

Contact: Diana Gonzalez

**REQUEST TO REVISE AND RESTRUCTURE THE
DOCTORAL BIOSCIENCE PROGRAMS AND FOR A NEW MASTER OF SCIENCE
PROGRAM IN BIOMEDICAL SCIENCE AT THE UNIVERSITY OF IOWA**

Action Requested: Consider approval of the request by the University of Iowa for the following: (1) Suspend admissions to the following bioscience Master of Science and Ph.D. programs – Biochemistry; Developmental and Cell Biology; Free Radical and Radiation Biology; Immunology; Microbiology; Molecular and Cellular Biology; Pharmacology; and Molecular Physiology and Biophysics; (2) Restructure the bioscience programs into a new program offered as the Ph.D. Program in Biomedical Science; and (3) Create a Master of Science Program in Biomedical Science in the Graduate College.

Executive Summary: The proposed actions are expected to reduce duplication and better equip students to work in a rapidly changing research environment. These proposals were reviewed by the Board Office and the Council of Provosts and are recommended for approval. No concerns were raised when they were presented to the Iowa Coordinating Council for Post-High School Education. The proposed actions address the Board of Regents Strategic Plan priorities to “provide educational excellence and impact as well as economic development and vitality” and Goal #8 – “Iowa’s public universities and special schools shall be increasingly efficient and productive.”

Background:

(1) SUSPENSION OF ADMISSIONS TO EIGHT BIOSCIENCE MASTER OF SCIENCE AND Ph.D. PROGRAMS.

◇ **Description of programs.**

- ⇒ *Biochemistry.* Students entering the Ph.D. program in Biochemistry have the opportunity to tailor their curriculum to take courses that enhance their educational goals. They are expected to take a combination of graduate level courses that include a first year laboratory research rotation course, seminar courses and topic based courses that have been divided into one hour modules. Currently, 34 hours of coursework plus 38 hours of research credit are required prior to completion of the Ph.D. degree. Nineteen hours of the coursework for all students includes Biophysical Chemistry (3 ch); Research Techniques (8 ch); Molecular or Cellular biology (4 ch); Graduate Seminar (3 ch); and Principles of Scholarly Inquiry (1 ch).
- ⇒ *Developmental and Cell Biology.* Students in the Developmental and Cell Biology Program benefit from integrated training in human structural anatomy and cell biology as a foundation for careers in research concerning the molecular mechanisms of human diseases. This training program for Ph.D. scientists reflects a global approach toward understanding the human body, organ function, and disease pathophysiology. This broad-based training provides students with a comprehensive view of human disease pathophysiology and molecular medicine, a solid foundation for careers in cutting-edge research concerning the molecular mechanisms underlying human diseases.

