

**BOARD OF GOVERNORS
STATE UNIVERSITY SYSTEM OF FLORIDA
NEW DOCTORAL DEGREE PROPOSAL STAFF ANALYSIS**

Program: Ph.D. in Integrative Biology
Institution: University of South Florida
Staffed By: Marion Merzer

CIP Code: 26.1399
Proposed Implementation Date: Fall 2013
Initial Review Date: 4/10/2013 **Last Update:** 5/16/2013

Projected program costs:

	Total	% & \$ Current Reallocated	% & \$ New Recurring	% & \$ New Non- Recurring	% & \$ C&G	Auxiliary Funds	Cost per FTE	SUS 10-11 Average Cost per FTE
Year 1	\$705,990	100% \$705,990	0% \$0	0% \$0	0% \$0	0% \$0	\$26,895	\$17,522 26 CIP
Year 5	\$741,145	100% \$741,145	0% \$0	0% \$0	0% \$0	0% \$0	\$19,764	

Projected FTE and Headcount are:

	Student Headcount	Student FTE
First Year	35	26.25
Second Year	40	30
Third Year	44	33
Fourth Year	48	36
Fifth Year	50	37.50

On March 29, 2007, the Florida Board of Governors approved Board Regulation 8.011, which sets forth criteria for implementation and authorization of new doctorates by the Board of Governors, as well as criteria for implementation and authorization of Bachelor's, Master's and Specialist degrees by Boards of Trustees. The following staff analysis is an assessment of how well the university meets Board Accountability and Readiness criteria for implementation of this degree program.

Proposal Page Numbers:

INTRODUCTION		ACCOUNTABILITY		READINESS				
Program Description	BOG Goals	Overall	Budget	Mission and Strength	Program Quality	Curriculum	Faculty	Resources
4	5	7	11	16	17	18	28	33

A. Program Description:

The University of South Florida (USF) is proposing to offer a new Ph.D. in Integrative Biology. This new program is the result of a reorganization of the Department of Biology in 2009. The reorganization separated the department into two new departments: the Department of Cell Biology, Microbiology, and Molecular Biology (CMMB) and the Department of Integrative Biology (IB). The establishment of the two new programs recognizes that the field of biological sciences has grown and faculty in each area focuses on different research perspectives. Replacing the original Ph.D. with two new stand-alone degree programs is expected to better serve the needs of the state and the students by allowing greater focus on specific research.

According to the USF proposal, the Ph.D. in Integrative Biology will primarily enable students and faculty to integrate the different approaches in Biology and involve the areas of conservation biology, global change biology, freshwater biology and pollution, marine biology, biomechanics, disease biology, biogeochemistry, and evolutionary biology.

Students must have a B.S. degree in Biology (or equivalent) to apply to the doctoral program. A total of ninety (90) semester hours beyond the baccalaureate degree, including a minimum of twenty-four (24) dissertation research hours, are required for degree completion. According to the USF proposal, previous Ph.D. students have been hired in one or more of the following positions: the U.S. Geological Service, Post Doctoral Researcher at Pennsylvania State University, Post Doctoral Researcher at Harvard, faculty member at Allegheny College, faculty member at the University of Tampa, Fisheries Biologist for the State of Washington, and a Senior Ecologist for a national biological consulting firm.

B. System-Level Analysis and Evaluation in accordance with Board of Governors Regulation 8.011:

The proposal references the previous State University System (SUS) Strategic Planning Goals for 2005-2013. According to the proposal, program goals demonstrate alignment with state-level priorities and directly support the following six goals from the 2005-2013 plan: 1) Goal 1A.1-3. Access to and production of degrees, 2) Goal 1A.4. Emerging Technology Doctorates, 3) Goal 1.5. Access/Diversity, 4) Goal 1.B. Meeting Statewide Professional and Workforce Needs, 5) Goal 1.B.4. Economic Development and, 6) Goal 1.C. Building world-class academic programs and research capacity. The USF Ph.D. program also directly supports two of the University's strategic goals: 1) expanding world-class interdisciplinary research, creative, and scholarly endeavors, and 2) promoting globally competitive graduate programs that support interdisciplinary inquiry, intellectual development, knowledge and skill acquisition, and student success through a diverse, fully engaged, learner-centered campus environment.

