FLORIDA ATLANTIC UNIVERSITY

UGPC Approval	
UFS APPROVAL	
CATALOG	

Graduate Programs—PROGRA	AM CHA	NGE REQUEST	
DEPARTMENT: BIOLOGICAL SCIENCES		COLLEGE: CHARLES E. SCHMIDT COLLEGE OF SCIENCE	
PROGRAM NAME: DOCTOR OF PHILOSOPHY INTEGRATION	VE BIOLOGY		EFFECTIVE DATE (PROVIDE TERM/YEAR) SPRING 2015
PLEASE EXPLAIN THE REQUESTED CHANGE(S) AND OFF	ER RATIONALE B	ELOW AND/OR ATTACHED:	
ADD TRACKS TO INTEGRATIVE BIOLOGY PHD PROGRAM	VI, SEE ATTACHEI	D MEMO.	
Faculty contact, email and complete phone number: Dr. Ken Dawson-Scully, ken.dawson-scully@fau.edu, 561-799-8051	See attached lo Complex Syste	etters of support from the Depa	fected by the change and attach comments. rtment of Psychology, the Center for epartment of Geosciences and the
	2 Environmenta	i Science i Togram.	
Approved by: Department Chair: College Curriculum Chair: College Dean: UGPC Chair: Graduate College Dean: UFS President:	All	esl	10/24/14 10/29/14 10/29/14 11/5/14

Email this form and syllabus to <u>UGPC@fau.edu</u> one week before the University Graduate Programs Committee meeting so that materials may be viewed on the UGPC website prior to the meeting.

Provost:



Charles E. Schmidt College of Science Department of Biological Sciences

> 777 Glades Road Boca Raton, FL 33431

> > tel: 561.297-3320 fax: 561.297-2749

Memorandum

From: Rod Murphey, Director, Integrative Biology Ph.D. Program

Subject: Proposal to add Name

Ph.D. Program

Date: 9/9/2014

This memo requests approval for the creation of two tracks within the Integrative Biology Doctoral Degree Program: Integrative Biology-Neuroscience (IB-N) and Integrative Biology-Environmental Science (IB-ES).

Completion of the IB-N concentration provides students with both knowledge and practical experience in the neuroscience field at an advanced level. The IB-N curriculum focuses strongly on both knowledge-based and experimental-based neuroscience courses and teaches the student appropriate scientific methodology. IB-N faculty, are active experts in their respective neuroscience fields and will support development of the students' research in the areas of neuronal circuitry, learning and memory, neurodegeneration, drug discovery, stress neurobiology, neurogenetics, and/or neurodevelopment.

Completion of the IB-ES concentration provides students with advanced research and technical training that will prepare them to find solutions to some of our world's most difficult environmental problems. Habitat degradation, invasive species, contaminants, and climate change challenge land and water managers in South Florida and indeed the world. IB-ES faculty have considerable experience conducting research to address these difficult conservation problems, particularly in South Florida's extensive freshwater and marine ecosystems. The IB-ES curriculum emphasizes experiential learning through dissertation research, combined with innovative courses in the fields of ecology, conservation biology, environmental chemistry, geographic information systems, statistics, and modeling.

The attached catalog description incorporates proposed changes to the current catalog description of the PhD degree in Integrative Biology, which are being submitted for approval simultaneously with this memo. We are also submitting four new course proposals separately from but in parallel with this new track proposal. The proposed new courses would serve as IB-N electives and they include Practical Cell Neuroscience (BSC 5417), Neurophysiology (PCB 5835C), Advanced Neurophysiology (BSC 6389L),



Charles E. Schmidt College of Science Department of Biological Sciences

777 Glades Road Boca Raton, FL 33431

tel: 561.297-3320 fax: 561.297-2749

and Human Neuroanatomy (BSC 6170). The course numbers specified were provided by the Registrar's office and are subject to change pending final approval of the new course proposals.