- ⇒ *Free Radical and Radiation Biology.* This program puts a strong emphasis on scientific communication as well as traditional high expectations for original research. It is a goal to have students graduate in four to five years. To meet this goal, the student is required to take the Ph.D. Comprehensive Examination no later than the beginning of their sixth semester. This examination has the form of a research proposal in NIH format (with minor changes) over the research they propose for their Ph.D. thesis. The proposal should have some preliminary data and have all the elements expected in the actual proposal body of an NIH R01 application.
- ⇒ *Immunology.* Immunology sit at the intersection of molecular biology, biochemistry, and microbiology and genetics with clinical medicine. A recently reorganized core immunology curriculum plus strong electives in related disciplines encourage creative thinking. Core facilities make the latest technologies available to all investigators. Numerous journal clubs and discussion groups complement a weekly seminar program featuring Iowa faculty and prominent immunologists from around the world.
- ⇒ *Microbiology.* The course of graduate studies is designed so that after receiving their Ph.D., students will have expertise in research in a specific area of microbiology and/or immunology. The Department of Microbiology consists of 23 faculty members with strengths in bacterial genetics and physiology, animal virology, pathogenic bacteriology and virology, and immunology. Areas of research include Bioinformatics, Cellular Microbiology, Molecular Virology and Immunology, Bacterial Biochemistry and Physiology, Bioremediation, Bacterial and Viral pathogenesis, and Molecular Parasitology. By working in the laboratory of their Ph.D. advisor, students learn to define and experimentally investigate scientific questions and to conduct original research in preparation for positions in academia, government, and industry.
- ⇒ *Molecular and Cellular Biology.* The ability to analyze and alter gene expression has become a central focus of a great deal of biological research. Scientists within many different disciplines are employing molecular biological approaches to gain new understandings of fundamental processes. Therefore, it is appropriate that the training of graduate students in Molecular and Cellular Biology reflect the interdisciplinary nature of research in this area. A crucial aspect of the program is the opportunity to participate in a diversity of research interests.
- ⇒ *Pharmacology.* The emphasis of the program is on laboratory research as well as development of critical analysis and communication skills. Students gain knowledge of the field through course work in molecular and cell biology, human physiology and pharmacological sciences during the first two years of the program. Over the past five years, the time required to complete the Ph.D. degree has averaged 5.4 years.
- ⇒ *Molecular Physiology and Biophysics.* The graduate program in Molecular Physiology and Biophysics offers opportunities for training and research leading to the Ph.D. degree. Faculty in the Department of Molecular Physiology and Biophysics have a strong research focus on the cellular, molecular, and physical mechanisms of physiological processes. During the first and second years, students take courses and participate in faculty research in one or more laboratories. After satisfying course and comprehensive examination requirements, students devote their full time to thesis research under faculty supervision. All degree candidates gain experience in classroom instruction as part of their training.

- ◇ Reason for proposed suspension of admissions. The three-year suspension of admissions to the eight programs is part of a comprehensive restructuring of the bioscience training programs at the university. The restructured program will reduce duplication at several levels. Students will have the opportunity to train in a multi-discipline environment which will equip them better to work in a rapidly changing research environment. The proposed umbrella program will afford a standardized and integrated curriculum for first-year students in areas such as scholarly integrity, professional development opportunities, a uniform seminar series, and courses in statistics and informatics.
- ◇ Effect of proposed suspension on current students. Current students will continue to be served by the department and their faculty advisors. Students will be given the choice of continuing under the currently named programs or completing their degree under the new Ph.D. Program in Biomedical Science with the appropriate subprogram indication. In either case, the curriculum responsibilities of the student will not change.
- ◇ Effect on cost savings and resource allocations. Cost savings will result from offering uniform and integrated curricula for first-year students.
- ◇ Availability of program in state. The eight programs are not available elsewhere in the state. However, they will continue to be offered at the university under the new Ph.D. Program in Biomedical Science with subprograms.
- ◇ Five-year trend of applications, enrollments, and graduates in the program. Between 2011 and 2015, there were 1,200 applicants to the eight programs. Between 2010 and 2014, there were 173 students enrolled in the eight programs. During that same period, there were 235 graduates from the eight programs.
- ◇ Proposed period of suspension of admissions. A three-year suspension of admissions will allow the departments of the eight programs to evaluate the effectiveness of their participation in the new Ph.D. Program in Biomedical Science.
- ◇ Effect on workforce. No impact on the workforce is expected. The eight programs will continue to operate under the new Ph.D. Program in Biomedical Science.
- ◇ Program impact on other programs. There is no anticipated impact on other programs. The restructuring of the eight programs in the new Ph.D. Program in Biomedical Science is likely to increase the appeal of the program as well as the academic quality and research experience of applicants.
- ◇ Anticipated impact on minorities and women. In the restructured programs, the departments anticipate that students will have opportunities to interact with faculty from a wider range of programs.
- ◇ Anticipated reduction in resources. No reduction in faculty, staff, or facilities is anticipated.
- ◇ Date of implementation. Suspension of admission to the eight programs will become effective upon approval by the Board of Regents and will be included in the University's General Catalog. The anticipated implementation date is Fall 2016.