Staff review of the State University System Strategic Plan 2012-2025 found the USF proposal for a PhD in Integrative Biology supports the current system goals of excellence, productivity, and strategic priorities for a knowledge economy in the following ways: 1) strengthen quality and reputation of academic programs and universities; 2) increase degree productivity and program efficiency; 3) increase the number of degrees awarded in STEM and other areas of strategic emphasis; 4) strengthen quality and reputation of scholarship, research and innovation; 5) increase collaboration and external support for research activity; and 6) increase community and business workforce.

The degree is categorized as a STEM program and is dedicated to the training of the next generation of biologists with the skills needed to work in areas of the natural sciences, such as conservation, global sustainability, or infectious diseases. Three areas of concentration are available for research: Ecology and Evolution, Morphology and Physiology, and Environmental and Ecological Microbiology. Additionally, according to the proposal, the integrative nature of the degree allows students to become experts in multiple areas and gain skills that can be useful in research in different areas of concentration. Much of the research conducted is considered “applied biology” and “is aimed at solving problems that benefit the State of Florida and beyond.”

The USF proposal predicts that the growth in population in Florida and its ensuing strain on natural resources will provide opportunities for graduates in the field of biological sciences. Scientists in Environmental and Ecological Microbiology have the skills and abilities to help local and regional state agencies address issues of water quality and the environment. The proposal states that employment for biological scientists is projected to grow 21% over the 2010-2020 decade. Staff review of the Bureau of Labor Statistics (BLS) Occupational Employment Statistics Projections Data of May 2012 found a projected increase for the decade of 2010-2020 of only 6.3% for general biological scientists. However, the report specifically predicted a 13.3% increase for Microbiologists, a 7.4% increase for Zoologists and Wildlife Biologists, and a 5.2% increase for Conservation Scientists, all professions pointedly discussed in the USF Proposal (<http://data.bls.gov/oepl/oepl>).

Most funding of basic research comes from the federal government through the National Institutes of Health and the National Science Foundation. BLS reports that federal budgetary decisions will impact funding and future employment. According to BLS, the majority of positions for zoologists and wildlife biologists are available in local, state, and federal government agencies, such as the United States Fish and Wildlife Service, and these opportunities will also be affected by budgetary decisions. The BLS ranks Florida third in the highest employment of zoologists and wildlife biologists, with 1,350 employed (<http://www.bls.gov/oes/current/oes191023.htm>.) The same report lists 451 microbiologists currently employed in Florida.

The USF proposal quotes a review of the employment website wwwIndeed.com for available positions in the biological sciences. In September 2012, the site listed 245 Wildlife biology positions and 524 Biological Science positions available in Florida. Staff review of the same site in April 2013 found approximately 400 Wildlife jobs in Florida, 259 Biological Science positions and 39 available positions in Wildlife Research. A review of the website Employ Florida, www.employflorida.com in April 2013 listed 2,186 job openings in the Life, Physical and Social Science Occupations, with 157 positions specifically for microbiologists and seven openings for zoologists and wildlife biologists in Florida.

Aside from position openings, recent publications illustrate that full-time employment opportunities in the life sciences are not keeping pace with the production of doctoral degree recipients (National Science Board, 2012; Patton, 2012). The National Science Foundation's *Science and Engineering Indicators 2012* survey indicated that full-time faculty positions, though the most common type of employment, increased more slowly than postdoctoral and other full- and part-time positions in the sciences. According to an article appearing in the *Chronicle of Higher Education*, Patton (2012) stated that the percentage of new doctoral recipients with employment offers in the sciences has fallen to its lowest level in the past 10 years. Further, Weissman (2013) reported on a study conducted by the National Science Foundation, which indicated that, at the time of graduation, unemployment for new doctorates in the life sciences had risen by twelve percent (from 26% to 38%) from 1991 to 2011.