We are also requesting that these tracks appear on student transcripts as the Major under Curriculum Information. See below examples for both IB-N and IB-ES.

Curriculum Info	rmation
Current Program	n
Doctor of Philosop	phy
Program:	PHD Integrative Biology
College:	C.E. Schmidt Coll of Science
Major:	Integrative Biology-Neuroscience

Curriculum In	nformation
Current Prog	ram
Doctor of Philo	sophy
Program:	PHD Integrative Biology
College:	C.E. Schmidt Coll of Science
Major:	Integrative Biology-Environmental Science

Doctor of Philosophy with Major in Integrative Biology

Integrative Biology Faculty:

Ayyanathan, K.; Azzarolo, A.; Baldwin, J.; Binninger, D.; Blanke, J.; Blanke, R.; Brew, K.; Broadfield, D.; Brooke, W. R.; Caputi, M.; Dorn, N.; Esiobu, N.; Fields, G.B.; Gawlik, D.; Godenschwege, T.; Guthrie, K.; Haerry, T.; Hartmann, J.; Herzing, D.; Huang, X.; Hughes, C.; Iragavarapu-Charyulu, V.; Isger, C.; Kajiura, S.; Kantorow, M.; Koch-Rese, M.; Kumi-Diaka, J.; Lemanski, L.; Li, Z.; Liebovitch, L.; Lu, M.; Lyons, H.; Mari, F.; Milton, S.; Murphey, R. K.; Narayanan, R.; Noonburg, E.; Orlando, E.; Perry, G.; Prentice, H.; Proffitt, E.; Roesijadi, G.; Salmon, M.; Shen, W.; Shibata, Y.; Tao, R.; Vertes, R.; Volin, J.; Warren, D., Emeritus; Wei, J.; Weissbach, H.; Wu, J.; Wyneken, J.; Zhang, X.H.

Harbor Branch Oceanographic Institution Faculty:

Bossart, G.; Cook, C.; Davis, M.; Frank, T.; Hanisak, D.; Lopez, J.; McCarthy, P.; Pomponi, S.; Sutton, T.; Widder, E.

U.S. Department of Agriculture Faculty:

Bausher, M.; Bowman, K.; Chellemi, D.; LaPointe, S.; McKenzie, C.; Niedz, R.; Shatters, R.

Integrative biology refers to interdisciplinary, multilevel approaches to education and research in the biological sciences. The Integrative Biology program focuses on the relationship between cell/molecular functions and experimental biology in the broad sense, with a view to connectivity between levels of biological organization and biological processes. Core courses and research elements will emphasize this theme. The curriculum is individually tailored to each student's research interests and built around a set of core courses that emphasize 1) the theme of integrative biology, 2) scientific communication, 3) statistics, 4) elective courses chosen by the student and an advisory committee, 5) seminar courses and 6) dissertation research.

The Department of Biological Sciences, Charles E. Schmidt College of Medicine, and the Center for Molecular Biology and Biotechnology, and Harbor Branch Oceanographic Institute participate in this doctoral program. FAU's Partner Institutions Harbor Branch Oceanographic Institute the Max Planck Florida Institute for Neuroscience and The Scripps Research Institute of Florida, Torrey Pines Institute for Molecular Studies, and the Vaccine and Gene Therapy Institute U.S. Horticultural Research Laboratory, USDA also contribute expertise to this program.

Those applicants seeking a doctorate in Integrative Biology may choose to apply to the Integrative Biology core track or to one of two Integrative Biology concentrations: Integrative Biology-Neuroscience (IB-N) or Integrative Biology-Environmental Science (IB-ES). These concentrations fall under the umbrella of the Integrative Biology major and all students accepted to IB-N or IB-ES are subject to all Integrative Biology policies and regulations as well as additional regulations that are specific to each concentration.

