STAFF ANALYSIS
Proposed Ph.D in Animal Molecular and Cellular Biology
University of Florida
Classification of Instructional Program (CIP) #26.0204

Estimated Costs:

	Total	% & $ Current	% & $ New	% & $ C&G	Cost per FTE	SUS 2004-2005 Average Costs
Year 1	$147,540	100 % $147,540	0% $0	0% $0	$21,198	$27,975 for CIP 26 at Doctoral Level
Year 5	$167,507	95 % $159,252	5% $8,255	0% $0	$10,696	

NOTE: The low cost per student FTE is due to an existing consortia agreement, whereby most costs are absorbed by other departments.

Projected FTE and Headcount are:

	Projected Headcount	**Student FTE**
First Year	8	6.96
Second Year	10	8.70
Third Year	13	11.31
Fourth Year	15	13.05
Fifth Year	18	15.66

On April 30, 2003, the Florida Board of Governors approved eight criteria, divided into the two categories of Readiness and Accountability, by which implementation authorization of new doctorates were to be assessed. The following is an analysis of the University's proposal based on further delineations of those eight criteria.

Index to Analysis per Board of Governors Approval Criteria:

READINESS

1. Mission and Strength *- The goals of the program are aligned with the university's mission and relate to specific institutional strengths. The program is aligned with goals identified within the State University System Strategic Plan.*

Evidence that the proposed program is responsive to the goals of the current State University System Strategic Plan and the goals of the proposed program relate to the institutional mission statement as contained in the Strategic Plan

The implementation of a Ph.D. in AMCB would be consistent with the goal of building world-class academic programs and research capacity in the 2005-2013 SUS Strategic Plan. The creation of such a program would assist the specific goal of creating access to and production of emerging technologies doctoral degrees. There is currently no Ph.D. program for Animal Molecular and Cellular Biology (AMCB) in the State University System, with only a scarce number of programs in this field throughout the country.

Evidence of a relationship to specific institutional strengths

The current University of Florida strategic plan has listed Biological Sciences as a major priority. A Masters degree in AMCB is currently available at the university. The proposed Ph.D. program elevates an existing interdisciplinary track combining Animal Science, Medicine, Veterinary Medicine and Liberal Arts and Sciences. This Ph.D. would enhance existing graduate programs by offering courses, colloquy and research seminars in life sciences.

2. Program Quality *– 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.*

Evidence that planning for the proposed program has been a collaborative process involving academic units and offices of planning and budgeting at the institutional level, as well as external consultants, representatives of the community, etc.

According to the proposal, the January 2002 Presidential Task Force at UF presented a report which included a strong recommendation for interdisciplinary Biology programs. In response, the interdisciplinary graduate degree program in Animal Molecular and Cellular Biology was discussed. During the Fall of 2002, informal discussions were held between three faculty members in the Department of Animal Sciences, the Dean and the Associate Dean of the College of Agricultural and Life Sciences (CALS). By June 2004, the revised proposal was submitted to the CALS Curriculum Committee and received final approval to move forward to the graduate council. In December 2004, the Zoology department and the College of Liberal Arts Studies wrote letters of support and became full participants in the program. The proposal passed the University Curriculum Committee in February 2005, and was approved by the UF Board of Trustees in September 2005.

Evidence of an appropriate timetable of events leading to the implementation of the proposed program
The timetable for implementation anticipates accepting the first students in January 2007 and conferring the first degree in May 2010. Because this proposal will elevate an existing track to a full degree program, faculty and resources will be in place for this timeline.

Evidence that progress has been made in implementing the recommendations from program reviews or accreditation activities in the discipline pertinent to the proposed program
The proposal states that an external review of the Department of Animal Sciences was conducted on March 13-17, 2006, focusing on the research, teaching, and extension programs therein. The review committee recommended that graduate education play a key role in the department's strategic planning process and that the department establish long and short term goals for participation in the AMCB program. The department's response to this review has not yet been finalized.

3. Curriculum *- The proposal describes an appropriate and sequenced course of study, admissions and graduation criteria are clearly specified and appropriate, and the appropriateness of specialized accreditation is addressed.*

Evidence of an appropriate, sequenced, and fully described course of study; evidence of specific learning outcomes and industry driven competencies are discussed for any science and technology programs
To be admitted into the AMCB doctoral program, a student must have a grade point average of 3.0 or better, a combined GRE score (verbal and quantitative) of 1000, a Bachelor's or Master's degree in a related discipline, and must meet any other University, College, or home departmental requirements. The degree consists of 90 credit hours, of which 30 can be transferred from an M.S. degree, and at least 24 must be directed towards graduate level research. Students will be required to enroll in 9 credit hours per semester during the academic year, and 6 credit hours during summer for the duration of the degree.