On the issue of competition and duplication, the proposal acknowledges that biology doctoral programs exist at the University of Florida, Florida State University, University of Central Florida, Florida International University, and the University of Miami. Most of the other programs are in the General Biological Sciences discipline, are not focused on the same specialization area, and do not carry the same CIP codes. USF expects the focusing of their graduate programs in biological sciences to create further opportunities for collaboration. Letters of support and interest in collaboration are included in the proposal from Florida International University and the University of Florida (pages 54-55 of the degree proposal). There are no letters from Florida State University or the University of Central Florida included in the proposal.

Addressing the issue of student demand, the proposal explains that faculty members in the Department of Integrative Biology have a history of attracting highly qualified students from around the world. Department policy dictates that students are not accepted into the program without a faculty sponsor willing to mentor them through the entire program. According to the proposal, in the last five years student applications have come from 23 countries and 30 states, with 229 students interested in pursuing the graduate degrees. USF admitted 83 (36%) and, of these, 62 (75%) actually enrolled in the program. Table 1-B in the proposal details the sources and numbers for projected headcount for year 1 to year 5. According to this table, the USF Ph.D. in

Integrative Biology program projects that non-Florida students will constitute more than half of the Ph.D. student headcount in the first four years, starting with 54% in year 1, increasing to 55% in year 2, 50% in year 4, and decreasing to 48% in year 5.

To respond to concerns over the separation of the department into two new separate degree programs, the proposal was reviewed by an outside consultant, Dr. Brian J. Wilkinson, Professor of Microbiology and University Distinguished Professor of the School of Biological Sciences at Illinois State University. Dr. Wilkinson's comments support the separation of the two programs. Dr. Wilkinson emphasized that biology is "too large and broad to be accommodated in one department." He added that the program is a STEM program and fully compatible with the goals of the university and the system. Complimenting the programs, Dr. Wilkinson said, "[T]he two curricula are well-designed, focused and rigorous and represent 'truth in advertising' for the recipients of the respective degrees." In conclusion, he declared the separation of the two programs as totally appropriate, calling the action "a forward-thinking move" by the University.

Although recent publications have reported concern about declining available positions for doctoral graduates in the biological sciences, it should be noted that the USF faculty in Integrative Biology have attracted more than \$16 million in extramural funding for research. Graduate students have worked with faculty on research impacting their local community and the state, in areas such as conservation biology, global change biology, freshwater biology and pollution, marine biology, disease biology, and evolutionary biology. Faculty and students have interacted with the South West Florida Water Management District, Walt Disney World, Mote Marine Institute, Lowry Park Zoological Gardens, Florida Forestry Agency, Florida Fish and Wildlife Commission, and the Florida Department of Health. Additionally, many students have been placed in teaching and/or research positions at institutions of higher education.

C. Assessment of the University Review Process in accordance with Board of Governors Regulation 8.011:

Due to the system of stair step accountability set in place by the Board of Governors in Regulation 8.011, it is now incumbent upon University Board of Trustees to verify that all doctoral programs coming before the Board of Governors have met the requirements of the regulation. The following is an assessment of the university review process to ensure that all criteria set forth have been considered by the university prior to submission to the Board of Governors office.

ACCOUNTABILITY

Check 'yes' or 'no' box, and make comments beneath criterion as appropriate.

- 1. Overall** – *The proposal is in the correct format, includes all necessary signatures, and contains complete and accurate tables for enrollment projections, faculty effort, and the proposed budget.*

YES NO

- The proposal has been approved by the university board of trustees and includes all required signatures.**

University of South Florida Board of Trustees approved the program on March 21, 2013.

- The university has provided a proposal written in the standard SUS format which addresses new academic program approval criteria outlined in Board of Governors Regulation 8.011.**

The Board of Governors new degree program proposal format was used, as expressed in Board of Governors Regulation 8.011.

- The university has provided data that supports the need for an additional program in the State University System as well as letters of support or concern from the provosts of other state universities with substantially similar programs.**

The USF proposal includes data on employment opportunities and the need for graduates with a Ph.D. in Integrative Biology. Letters of support from the University of Florida and Florida International University are included in the proposal (pages 54-55 of the degree proposal) The proposal does not include letters of support from Florida State University or the University of Central Florida.