Integrative Biology-Neuroscience (IB- N)

Completion of the Neuroscience concentration will provide students with both knowledge and practical experience in the neuroscience field at an <u>advanced level</u>. In the evolving and growing field of neuroscience, students who complete the IB-N concentration will have the appropriate training to succeed both within and outside of academia. The Neuroscience curriculum focuses strongly on knowledge-based and experimental-based neuroscience courses and includes training in scientific methodologies. IB-N faculty are active experts in their respective neuroscience fields and will support development of the students who can focus on a number of research areas including neuronal circuitry, learning and memory, neurodegeneration, drug discovery, stress neurobiology, neurogenetics, and/or neurodevelopment.

Integrative Biology-Environmental Science (IB-ES)

Completion of the Environmental Science concentration provides students with advanced research and technical training that will prepare them to find solutions to some of our world's most difficult environmental problems. Habitat degradation, invasive species, contaminants, and climate change challenge land and water managers in South Florida and indeed the world. IB-ES faculty have considerable experience conducting research to address these difficult conservation problems, particularly in South Florida's extensive freshwater and marine ecosystems. The IB-ES curriculum emphasizes experiential learning through dissertation research, combined with innovative courses in the fields of ecology, conservation biology, environmental chemistry, geographic information systems, statistics, and modeling.

Admission Requirements

The decision to consider a student acceptable for admission to the Integrative Biology program includes the following criteria:

- 1. Applicants must have a baccalaureate degree in a field of biological science or a related field.
- 2. Applicants who meet the minimum University standard for grade point average of 3.0 (on a 4.0 scale) and have scores of 150 each on the verbal and quantitative sections of the Graduate Record Examination are eligible to be considered for admission to the program. Successful applicants will normally show strong performance in their undergraduate coursework and on the verbal and quantitative sections of the Graduate Record Examination, which exceeds these scores.
- 3. Strength of letters of recommendation and personal statements from the applicants.
- 4. International students whose native language is not English must score at least 550 (paper-based test version), or 213 (computer-based test version), or 79-80 (internet-based test) on the Test of English as a Foreign Language (TOEFL). Satisfactory TOEFL scores can offset verbal GRE scores at the discretion of the program's admission committee. Additionally, international students whose transcripts are from non-U.S. institutions must have their credentials evaluated course-by-course. International students must also demonstrate competency in spoken English.
- 5. Each student's major professorPhD supervisor will be a member of the program's graduate faculty and will chair the supervisory and dissertation research committees. Students participating in an Integrative Biology concentration must match with a PhD supervisor on the concentration's graduate faculty list (see concentration faculty lists on their respective concentration webpages). Integrative Biology core and IB-N applicants may enter the program prior to identifying a PhD supervisor and participate in laboratory rotations within their first year in the PhD program. IB-ES applicants must have a PhD supervisor from within Florida Atlantic University prior to applying. For IB-ES PhD supervisor selection suggestions, students should utilize the Biology Department website to examine the fields and interests of individual faculty.

Integrative Biology Degree Requirements

Doctoral degrees at FAU require at least 80 credits beyond the baccalaureate degree. The following are specific requirements of the program in Integrative Biology.

- 1. The Integrative Biology PhD program is a research intensive program. The 80 minimum post-baccalaureate credits required to complete the Integrative Biology PhD, —Coursework, to be decided under the direction of the student's supervisory committee, will include a minimum of 18 credits of coursework with a cumulative grade point average of 3.0 or higher with the following requirements:
- a. Of the 18 required coursework credits, nine to ten credits (3 courses) will be in courses designated as core courses. The core requirements include:

Integrative Biology I (BSC 6390) 3

Scientific Communication (BSC 6846) 3

One course in statistics

Students may fulfill the statistics core requirement by completing:

Experimental Design and Biometry (PCB 6456)

Experimental Design 1 (PSY 6206). 3

- b. The remainder of the 18 credits will include elective courses that support the student's research plan. The student's major advisorPhD supervisor and the supervisory committee must approve all elective courses.
 - c. The elective courses must be 5000-, 6000- or 7000-level courses in Biology, Biomedical Science, Psychology, Complex Systems and Brain Sciences, Geoscience, Urban and Regional Planning, Chemistry or approved cognates. Students participating in an Integrative Biology concentration must select from graduate level elective courses related to the specific concentration (see the below elective lists for IB-N and IB-ES). The lists of track-specific elective courses below are not exclusive and the selection of elective courses to meet degree requirements will be determined by consultation between the student and the PhD supervisor and/or the student's advisory committee.