The core curriculum includes a graduate seminar, two graduate research courses, a biochemistry course, a molecular biology course and a cellular biology course. The program core appears to be structured similarly to the Cellular and Molecular Biology programs at both the University of Texas at Austin and University of Michigan. The student's supervisory committee will develop the remainder of the student's curriculum. Possible areas of specialization include, but are not limited to: reproductive physiology, animal health, animal biotechnology, muscle biology, and nutritional physiology.

One learning outcome of this new PhD degree is the education of scientists that have an understanding of principles of molecular and cellular biology, and the ability to apply

this knowledge to problems of animal health, livestock production, and animal biotechnology. Another outcome is the training of integrationists who can combine concepts derived from physiology, genetics, cell biology, molecular biology, and animal management, to develop unique approaches to animal production.

Evidence that, if appropriate, the bachelor's and master's degree programs associated with the program are accredited and that the institution anticipates seeking accreditation for the proposed program if available

The proposal does not address specialized accreditation for the Animal Biology Bachelor of Science, the AMCB Master of Science and/or the potential AMCB Ph.D. at the University of Florida. However, BOG staff is not aware of any specialized accreditation pertinent to this program.

Evidence that the institution has analyzed the feasibility of providing all or a portion of the proposed program through distance learning technologies via its own technological capabilities

At present, this program will be offered to on-campus full-time students in a traditional format. In the future, as need arises, the Graduate Council may be asked to consider proposals to confer this degree jointly with other institutions, including collaborators such as Scripps or international universities.

4. Faculty *– A critical mass of faculty will be available to initiate the program based on estimated enrollments, and faculty in the aggregate has the necessary experience and research activity to sustain a doctoral program.*

Evidence that there is a critical mass of faculty available to initiate the program based on estimated enrollments

The proposal states that there will be fourteen faculty members involved with the implementation of this new degree program. There is a plan to hire one new faculty member in Physiology in 2009. In addition, new faculty hired into participating home departments may apply and will be admitted as new AMCB faculty after one year of participation in the program. The average faculty member will spend, on average, four hours per week with each doctoral student under their supervision, an effort of 10%. Eight Ph.D. students are projected to enroll during the first year. By year five of the new program, eighteen Ph.D. students are projected to enroll.

Evidence that the faculty in aggregate have the necessary experience and research activity to sustain the program

The AMCB department has fourteen tenure track faculty members consisting of one distinguished professor, five full professors, two associate professors, four assistant professors, one clinical professor, and one graduate research professor. All faculty hold a Ph.D. The clinical professor holds an M.D. as well. All faculty members have participated in Masters and/or Ph.D. committees; only one has not chaired a committee. Five faculty members have chaired over 14 committees each; two have each chaired 30

committees and participated in over 50 more. Faculty members have also produced a significant number of publications; five have authored over a hundred publications, and two have authored more than 20 book chapters.

Evidence that, if appropriate, there is a commitment to hire additional faculty in later years, based on estimated enrollments
The proposal shows the intent to provide good coverage of teaching, advising and scholarly activity as enrollment increases. A plan is in place to hire one new faculty member in Physiology in 2009. The interdisciplinary nature of the program allows new faculty hires in participating departments to become AMCB faculty after participating in the program for one year. The university will compare favorably with its selected peer institutions with regard to number of faculty, research productivity, and projected number of students.

*5. **Resources** – The necessary 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.*

Evidence that library volumes and serials are sufficient to initiate the program
Both the Marston Science Library and Health Science Center Library have indicated that the current collections are adequate to support the AMCB Ph.D. program. Memorandums from each library are attached to the proposal as appendices.

Evidence that classroom, teaching laboratory, research laboratory, office, and any other type of space that is necessary for the proposed program is sufficient to initiate the program
Facilities available to the AMCB interdisciplinary graduate program include laboratory space for each AMCB faculty member, classroom space, computer laboratories, and dairy, beef, horse and swine farms equipped with space, animals and equipment for their studies. Additionally, faculty and students have access to the Interdisciplinary Center for Biotechnology Research (ICBR) core laboratories. A table included in the proposal that shows 2,709,631 total square feet of classrooms, teaching labs, research labs, offices and support space will be available to AMCB faculty and students through the Colleges of Medicine, Liberal Arts Studies, Agricultural and Life Sciences, and Engineering.

Evidence that necessary and sufficient equipment to initiate the program is available
The laboratories of the AMCB interdisciplinary faculty are equipped with many of the instruments, equipment and computers needed for conducting research in cellular and molecular biology, including a Typhoon 9210 variable mode scanner, tissue culture incubators, laminar flow hoods, microscopes, micromanipulators, electroporators, thermocyclers, centrifuges, scintillation counters, electrophoresis equipment, blotting apparatuses, film developers, spectrophotometers, distillers, purification columns, autoclaves, ultralow freezers and liquid nitrogen storage tanks. Additional instruments

and equipment are available at the ICBR core laboratories for a modest charge. Most classrooms are equipped with networked computers.