- The university has provided complete and accurate projected enrollment, faculty effort, and budget tables that are in alignment with each other.**

The proposal provides information on each of these areas. Detailed tables are provided on projected enrollment (Table 1-B of the degree proposal); on faculty effort (Table 4 of the degree proposal); and on budget (Tables 2 & 3 of the degree proposal).

- The university has included a statement in the proposal signed by the equity officer as to how this proposal will meet the goals of the university's equity accountability plan.**

The program plan for achieving diversity was reviewed and signed by the USF Equal Opportunity Officer on January 8, 2013.

- The program does not substantially duplicate programs at FAMU or FIU or, if it does, evidence was provided that consultations have occurred with the affected university on the impact of the new program on existing programs.**

According to the USF proposal, the program does not substantially duplicate programs

at FAMU or FIU. Letters of support are provided from FIU and UF confirming the non-duplicative nature of the program and their willingness for future collaboration related to graduate education and research. FAMU does not offer a PhD in Biology.

2. Budget – *The proposal presents a complete and realistic budget for the program consistent with university and Board of Governors policy, and shows that any redirection of funding will not have an unjustified negative impact on other needed programs.*

YES NO

The University Board of Trustees has approved the most recent budget for this proposal.

The current budget proposal has been approved by the USF Board of Trustees on March 21, 2013.

The university has reviewed the budget for the program to ensure that it is complete and reasonable, and the budget appears in alignment with expenditures by similar programs at other SUS institutions.

Projected costs of the program as provided in Table 2 of the degree proposal are only slightly higher than the average expenditures at other SUS institutions. The proposal claims the Cost per FTE at USF will be \$26,895 in the first year, and \$19,764 in year 5, compared with \$17,522 Costs per FTE system-wide for the same CIP code 26. The budget detailed in Table 2 of the proposal shows total costs needed as \$705,990. The two programs were split from a general PhD in Biological Science program in 2009. Table 3 of the proposal shows anticipated reallocation of education and general funds as the same \$705,990. A footnote explains that these funds are the current IB support and the reallocation is maintaining the original base funding. The proposal explains that the total funding of the original PhD in Biology program was \$1,423,492. When the two programs were separated, the PhD in CMMB program received a budget of \$717,502, and the IB doctoral program received \$705,990. The proposal states that “no new resources will be required for this program,” and they “do not anticipate any need for an increase in funding.” Staff review of Board of Governors enrollment data shows a total of 76 students in the current Ph.D. in Biological Sciences. According to the proposal, IB currently has 40 Ph.D. students and 18 M.S. degree students. In the degree proposal, the table on page 2 and in Table 1-B show the projected enrollment of 35 Headcount and 26.25 FTE in the first year, steadily increasing to 50 enrolled, with 37.50 FTE in year 5. These numbers align with the current enrollment and the department statement that “because the number of Ph.D. students is near capacity for the number of faculty, we project only modest increases over the next five years.” Current students will have the option to switch to the new program or finish their degree with the current program.

- In the event that resources within the institution are redirected to support the new program, the university has identified this redirection and determined that it will not have a negative impact on undergraduate education, or the university has provided a reasonable explanation for any impact of this redirection.**

According to the USF proposal, the program has been offered for many years in the former Department of Biology. For this reason, USF doesn't anticipate any negative effects of the new Ph.D. program on any other departments or programs. The faculty will continue to engage undergraduates in research and the library provides complete access to needed electronic journals, books and other resources. The courses required for completion of the program are existing courses, can be taken by students in either program and the new program does not require the creation of any new courses.

Education & General funding and reallocated funding is detailed in Tables 2 & 3 of the proposal (pages 50 & 52). Additionally, as evidenced in the USF proposal, more than \$16 million in extramural funding has been allocated to faculty members of the Department of Integrative Biology over the past five years. A list of these sources is included on page 12 of the degree proposal.

READINESS

Check 'yes' or 'no' box, and make comments beneath criterion as appropriate.