- d. Courses designated as proficiency or remedial (4,000 level and below) may not be used to satisfy the course requirement.
- 2. Students must enroll in three seminar/journal <u>club</u> courses offered by the program prior to graduation. A seminar course is considered to be one based on student participation in activities, such as student presentations or student/faculty-led discussions of relevant topics.
 - 3. Dissertation research is to be conducted under the direction of the student's dissertation research committee.
 - 4. A minimum of 25 credits of doctoral dissertation (Dissertation BSC 7980) are required. Students may enroll in dissertation research upon successful advancement to candidacy. Prior to candidacy, students may enroll in one of two research credit types: Advanced Research in Integrative Biology (BSC 7978) or IB Lab Rotations (BSC 6905).
 - 5. Admission to candidacy follows successful defense of a dissertation research proposal. The defense of the dissertation will be held with the student's dissertation research committee.
 - 6. Public presentation of the dissertation research.

IB-N Approved Electives

Students enrolled in the IB-N concentration must select graduate level elective courses that are relevant to the field of neuroscience. Students who enter the program with no prior neuroscience coursework must take two of the following five courses: the Neuroscience 1 (PSB 6345), Neuroscience 2 (PSB 6346), Practical Cell Neuroscience (BSC 5417C), Neurophysiology (PCB 5835C), and Advanced Neurophysiology Lab (BSC 6389L). Completion of these courses can be used toward fulfillment of the nine credit Integrative Biology elective requirement.

General Neuroscience

Neuroscience 1 (PSB 6345) 3 Neuroscience 2 (PSB 6346) 3

Molecular and Cellular Neuroscience

Advanced Cell Physiology (PCB 6207) 3
Developmental Neurobiology (PSB 6515) 3
Brain Diseases: Mechanisms and Therapy (BMS 6736)
Cellular Neuroscience and Disease (PCB 6849) 3
Practical Cell Neuroscience (BSC 5417) 3
Advanced Neurophysiology Lab (BSC 6389) 3
Autonomic Function and Diseases (BMS 6523) 3
Neurophysiology (PCB 5835C) 3
Advanced Neurophysiology (BSC 6389L) 3
Human Neuroanatomy (BSC 6170) 3

Behavioral Neuroscience

Seminar in Behavioral Neuroscience (PSB 6058) 3
Developmental Neuropsychology (PSB 6516) 3
Principles of Neuroscience (PSB 6037) 3

Cognitive Neuroscience

Cognitive Neuroscience (ISC 5465) 3 Seminar in Cognition (EXP 6609) 3 Seminar in Human Perception (EXP 6208) 3

Theoretical and Dynamical Neuroscience

Computational Neuroscience I (ISC 6460) Bioinformatics (BSC 6458C) 4

Bioinformatics: Engineering Perspectives (BME 6762)

IB-ES Approved Electives

Students enrolled in the IB-ES concentration must complete at least one course from each of the two focal areas below. Completion of these courses can be used toward fulfillment of the nine-credit Integrative Biology elective requirement.

