

# FLORIDA ATLANTIC UNIVERSITY™

UGPC APPROVAL \_\_\_\_\_

UFS APPROVAL \_\_\_\_\_

CATALOG \_\_\_\_\_

## Graduate Programs—PROGRAM CHANGE REQUEST

DEPARTMENT: BIOLOGICAL SCIENCES

COLLEGE: CHARLES E. SCHMIDT COLLEGE OF SCIENCE

PROGRAM NAME: DOCTOR OF PHILOSOPHY INTEGRATIVE BIOLOGY

### EFFECTIVE DATE

(PROVIDE TERM/YEAR)

SUMMER 2015

PLEASE EXPLAIN THE REQUESTED CHANGE(S) AND OFFER RATIONALE BELOW AND/OR ATTACHED:

CHANGE THE MINIMUM NUMBER OF REQUIRED CREDIT HOURS FROM 80 TO 90 FOR THE INTEGRATIVE BIOLOGY PhD PROGRAM, SEE ATTACHED MEMO.

Faculty contact, email and complete phone number:

Dr. Ken Dawson-Scully, [ken.dawson-scully@fau.edu](mailto:ken.dawson-scully@fau.edu), 561-799-8051

Consult and list departments that might be affected by the change and attach comments.

See attached letters of support from the Department of Psychology, the Center for Complex Systems and Brain Sciences, the Department of Geosciences and the Environmental Science Program.

Approved by:

Department Chair: R.K. [Signature]

College Curriculum Chair: [Signature]

College Dean: [Signature]

UGPC Chair: [Signature]

Graduate College Dean: [Signature]

UFS President: \_\_\_\_\_

Provost: \_\_\_\_\_

Date:

2-17-15

2-20-15

2-20-15

3-20-15

3/25/15

Email this form and syllabus to [UGPC@fau.edu](mailto:UGPC@fau.edu) one week before the University Graduate Programs Committee meeting so that materials may be viewed on the UGPC website prior to the meeting.

## Nancy Diamond

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**From:** Charles Roberts  
**Sent:** Friday, March 20, 2015 4:10 PM  
**To:** Nancy Diamond  
**Subject:** FW: IB PhD Program Change Request - Change minimum number of post-bach credits required from 80 to 90  
**Attachments:** IB PhD Prog Change Req - min Diss 80 to 90\_2.17.2015.pdf

### ACTION AGENDA ITEM

The Tuition waiver rule will go into effect in the fall. The minimum number of credits in the IB PhD program are 80. However, it typically takes students 5 years or longer to get through this direct entry program. This is typical of direct entry programs around the nation. Five years of full time work at FAU would be 95 credits. That is more credits than the tuition waiver rules allow under the current catalog minimum degree requirements. Therefore the department of Biology is changing the minimum number of credits to 90 for the Ph.D. program.

The changes are in blue, but the catalog description is marked up in red. The red changes were done previously and the catalog has not been updated yet. So only the changes in blue are new. The change occurs in the degree requirements section and consists of the following:

“The Integrative Biology PhD program is a research intensive program, and a minimum of 90 credits beyond the baccalaureate degree must be completed to fulfill degree requirements of the Doctorate in Integrative Biology. The 90 minimum post-baccalaureate credits required to complete the Integrative Biology PhD, will include a minimum of 18 credits of coursework with a cumulative grade point average of 3.0 or higher with the following requirements:”

Charles Roberts  
Interim Chair of Geosciences  
Associate Dean of Graduate Studies  
Charles E. Schmidt College of Science



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

**To:** University Program Committee

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

**Subject:** Proposal to change the minimum number of post-baccalaureate credit hours required to complete the Integrative Biology Ph.D. Program to 90

**Date:** 2/16/2015

This memo requests approval for a change to the minimum number of post-baccalaureate credits required to complete the Integrative Biology Doctoral Degree Program. Under the current catalog description of the program, a minimum of 80 credit hours beyond the baccalaureate degree must be completed to fulfill the degree requirements of the Doctorate in Integrative Biology. This request would amend the catalog description to require a minimum of 90 post-baccalaureate credits for completion of the degree. This change would more accurately reflect the amount of coursework and research hours necessary to complete the Integrative Biology Doctoral Degree Program.

The attached catalog description incorporates previously-submitted proposed changes to the current catalog description of the PhD degree in Integrative Biology (in red). These previously-submitted proposed changes have been approved however the university catalog has not yet been updated to reflect them. The current proposed change may be found in blue on page two of the document.



## Doctor of Philosophy with Major in Integrative Biology

### **Integrative Biology Faculty:**

Ayyanathan, K.; Azzarolo, A.; Baldwin, J.; Binninger, D.; Blanks, J.; Blanks, R.; Brew, K.; Broadfield, D.; Brooks, 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.; Ieger, C.; Kajiura, S.; Kantorow, M.; Koch-Rose, 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.; Vortos, R.; Volin, J.; Warren, D., Emeritus; Wei, J.; Weissbach, H.; Wu, J.; Wyncken, 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.; Chollemi, 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 **advanced level**. 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 professor~~ PhD 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 secure a PhD supervisor from within Florida Atlantic University prior to admission. 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, and a minimum of 90 credits beyond the baccalaureate degree must be completed to fulfill degree requirements of the Doctorate in Integrative Biology. The 80 90 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) 4

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 advisor~~ PhD 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 club 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) 3  
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



**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	4
Modeling Groundwater Movement GLY 6836	3
Ecological Modeling EVR 6070	3
Ecological Theory PCB 6406	3

**Ecology and Earth Sciences**

Biogeography GEO 5305	3
Plants And People GEO 6317	3
Environmental Restoration EVR 6334	3
Flora of South Florida BOT 5155	2
Flora of South Florida Lab BOT 5155L	2
Coastal Plant Ecology BOT 6606	2
Coastal Plant Ecology Lab BOT 6606L	2
Conservation Biology PCB 6045	3
Marine Ecology PCB 6317	3
Advanced Ecology PCB 6046	3
Marine Ecology Lab and Field Studies PCB 6317L	2
Freshwater Ecology PCB 6307	3
Freshwater Ecology Lab PCB 6307L	2
Symbiosis BSC 6365	3
Environmental Physiology PCB 6749C	4
Marine Geology GLY 5736C	3
Advanced Topics in Applied, Coastal and Hydrogeology GLY 5934	3
Regolith Geology GLY 6707	3
Coastal Environments GLY 6737	3
Shore Erosion and Protection GLY 5575C	3
Global Environmental Change GLY 6746	3
Environmental Geophysics GLY 6457	3
Methods in Hydrogeology GLY 6838	3
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	3
Marine Invertebrate Zoology Lab ZOO 6256L	2
Natural History of Fishes ZOO 6456	3
Natural History of Fishes Lab ZOO 6456L	2
Seminar in Emerging Topics in Avian Ecology ZOO 6544C	1
Chemistry for Environmental Scientists CHS 6611	3
Advanced Environmental Geochemistry GLY 5243	3
Physiology of Marine Animals PCB 6775	3
Introduction to GIS in Planning URP 6270	3
Principles of Geographic Information Systems GIS 5051C	3
Applications in Geographic Information Systems GIS 5100C	3
Programming in Geographic Information Systems GIS 5103C	3
Remote Sensing of the Environment GIS 5038C	3
Digital Image Analysis GIS 5033C	3
Advanced Remote Sensing GIS 6039	3
Hyperspectral Remote Sensing GIS 6127	3
Topics in Geoinformation Science GIS 6120	3