Proposal to Establish a Graduate Certificate Program

The faculty of the Roy J. Carver Department of Biochemistry, Biophysics and Molecular Biology propose to establish a graduate certificate program in Biochemistry. This certificate will be focused in the BBMB department so this proposal is being routed through the appropriate curriculum committees.

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<tr>
<th>Committee/Administrator</th>
<th>Date</th>
<th>Approval</th>
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<tbody>
<tr>
<td>BBMB Curriculum</td>
<td>Sept. 28, 2016</td>
<td>Yes</td>
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<tr>
<td>CALS Curriculum</td>
<td>Oct. 12, 2016</td>
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<td>LAS Curriculum</td>
<td>Oct. 14, 2016</td>
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<td>LAS Rep. Assembly</td>
<td>Nov. 2, 2016</td>
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<td>Grad. Council</td>
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<td>Graduate Dean</td>
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Name of the proposed graduate certificate.

Graduate Certificate in Biochemistry

Name of the departments and/or programs involved.

Roy J. Carver Department of Biochemistry, Biophysics and Molecular Biology

Name of the contact person.

Jack R. Girton PhD., University Professor
Roy J. Carver Department of Biochemistry, Biophysics and Molecular Biology

Need for the graduate certificate.

A graduate certificate provides a mechanism for bestowing formal recognition for graduate study in a focused, specialized area that is less comprehensive than a master’s degree. Graduate certificates are attractive to individuals who do not wish to, or cannot at this time, pursue a master’s degree or for those who simply wish to add to their credentials in their field. Students for whom this would be an attractive option include individuals with a BS who wish to gain graduate level experience in Biochemistry, either for its own sake or perhaps to gain graduate credit that could later be applied toward a graduate degree program. This would include individuals with a BS degree who are employed in industry and wish to update their education, but who are not able to attend graduate school full time. We believe that a sufficient number of such students exist to justify offering this certificate.

Objective of the graduate certificate.

This certificate will provide interested students with a broad exposure to the core areas of Biochemistry at the graduate level.

General description of the graduate certificate.

The certificate program consists of 12 credits of graduate courses in Biochemistry. These are in two groups. There are four required “core” graduate courses in Biochemistry (BBMB504, 505, 506, and 507), a total of 8 credits. These are the same core courses that all entering Biochemistry graduate students take in their first year. In addition to these courses the certificate students will take additional courses totaling 4 credits from a Departmental list of approved graduate courses.
Graduate certificate requirements including:

Admission standards and prerequisites for the certificate program.

Prospective students must have a BS in Biochemistry with a GPA of at least 3.00, or else hold an equivalent BS degree from an accredited university with a background in Biochemistry equivalent to a 3rd year student in the ISU BS program.

Courses and seminars.

12 Cr. in selected graduate level biochemistry courses.

8 Credits in required courses:

- BBMB 504: Amino Acids and Proteins 2Cr
- BBMB 505: Bioenergetics and metabolism 2Cr
- BBMB 506: Membrane Biochemistry 2Cr
- BBMB 507: Biochemistry of Nucleic Acids. 2Cr

4 Credits from the Departmental list of supplemental courses

Current List:

- BBMB 510: Molecular Biology and Biochemistry of RNA 2Cr
- BBMB 512X: Principles of Glycobiology 2Cr
- BBMB 530: Prokaryotic Diversity and Ecology 3Cr
- BBMB 531X: Plant Biochemistry 2Cr
- BBMB 532X: Enzyme Kinetics and Mechanisms 2Cr
- BBMB 542: Introduction to Molecular Biology Techniques 1Cr
- BBMB 549X: Nuclear Magnetic Resonance spectroscopy 2Cr
- BBMB 551X: Computational Biochemistry 2Cr
- BBMB 553X: Current Research in Chemical and Physical Biology 2Cr
- BBMB 561: Molecular Biophysics. 2Cr
- BBMB 561L: Laboratory in Molecular Biophysics. 2Cr

General description of the resources currently available and future resource needs:

A list of supporting faculty members including a brief description of their expertise relating to the graduate certificate.
All faculty members in the BBMB department will be supporting this certificate program. The individuals actively involved in administration and/or teaching the courses in the program are listed below.

Kristen Johansen, Interim Department Chair and Professor
Regulation of nuclear organization and function

Amy Andreotti, Professor
Protein structure and function, nuclear magnetic resonance spectroscopy

Adam Barb, Assistant Professor
Glycoprotein structure and immune activation, nuclear magnetic resonance spectroscopy

Thomas Bobik, Professor
Conversion of inactive cobalamins to coenzyme B12

Alan DiSpirito, Professor
Bioenergetics of chemoautotrophic and methanotrophic bacteria

Jack Girton, University Professor
Chromatin structure and function; regulation of cell determination

Mark Hargrove, Professor
Heme protein structure and function; regulation of cell determination

Richard Honzatko, Professor
X-ray crystallography of proteins; enzyme structure/function

Gustavo MacIntosh, Associate Professor
Gene expression and metabolic changes during plant defense responses to pests; functional genomics of plant nucleases

Scott Nelson, Associate Professor
Molecular mechanisms of DNA replication and repair

Marit Nilsen-Hamilton, Professor
Nucleic acid, aptamer-based analytical technology; Growth factor function

Reuben Peters, Professor
Enzymatic and metabolic engineering of terpenoid biosynthesis

Yeon-Kyun Shin, Professor
SNARE complex assembly and mechanisms of membrane fusion; EPR methods

Michael Shogren-Knaak, Associate Professor
Role and establishment of histone modifications; Chromatin structure

Eric Underbakke, Assistant Professor
Architecture and assembly of scaffolded signaling complexes

Olga Zabotina, Associate Professor
Plant cell wall structure; polysaccharide biosynthesis, modification and degradation; bioactive carbohydrates

The effects of any new courses on faculty workload.

All courses proposed for the certificate are currently being taught by BBMB faculty, so the only effects on faculty course loads would be from increased enrollment, and increased student advising.

Other resources required for the program including graduate assistants, laboratories and other facilities, supplies, etc.

No additional resources are required.

Relationship of the proposed graduate certificate to the strategic plans of the department, college, and the university.

The proposed certificate is an important part of the BBMB department’s plan for graduate education in Biochemistry. With the assistance of resources provided by the Roy J. Carver Trust the department has begun expanding its faculty base through a program of new faculty hiring. This new expertise is allowing the department to expand both its research and educational capabilities. Expansion in graduate education of Biochemistry is one of the Department’s key strategic goals. This includes the development of several new graduate courses, increasing the opportunities for BS students interested in graduate education, and in reaching out to nontraditional students, individuals employed in professional careers in a variety of academic and industry environments who are interested in continuing education / advanced training but who cannot take time to enroll in a full time graduate program.

Plan for periodic review of the certificate program.

The certificate program will be formally reviewed by the BBMB department on a 5 year basis.