Statistics and modeling

Environmental Design and Biometry PCB 6456 Modeling Groundwater Movement GLY 6836 Ecological Modeling EVR 6070 Ecological Theory PCB 6406

Ecology and Earth Sciences

Biogeography GEO 5305 3 Plants And People GEO 6317 Environmental Restoration EVR 6334 3 Flora of South Florida BOT 5155 Flora of South Florida Lab BOT 5155L Coastal Plant Ecology BOT 6606 Coastal Plant Ecology Lab BOT 6606L Conservation Biology PCB 6045 Marine Ecology PCB 6317 Advanced Ecology PCB 6046

Marine Ecology Lab and Field Studies PCB 6317L

Freshwater Ecology PCB 6307 Freshwater Ecology Lab PCB 6307L Symbiosis BSC 6365 Environmental Physiology PCB 6749C

Marine Geology GLY 5736C

Regolith Geology GLY 6707

Advanced Topics in Applied, Coastal and Hydrogeology GLY 5934 3

Coastal Environments GLY 6737 Shore Erosion and Protection GLY 5575C 3 Global Environmental Change GLY 6746 3 Environmental Geophysics GLY 6457 Methods in Hydrogeology GLY 6838 Natural History of the Indian River Lagoon OCB 6810 3 Marine Global Change OCE 6019 3

Seminar in Ichthyology ZOO 6459 1-2 Marine Invertebrate Zoology ZOO 6256 2 Marine Invertebrate Zoology Lab ZOO 6256L Natural History of Fishes ZOO 6456 Natural History of Fishes Lab ZOO 6456L

Seminar in Emerging Topics in Avian Ecology ZOO 6544C 1 Chemistry for Environmental Scientists CHS 6611

Advanced Environmental Geochemistry GLY 5243

Physiology of Marine Animals PCB 6775 Introduction to GIS in Planning URP 6270

Principles of Geographic Information Systems GIS 5051C Applications in Geographic Information Systems GIS 5100C Programming in Geographic Information Systems GIS 5103C 3

Remote Sensing of the Environment GIS 5038C

Digital Image Analysis GIS 5033C 3

Advanced Remote Sensing GIS 6039 Hyperspectral Remote Sensing GIS 6127 Topics in Geoinformation Science GIS 6120 3 From:

Diane Baronas-Lowell

To:

Michelle Cavallo; Rodney Murphey; Brenda Claiborne; ken.dawson-scully@fau.edu

Subject:

FW: Graduate Program Change Request-Proposal to add Neuroscience and Environmental Science to IB Ph.D.

Program

Date:

Friday, September 19, 2014 1:52:48 PM

Hi

Please find Dr. Wolgin's letter of support for the IB Program Change Request below.

Thanks, Diane

Diane Baronas-Lowell, Ph.D.
Scientific Writer and Editor
Research Associate Professor
Department of Biological Sciences
Charles E. Schmidt College of Science
John D. MacArthur Campus
5353 Parkside Dr.
MC-19, RE Bldg., Room 107
Jupiter, FL 33458
561 799-8073 (work)
561 374-0469 (cell)

From: David Wolgin

Sent: Friday, September 19, 2014 1:47 PM

To: Diane Baronas-Lowell

Subject: Re: Graduate Program Change Request-Proposal to add Neuroscience and Environmental

Science to IB Ph.D. Program

Diane,

The Department of Psychology supports the proposed changes to the Integrative Biology Ph.D. program.

David

David L. Wolgin, Ph.D. Professor and Chair

Department of Psychology Florida Atlantic University

Boca Raton, FL 33431

E-mail: WOLGINDL@FAU.EDU

Phone: 561/297-3366 Fax: 561/297-2160

From: Diane Baronas-Lowell <dlowell@fau.edu>
Date: Tuesday, September 16, 2014 9:04 AM

To: David Wolgin < wolgindl@fau.edu >, Janet Blanks < blanks@fau.edu >

Cc: Rodney Murphey < RMURPHEY@fau.edu >, Michelle Cavallo < MCAVALLO@fau.edu >,

"ken.dawson-scully@fau.edu" < ken.dawson-scully@fau.edu>

Subject: Graduate Program Change Request-Proposal to add Neuroscience and Environmental

Science to IB Ph.D. Program

Hello Dave and Janet:

Good morning. Please find attached the Graduate Program Change Request form to add Neuroscience and Environmental Science to the Integrative Biology Ph.D. Program with attached memo from Rod Murphey.