(2) RESTRUCTURE THE EIGHT BIOSCIENCE PROGRAMS INTO A NEW PROGRAM OFFERED AS THE Ph.D. PROGRAM IN BIOMEDICAL SCIENCE.

- ◇ Background. The quality of biomedical Ph.D. programs is directly tied to and driven by the quality of the applicant pool and students matriculated. The university created an umbrella first-year entry program about 15 years ago (“Biosciences Program”) for the purpose of recruiting high quality but “undifferentiated” biomedical graduate students who would rotate through various laboratories to gain a sense of their preferred program of biomedical Ph.D. work. This centralized preparatory approach has not been successful in consistently generating stellar applicant pools and has not met needs of constituencies (quality, quantity, and types of students matched with faculty specialization needs).

Biosciences has not achieved the success anticipated when the programs were implemented in 2000. The quality and quantity of students in the applicant pool has waned, and fewer students have matriculated over time. The numbers of matriculated students has ranged from around 20-25 in the mid-2000s to lows of less than 15 in recent years. In the past four years, 15, 14, eight, and 10 students matriculated, respectively. The performance of students in the Biosciences Program has also been, on average, below that of students who matriculate directly into many of the various (11 affiliated) departments and degree programs, as evidenced by completion rates and time to degree.

There has been uneven quality across the 11 biomedical doctoral programs ranging from stellar to modest. Several programs are small and have modest records of success. Some of the programs have successful T32 grants while some have never been T32 supported. Furthermore, there is overlap and redundancy among several of the programs relating to themes, faculty, and rubrics.

- ◇ Description of proposed program. The university proposes to revise and restructure the bioscience programs into a new Ph.D. Program in Biomedical Science. This requires collapsing eight of the 11 existing departmental and interdisciplinary doctoral programs into one Ph.D. Program with eight subprograms. The eight doctoral programs which will be included in the new program include the following – Biochemistry; Developmental and Cell Biology; Free Radical and Radiation Biology; Immunology; Microbiology; Molecular and Cellular Biology; Pharmacology; and Molecular Physiology and Biophysics.

New subprograms may be added in the future. Current subprograms can be renamed, sharpened, or closed in response to changing market demands and scholarship opportunities. Potential future subprograms include Cancer Biology; Cardiovascular Biology; and Diabetes, Obesity and Metabolism.

The three doctoral programs that will remain independent from the proposed program (Genetics, Human Toxicology, and Neuroscience) are highly interdisciplinary and cross college boundaries. Furthermore, they do not fit well under the umbrella of “biomedical.”

- ◇ Statement of academic objectives. The overall academic objectives of the subprograms in the proposed umbrella program will not change significantly with the restructuring. However, it is expected that the first-year curriculum will be modified in a more integrated manner to foster efficient delivery of courses involving biostatistics, bioinformatics, a common seminar series, and professional development opportunities.

- ◇ Need for proposed program. The desire to restructure the biomedical science doctoral programs has its origins with internal¹ and external² reviews which suggested that some programs would benefit from a more cohesive and interdisciplinary training and research programs. The restructuring would address the following goals:

- ⇒ A primary goal is to have more of the Ph.D. program supported by T32 grants. The likelihood of this funding is increased under the proposed umbrella program.
- ⇒ Another goal of the proposed restructuring is to minimize overlap and redundancy among several of the biomedical programs. Overlap in themes, faculty effort, and curricular matters could be reduced.
- ⇒ A third goal is to provide greater flexibility in shaping biomedical graduate education to meet new demands, themes, and institutional strengths and priorities, such as cluster hires, Carver College of Medicine and Graduate College vision, and evolving research initiatives of the federal funding agencies.

There are models at highly successful institutions of umbrella biomedical degree granting programs that provide a structure for emulation. Simplification and streamlining with necessary maneuverability are compelling goals.

