of genetics on the practice of their

professions. Dr. Hansen has previous experience with and will develop a certificate program in Genetic Counseling and Genomics within our department. This program will include developing two new upper-level courses within our department, *Medical Genomics* and *Genomic and Bioinformatics,* establishing clinical internship experience and requiring our students to take a specific subset of psychology and counseling courses. Completion of the certificate will prepare our graduates with the competitive backgrounds necessary to enter Genetic Counseling Master's degree programs. There is the potential for rapid program growth as hospitals expand their Genetic Counseling departments to meet the growing expanse of patient genetic data. The long-term goal would be to develop a stand-alone Master's degree in Genetic Counseling at FAU.

- MPFI and TSRI were ranked as the world's top two stand-alone nonprofit scientific institutions for biomedical research by Nature Index in 2019. Receiving such recognition will bring more visibility to FAU. Being located on our Jupiter campus and engaging in extensive collaborations (outlined above), MPFI and TSRI are helping to shape our students and the growing life sciences industry.

Signature of Department Chair

Signature of Dean