Under the "Consult and list departments that might be affected by the change and attach comments" box, we are including Psychology and Center for Complex Systems and Brain Sciences.

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

Thank you very much for your time and attention.

Regards, Diane

Diane Baronas-Lowell, Ph.D.
Research Associate Professor
FAU-Neuroscience
Charles E. Schmidt College of Science
John D. MacArthur Campus
5353 Parkside Dr.
MC-19, RE Bldg., Room 107
Jupiter, FL 33458
561 799-8073 (work)
561 374-0469 (cell)

From:

Janet Blanks

To:

Diane Baronas-Lowell

Cc:

Rodney Murphey; Michelle Cavallo; ken.dawson-scully@fau.edu

Subject:

RE: Graduate Program Change Request-Proposal to add Neuroscience and Environmental Science to IB Ph.D.

Progran

Date:

Thursday, September 18, 2014 7:24:05 AM

Importance:

High

Hi Diane,

I was very happy to see the new changes in the Integrative Biology Ph.D. program which now includes a track for Neuroscience and another for Environmental Science! As a neuroscientist, I can only comment on the proposed changes in this field of study. I (and members of the Center) welcome a more comprehensive cellular and neurophysiological plan of study for this program. The new Neuroscience courses recently proposed by the Biology Department are "hands-on" neurophysiology courses, as well as a much needed neuroanatomy. These course will complement existing courses offered by the Center for Complex Systems and Brain Sciences.

Good luck with the revised Ph.D. program.

Janet Blanks

From: Diane Baronas-Lowell

Sent: Tuesday, September 16, 2014 9:04 AM

To: David Wolgin; Janet Blanks

Cc: Rodney Murphey; Michelle Cavallo; ken.dawson-scully@fau.edu

Subject: Graduate Program Change Request-Proposal to add Neuroscience and Environmental Science

to IB Ph.D. Program

Hello Dave and Janet:

Good morning. Please find attached the Graduate Program Change Request form to add Neuroscience and Environmental Science to the Integrative Biology Ph.D. Program with attached memo from Rod Murphey.

Under the "Consult and list departments that might be affected by the change and attach comments" box, we are including Psychology and Center for Complex Systems and Brain Sciences.

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

Thank you very much for your time and attention.

Regards, Diane

Diane Baronas-Lowell, Ph.D.
Research Associate Professor
FAU-Neuroscience
Charles E. Schmidt College of Science
John D. MacArthur Campus
5353 Parkside Dr.
MC-19, RE Bldg., Room 107
Jupiter, FL 33458
561 799-8073 (work)
561 374-0469 (cell)

From: To: Dale Gawlik Michelle Cavallo IBES track in IB

Subject: Date:

Tuesday, September 23, 2014 3:45:57 PM

Michelle,

In September 2014 the Program Committee for the Environmental Science Program voted unanimously to support the catalog changes to create a track, entitled Integrative Biology in Environmental Science, within the Integrative Biology PhD degree.

Dale Gawlik, Director, Environmental Science Program

Dr. Dale E. Gawlik, Director
Environmental Science Program
Professor of Biological Sciences
Florida Atlantic University
777 Glades Road
Boca Raton, FL 33431-0991
561.297.3333
561.297.2749 (fax)
dgawlik@fau.edu
www.science.fau.edu/biology/gawliklab
www.science.fau.edu/biology/envirosci

From: To: Charles Roberts
Michelle Cavallo

Subject:

RE: New IB Track Proposal

Date:

Friday, September 19, 2014 4:26:50 PM

The department of Geosciences has reviewed the proposal and has no objections to the Environmental Sciences track

Dr. Charles Roberts
Interim Chair, Department of Geosciences and
Associate Dean of Graduate Studies
Charles E Schmidt College of Science
Florida Atlantic University