- ◇ Restructuring overview.

- ⇒ Name of degree. The program will be Biomedical Science. The name of the subprogram will appear in parentheses (Pharmacology).
- ⇒ Matriculation. Students will be admitted directly into one of the eight subprograms and complete three first-year rotations. This represents one of the biggest operational changes for the new program because a “direct admit” is not how the current programs were configured. Students will be assigned a faculty advisor upon admission.
- ⇒ First-year curriculum. The first-year curriculum will be fully specified; the top priority is that students will complete coursework and other requirements associated with their subprogram.
- ⇒ Curriculum specialization. There will be subprogram-specific coursework. Subprograms will have full autonomy regarding degree requirements.
- ⇒ Administrative home. The new program will be an interdisciplinary graduate program with a dual reporting relationship to the Graduate College and the Carver College of Medicine.

- ◇ Link to institutional strategic plan. The proposed restructuring into an over-arching umbrella program named the “Biomedical Sciences” Program addresses University goals of fostering interdisciplinary approaches in academic offerings and research opportunities. It promotes efficiencies in resource usage (faculty effort in curricular and research matters) and financial resources. The restructured program will foster student success by providing students with academic credentials and experiences matching those in the rapidly evolving field of research.

¹ 2010 Graduate College Task Force.

² 2008-2009 National Research Council.

- ◇ Relationship to existing programs at SUI. The proposed restructuring will reduce duplication at several levels. Students will have the opportunity to train in a multi-discipline environment better equipping them to work in a rapidly changing research environment. The proposed program will afford a standardized and integrated curriculum for first-year students in areas such as scholarly integrity, professional development opportunities, a uniform seminar series, and courses in statistics and informatics. A Memorandum of Understanding between the Carver College of Medicine and the Graduate College is included in Attachment A.
- ◇ Relationship to existing programs at other colleges and universities. The proposed program has a similar name to a program at Iowa State University (M.S., Ph.D.). However, the ISU program is offered by the College of Veterinary Medicine and is related to veterinary medical sciences. The proposed program at SUI is a consolidation of existing programs residing in the Carver College of Medicine and Graduate College. It is focused on human medical sciences. The graduate deans at ISU and SUI have discussed this proposal, agree that there is no overlap, and, in fact, are complementary in offering students a breadth of opportunities.
- ◇ Unique features. The biomedical Ph.D. programs include some of the most elite programs at the University of Iowa. Several of the programs are ranked in the top 15 nationwide. The programs are supported by more than six NIH T32 training grants. The programs attract competitive applicant pools each year. Matriculation is highly competitive and selective. Students across the various biomedical Ph.D. programs have a long history of success in securing extramural funding.
- ◇ Resources. The needed personnel, facilities, and equipment are in place and used to train biomedical doctoral students. The proposed program will have a program director who will have paid percent time and dual reporting to the deans of the Carver College of Medicine and Graduate College.
- ◇ Student demand. The restructuring will allow programs to recognize current trends, preferences, and targets as well as appropriate lab placements.
- ◇ Duplication. The graduate deans at ISU and SUI have discussed this proposal and agree that there is no overlap between programs. The doctoral programs are not offered elsewhere in the state.
- ◇ Consultation with representatives of other programs. The ISU graduate dean was consulted.
- ◇ Cost. Support for all first-year students will be provided by a combination of resources from the Carver College of Medicine (\$935,000 as well as annual increases) for stipends, tuition-fees, and benefits for 22 first-year students and the Graduate College (\$680,000 as well as annual increases) for stipends, tuition-fees, and benefits for 16 first-year students. After the first year, because subprograms will function autonomously, students will be funded as before by their advisor, training grants, individual grants, etc. Home departments of supervising faculty will have primary responsibility for supporting students whose mentors' funding may not cover the students.