3. Program Quality – *The proposal provides evidence that the university planning activities have been sufficient and responses to any recommendations to program reviews or accreditation activities in the discipline pertinent to the proposed program have been addressed.*

YES NO

- The university has followed a collaborative planning process for the proposed program in accordance with policies and procedures adopted by the University Board of Trustees.**

As explained in the proposal, USF split the two major focus areas in 2009. The department had grown large with 40 faculties and 100 graduate students. The faculty was too diverse in research to belong to one single degree program. In 2009, the Department of Biology reorganized to form the two new departments, housed in separate buildings: the Department of Cell Biology, Molecular Biology and Microbiology and the Department of Integrative Biology. It was agreed that each program would establish a new Ph.D. program with separate CIP Codes. Faculty from both departments, the Dean of Arts and Sciences, and the IB Graduate Committee were involved in the process from 2006-2013.

Details of the planning process, along with the departments, committees and

participants involved, is located in the proposal (page 17).

- An external consultant has reviewed the proposal and supports the department's capability of successfully implementing this new program.**

In response to a request from USF, Dr. Brian J. Wilkinson, Professor of Microbiology and University Distinguished Professor for the School of Biological Sciences at Illinois State University provided an external review of the proposal for the Ph.D. in Integrative Biology. Dr. Wilkinson's findings and comments were very favorable for the establishment of the new Ph.D. programs. Dr. Wilkinson wrote that, "[T]he discipline of biology is too large and broad to be accommodated in one department." Dr. Wilkinson recognized that the Integrative Biology graduate program at USF attracts students world-wide and the faculty has an outstanding record for obtaining grant money and publishing. In summation, Dr. Wilkinson gave his support and wrote: "The creation of two new departments...was a forward-thinking move by the University of South Florida that promoted the further development of the broad discipline of biology at the university." In his opinion, the creation of two separate degree programs provided an "efficient administrative structure," and ensures that the "two departments will continue to grow and flourish." A copy of his review is provided in the proposal (pages 56-59).

- The university has found the level of progress that the department has made in implementing the recommendations from program reviews or accreditation activities in the discipline pertinent to the proposed program to be satisfactory.**

The proposal states that the former Department of Biology was reviewed by the Southern Association of Colleges and Schools (SACS), during the 2005-2006 academic year. The next planned review is for 2014 or 2015. However, SACS reviews and accredits the institution, not individual programs. It is likely that the department or College participated in the university's review for SACS accreditation but is not separately accredited by SACS as a program.

At this time, the Department of Integrative Biology has not been evaluated by any outside group or specialized accrediting agencies.

The proposal explains that at USF, internal review is provided by the Graduate Admission and Policy Committee (GAPC). Consisting of the Graduate Director, three faculty members, and one graduate student, the GAPC monitors all aspects of graduate studies. Dr. Robert Potter, Associate Dean of Academic Affairs at the College of Arts and Sciences oversees all graduate programs, and a committee composed of the Graduate Directors from the academic departments that form the School of Natural Sciences and Mathematics (SNSM) provide programmatic oversight.

- The university has analyzed the feasibility of providing all or a portion of the proposed program through distance learning.**

USF will conduct the Ph.D. in Integrative Biology program as a traditional delivery system on the main (Tampa) campus. The proposal states that no plans currently exist to collaborate with other universities or deliver the program online.

4. Curriculum - The proposal provides evidence that the university has evaluated the proposed curriculum and found that it describes an appropriate and sequenced course of study, and that the university has evaluated the appropriateness of specialized accreditation for the program.

YES NO

- The university has reviewed the curriculum and found that the course of study presented is appropriate to meet specific learning outcomes and industry driven competencies discussed in the proposal.**

According to the USF proposal, Integrative Biology graduates are employed in a large variety of fields in public service and industry. No specific industry-driven standards or competencies exist. The proposal explains that the Department of Integrative Biology created curriculum to produce independent creative thinkers. Students learn research tools, enhance their skills, and analyze data using modern methods of analysis. Because many of the graduates enter the academic field, they are provided with extensive training in their roles as teaching assistants.