Evidence that, if appropriate, fellowships, scholarships, and graduate assistantships are sufficient to initiate the program

Presidential Fellowships, Alumni Fellowships and Assistantships for students admitted to the proposed AMCB doctoral program will be made available based on academic achievement and priority. Currently, the AMCB program receives up to two Alumni Fellowships per year, is eligible to apply for Presidential Fellowships on a competitive basis, and receives two half assistantships from CALS. Ninety-five percent or more of the AMCB doctoral students are funded either through grants, fellowships or assistantships.

Evidence that, if appropriate, clinical and internship sites have been arranged

Internships are not a requirement of the proposed program. Students may opt to participate in an internship as part of their individual programs of study.

ACCOUNTABILITY

6. Need *- There is a need for more people to be educated in this program at this level and if the program duplicates other professional and doctorate degrees in Florida, a convincing rationale for doing so is provided.*

Evidence that there is a need for more people to be educated in this program at this level

Enterprise Florida has identified life sciences as one of the key sectors in Florida's growing economy. In 2003, the Scripps Research Institute received some $500 million in incentives, including state and federal funds, to build a new facility in Palm Beach County. Recently, the Burnham Institute for Medical Research received $310 million worth of state and local incentives, to construct a new Orlando campus. The Torrey Pines Institute for Molecular Studies plans to open a facility in Port St. Lucie in return for $80 million worth of state and local incentives.

Florida has also allocated $20 million towards attracting world class scholars to the State University System, and $30 million to boost the state's science-focused Centers of Excellence. An additional $50 million has been used to create the Quick Action Closing Fund, the goal of which is to enable the state to respond quickly to extraordinary economic opportunities.

On the national level, the Fall 2006 issue of *Occupational Outlook Quarterly,* a Bureau of Labor Statistics (BLS) publication, projects an additional 8,000 net job openings for doctoral level biochemists and biophysicists, and 7,000 net job openings for doctoral level microbiologists for the period of 2004-14. The BLS' Occupational Outlook Handbook considers this growth to be "as fast as average."

Evidence that the proposed program does not duplicate other SUS or independent

college offerings or, otherwise, provides an adequate rationale for doing so
The proposed program is not offered anywhere else in the SUS or independent institutions.

Evidence of reasonable estimates of student headcount and FTE who will major in the proposed program, and commitment to a diverse student body
The FTE estimates appear high, averaging 0.87 FTE/graduate student. The proposal explains that compliance with the rules of university assistantships and fellowships has lead to this high ratio. All students enrolled in this degree program are expected to be either on a fellowship or an assistantship. Assistantships require students to register for 9 credit hours per semester during the academic year, and 6 credit hours during the summer, for a total of 24 hours per year. Fellowships require students to enroll in 12 credit hours per semester during the academic year, and 8 credit hours during the summer, for a total of 32 hours per year.

The proposal states that the AMCB will follow the standard practices and procedures of the College of Agricultural and Life Sciences to ensure achievement of a diverse student body. No supporting evidence is provided that current policies have historically been effective, but the proposal is signed by the university's equal opportunity officer, Mr. Larry Ellis, and annual reports of student diversity will be filed with him.

7. Budget - *A complete and realistic budget for the program is provide, and any redirection of funding will not have an unjustified negative impact on other needed programs.*

Evidence of a budget for the program that is complete and reasonable, and comparable to the budgets of similar programs at other SUS institutions, and reflective of the proposal's text
Due to the interdisciplinary nature of this program, faculty salaries, benefits and facilities are supported by the faculty's home departments. Resources required for research are also supplied to faculty members by their respective departments, and contract and grant dollars will be associated with the departments as well. Graduate student stipends are supported through the faculty, by CALS partial assistantships or Alumni Fellowships. This is reflected in the budget tables which include only new faculty costs.

Evidence that, in the event that resources within the institution are redirected to support the new program, such a redirection will not have a negative impact on undergraduate education.
The proposal states that there are no plans to shift institutional resources for the proposed AMCB Ph.D. program. Students will continue to enroll in courses and use resources in the Colleges of Medicine, Liberal Arts Studies, Agricultural and Life Sciences, and Veterinary Medicine as they would have in the interdisciplinary AMCB track.

8. Productivity *- The academic unit(s) associated with this new degree have been productive in teaching, research, and service.*

Evidence that the academic unit(s) associated with this new degree have been productive in teaching, research, and service.

Twenty-one Ph.D. degrees have been granted to students participating in the AMCB track since it began in May of 1993. Committee participation and publications are used in this proposal as measures of faculty productivity. Student productivity is also discussed in the proposal. Four graduate students from the interdisciplinary AMCB track have been recipients of the University of Florida Chapter of Sigma Xi Graduate Research Award and one has won the award for the Outstanding Dissertation in IFAS in 2002. In addition, graduates of the program serve on the faculties of University of Florida, University of Tennessee, University of Utah College of Medicine, Universidade de Sao Paolo, Universidad Central de Venezuela, and other institutions. Some graduates are working as research scientists in pharmaceutical and biotechnology companies such as Monsanto, Pfizer, Genzyme, and XenoTech.