- ◇ Projected enrollment. The enrollment is expected to include 38 new students each year with an increase of 194 students by Year Seven. The number of funded slots for each subprogram will be based on historical trends and stated targets from the program leadership.
 - ◇ Anticipated sources of students. Students are currently recruited both nationally and internationally. The restructuring will not alter that approach but is expected to attract a higher caliber of applicants.
 - ◇ Off-campus delivery. Off-campus delivery is not planned.
 - ◇ Potential for accreditation. The proposed programs do not have accrediting agencies. The proposed restructuring will not affect Higher Learning Commission (HLC) accreditation.
 - ◇ Existence of similar program at peer institutions. Many peers and comparable institutions have degree-granting programs in Biomedical Science, including Ohio State University, Harvard University, the University of Virginia, and the University of California – Berkeley. Most of these programs are called “Biomedical Sciences,” “Biological and Biomedical Sciences,” or “Life and Biomedical Sciences.” Within the broader biomedical science programs, there are “subprograms or tracks,” including Developmental and Stem Cell Biology and Neurobiology.
 - ◇ Articulation agreement. Articulation agreements are not needed.
 - ◇ Marketing plan. Marketing for the new program will remain the same as for the individual programs and will include website information, campus visits, summer undergraduate research opportunities, conferences, and program reputation.
 - ◇ Evaluation plan. After a period of three years, the programs will re-evaluate whether the restructuring has allowed them to take greater advantage of scholarship opportunities and provided greater flexibility in shaping biomedical graduate education to meet new demands, themes, and institutional strengths and priorities, such as cluster hires, collegiate visions, and state needs and strengths.
 - ◇ Date of implementation. Creation of the proposed program will become effective upon approval by the Board of Regents and will be included in the University’s General Catalog. The anticipated implementation date is Fall 2016.
- (3) CREATE A MASTER OF SCIENCE PROGRAM IN BIOMEDICAL SCIENCE IN THE GRADUATE COLLEGE.**
- ◇ A new Master of Science Program in Biomedical Science (thesis and non-thesis) will be created. This program will be used as an entry point for students who wish to pursue a master’s degree; an exit point for students who decide to discontinue the Ph.D. program but have completed sufficient coursework and requirements for the master’s degree; and to provide a mechanism for students to obtain two years of graduate education before committing to and being evaluated for a doctoral program. There will be no subprograms for the Master of Science Program.

The financial support and matriculation mechanisms for doctoral students will not be available for master's students. If this becomes a more commonly used pathway for students to enter the doctoral programs, the possibility of institutional resourcing of master's students could be re-evaluated.

- ◇ Date of implementation. Creation of the proposed program will become effective upon approval by the Board of Regents and will be included in the University's General Catalog. The anticipated implementation date is Fall 2016.



University of Iowa Health Care

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September 28, 2015

RE: Creation of the Biomedical Science Program

Dear Graduate Council Members:

This letter serves to confirm the unified willingness of our Basic Science Departmental Graduate Programs and Interdisciplinary Graduate Programs (IDGPs) to join the consortium Biomedical Science Program (BSP) and our understanding of the conditions under which this will occur.

- 1) All students who enter into the BSP will have the first year funded through institutional resources from multiple sources. The Microbiology and Biochemistry Departments currently fund their first year students largely from their departmental General Education Funds (GEFs). These funds will not be withdrawn from their departmental GEF when they join the BSP.
- 2) The BSP will have a Program Director, who will have paid percent time, and dual reporting to the Deans of the Carver College of Medicine (CCOM) and Graduate College (GC).
- 3) The Biomedical Science PhD will be conferred by the GC. The degree name on the official transcript and diploma issued by the University of Iowa will be: "Biomedical Science (subprogram name)." Degree names on CVs, biosketches, etc. may use the subprogram name as shorthand, per individual preference.
- 4) The number of funded slots for each subprogram will be based on historical trends and stated current preferences/targets from DEOs/DGSs/Directors. The matriculation targets each year can be tailored to fit faculty needs, funding, etc. Reallocation is possible. For example, if a given subprogram has few faculty that can take students, other subprograms will have the opportunity to recruit more students should faculty in those subprograms have the need and grants to support students past the first year.
- 5) The proposed eight subprograms are derived from existing departmental programs/IDGPs. These can morph and evolve moving forward. Subprograms may form from faculty with similar research interests without the need for secondary appointments across departmental lines. Faculty in subprograms may also come from any department, including clinical departments in the CCOM, in ways that make sense thematically according to coherent research interests.
- 6) Governance of each subprogram will be controlled by the Department Executive Officer (DEO), Director of Graduate Studies (DGS), Director and faculty/committees within that subprogram. For established programs, the present DGS/Director will