- The university anticipates seeking accreditation for the proposed doctoral program, or provides a reasonable explanation as to why accreditation is not being sought.**

There is no specialized accreditation for biology programs at any level. USF is a member of Beta, Beta, Beta, the National Honor Society for biologists.

5. Faculty - The proposal provides evidence that the university is prepared to ensure a critical mass of faculty will be available to initiate the program based on estimated enrollments, and that faculty in the aggregate have the necessary experience and research activity to sustain a doctoral program.

YES NO

- The university has reviewed the evidence provided and found that there is a critical mass of faculty available to initiate the program based on estimated enrollments.**

The proposal provided evidence of 17 faculty members. Each student must be mentored

by a faculty member. There are currently 40 Ph.D. students and 18 M.S. students in the department. The number of students will be limited by the number of faculty available. The proposal has no plans for more hires.

- The university has reviewed the evidence provided and found that the faculty in aggregate has the necessary experience and research activity to sustain the program.**

As evidenced in Table 4 (pages 52-53 of the degree proposal), all of the current faculty hold terminal degrees in their field. Fourteen faculty members are tenured and 3 are non-tenure track. Additionally, 11 are full professors, 4 are associate professors, 1 is an assistant professor and 1 is an instructor.

- The university has reviewed the evidence provided and found the academic unit(s) associated with this new degree to be productive in teaching, research, and service.**

The chart on page 29 of the degree proposal shows a substantial number of publications and participation on theses and dissertation committees by the current faculty. According to the proposal, each faculty member maintains an active research laboratory.

- If appropriate, the university has committed to hiring additional faculty in later years, based on estimated enrollments.**

The proposal provides no plan for future hiring of additional faculty to implement the program because a sufficient number of faculty are already in place.

6. Resources – The proposal provides evidence that the university has ensured the available library volumes and serials; classroom, teaching laboratory, research laboratory, office space, equipment, clinical and internship sites, fellowships, scholarships, and graduate assistantships will be sufficient to initiate the program, and that if applicable, funding has been secured to make more resources available as students proceed through the program..

YES NO

- The university has provided a signed statement from the Library Director verifying that the library volumes and serials available are sufficient to initiate the program.**

The proposal provides evidence that sufficient library resources are available to implement the program and no additional resources are needed at this time. A statement was signed by the Dean of USF Libraries on February 8, 2011.

- The university has ensured that the physical space necessary for the proposed program, including classrooms, laboratories and office space, is sufficient to initiate the program.**

The proposal describes adequate classrooms and laboratories to accommodate this program. The department currently has eight classrooms for instruction, including three large auditoriums that are shared with other programs. Each faculty member has his or her own office space, computer and access to needed software and tech support for teaching and research needs. Each faculty member has a laboratory, which is also used by his or her graduate students. Doctoral students are provided with space in the lab and access to computers. A teaching assistant is provided with office space for meeting with students from his or her class. Business equipment, including a printer, fax machine, and copier, are available and shared.

The proposal declares that, "no additional space of any kind is needed to implement or maintain the proposed program through Year 5."

- The university has ensured that necessary equipment is available to initiate the program.**

The proposal reports that USF currently has the specialized equipment needed for the program (see pages 42-46).

- The university has ensured that fellowships, scholarships, and graduate assistantships are sufficient to initiate the program.**

According to the proposal, the Department of Integrative Biology has 29 teaching assistantships that support graduate students who teach undergraduate laboratories. External funding has been used during the past two years to provide salaries for the teaching assistantships totaling \$372,649. Additionally, as evidenced in Table 2 (page 50 of the degree proposal), USF has budgeted \$351,426 for research assistantships. The proposal states that there are usually 5 to 10 Research Assistantships available.

- If applicable, the university has ensured that the department has arranged a suitable number of clinical and internship sites.**

According to the USF proposal, outside internships and practicum experiences are not typical for Ph.D. students in Integrative Biology. However, the Department currently has between 5 to 10 Research Assistantships available with salaries paid from E&G funding (see Table 2 of the degree proposal).