remain and have full authority over that subprogram in conjunction with existing governing committees. Such authority includes admissions, course requirements, comprehensive exam format, teaching requirements, expectations for research progress, degree completion, and faculty membership (all subject to GC rules as usual). Common courses utilized by several subprograms may be administered through the CCOM Office of Graduate and Postdoctoral Studies (OGPS). For now, a Principles of Scholarly Integrity (PSI) course will be the only mandated course for all subprograms, and will be run through the CCOM OGPS.

- 7) Each subprogram will retain its own admissions committee. Smaller subprograms may elect to join together and operate a common admissions committee across several subprograms. A subprogram has the option of admitting students directly into a faculty member's laboratory with approval of relevant DGS/DEO. Such "direct admit" students will not be eligible for first year funding packages.
- 8) Admission to the existing graduate programs will be suspended for three years. Current students in those programs may elect to graduate through their existing program or have their degree conferred in Biomedical Science. At the end of the three year period, the DEO, DGS, Director, etc., will evaluate their program's participation in the BSP, and decide whether to continue in the umbrella or withdraw. If a subprogram chooses to withdraw from the BSP, the institutional resources committed to that subprogram through the umbrella will be reconsidered.
- 9) The OGPS will oversee recruitment weekends as previously performed by the Biosciences Program with central funding for this effort that comes from the BSP budget.
- 10) Election of new faculty into a subprogram will be approved by the DGS/Director and/or the subprogram's appointed governing body, and then submitted to the Director of the BSP for final institutional approval. Faculty may elect to join up to three subprograms. DEOs must approve their faculty's participation in other subprograms. Though each program may have teaching and committee expectations for participating faculty members, the complete portfolios of faculty members will be considered when setting teaching expectations.
- 11) Primary departments will be financially responsible for bridging students, should the student's mentor lose funding. DEOs will approve rotations and permanent student placements.
- 12) For sustained institutional support for first-year slots, subprogram faculty will need to demonstrate efforts to lead and/or participate in National Institutes of Health (NIH) Ruth L. Kirschstein National Research Service Award (T32) applications. ("Effort" is key; success is not mandatory.)
- 13) Irrespective of the entry subprogram, students will have the opportunity to rotate through other subprograms should they choose, subject to appropriate approval from subprogram DGSs and departmental DEOs. Should a student fail to match with a laboratory after three rotations, a fourth rotation will be funded by the BSP. After this rotation, should the student not find a suitable mentor, he or she may be dismissed.
- 14) Opening and closing of subprograms will follow the relevant principles in the UI Manual of Rules and Regulations. Proposals for such actions will normally originate from the subprogram, and in accord with the Manual, will be reviewed by the

Graduate College, Graduate Council, Faculty and Provost.

We agree to the above parameters for the new BSP and agree to act in good faith to allow faculty and students to matriculate into the best-fit subprograms that will enhance both research and training in the biomedical science programs affiliated with the CCOM.

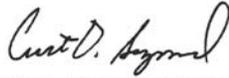
Sincerely,



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Patrick M. Schlievert, Ph.D.



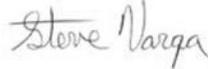
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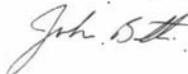
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