Academic Business Plan, Biochemistry and Chemical Biology Graduate Program Proposal, 3/16/2020

Overview

The proposed Biochemistry and Chemical Biology (BCCB) graduate program will prepare students for careers at the interface between the chemical and biological sciences. As a highly interdisciplinary program, it will provide opportunities for education in the molecular aspects of life, for example how biomolecules operate, fold, interact, and direct cellular function. Students will integrate cutting edge laboratory research with classroom work to generate new knowledge about biochemical and chemical biology mechanisms and pathways, and the implications of these mechanisms for human disease. Graduates from the program will work as educators and researchers in academia, pharmaceutical and

that this above average growth will continue to provide opportunities for graduates with life science degrees, especially at the Master and Ph.D. level.

The proposed BCCB program will be administered under the umbrella of the Chemistry Department in close collaboration with other departments on the BU campus, most importantly Biological Sciences. It is expected to continue existing, or increase future participation of a diverse population of faculty and graduate students in these departments. The Chemistry Department already offers a Biological Chemistry track for graduate students, however, these students graduate with a Chemistry degree. The proposed BCCB program will expand on this Biological Chemistry track, offering a more specialized and applicable degree, while utilizing infrastructure that already exists and is used for the Biological Chemistry Track. For example, the courses that are required for the new program are already in place,

School of Engineering).

The Biochemistry and Chemical Biology program will share existing resources with the existing Chemistry and Biological Sciences graduate programs. For example, students who are currently on the Biological Chemistry track in the Chemistry program are expected to enter BU in the future through the new Biochemistry and Chemical Biology program. Thus, TA lines that are currently utilized for the Chemistry graduate students on the Biological Chemistry track can be utilized to fund graduate students in the new program. Therefore, no resources for new TA lines are requested.

Both, Chemistry and Biological Sciences Departments had recent success in attracting federal funding. 12 out of the 17 faculty members are currently funded by the NIH and/or NSF. Therefore, it is expected that a substantial number of students in the Biochemistry and Chemical Biology program will be funded by external grants on research assistantships.

Administrative support for the Chemistry graduate program is currently provided by three administrative assistants. At the start of the new program, it is planned to utilize the administrative structure of the Chemistry Department for administrative support. Specifically, Anne Hull (Instructional Support Specialist in Chemistry) will provide the necessary administrative support for the program. While no new resources for an Administrative Assistant are requested at this time, it is possible that a part-time Administrative Assistant may be required in the future, depending on the rate of growth of the program.

Operating Plan

We project that the new graduate program will begin in the Fall of 2020. The target for admissions in the first year is 2-3 Ph.D. track students and 4-5 Masters students. At a constant admissions rate, we expect to have 18-27 students in the program at year five, about half of those will be on the Ph.D. track. Traditionally, many of the domestic students in the existing chemistry graduate program are in state. We expect this trend to continue in the admissions to the new program. 40% of the incoming students are expected to be international.

These numbers are based on our experience with current chemistry graduate students, who specialize in the existing biological chemistry track of the program. It is expected that most of these biological chemistry track students (who graduate with a degree in chemistry) will enter through the proposed Biochemistry and Chemical Biology program in the future. If enrollments are not achieved, the program

GPC may be established for the new program. The GPC will oversee issues such as student's progress to degree, approval of credit from outside graduate courses, graduate students awards etc.

Admissions will be handled though the Slate admissions system of the graduate school, to which prospective students submit their application materials. Required application materials consist of the application from, transcripts, GRE scores, English language credentials, three letters of recommendation, a personal statement and a resume. While the GPA cutoff is 3.0, consistent with graduate school regulations, we expect the average applicant to have a GPA of 3.4-3.5, based on our experience with applications to the current biological chemistry track. The quantitative GRE scores may be of particular importance, with accepted students in the 50% and above range. For international applicants, we expect documentation of TOEFL (>90) or IELTS scores (> band seven).

The proposed program will be under the umbrella of the Chemistry department. Therefore, admissions will be initially administered by the existing Graduate Admissions Committee (GAC) of the Chemistry graduate program. Because the interdepartmental nature of the program, with faculty members contributing from other departments, the GAC will collaborate closely with admissions committees from other departments, most importantly Biological Sciences. The GAC will review applications and make admissions decisions in communication with department chairs, as well as with consideration of the funding situation with respect to anticipated numbers of RA and TA lines. The committee will also uphold admission standards and strive for diversity in the pool of admitted students. Recruiting will be achieved in collaboration with the Chemistry graduate program, which has a recruiting committee. Activities include recruiting tables at conferences, sending current students to their Alma Maters to give presentations, the visiting speakers program with four-year colleges, and an undergraduate colloquium. The program will also coordinate with efforts of the graduate school to recruiting, including recruitment fairs dedicated to minority applicants, visiting colleges where minority students attend in large numbers, and my advertising the affordability of the Binghamton area in terms of cost of living.

The program will be assessed on an annual basis, the first assessment being three years after the start of the program, which is planned for Fall 2019. The Chemistry Department has developed a detailed assessment plan for the Chemistry graduate program. The assessment plan for the new program will be built on this existing plan, with modifications targeted toward the new program. The program director will be responsible for generating the assessment reports. The reports will be based on data collection through a variety of data mining pathways, including results from coursework, exams, research, and output from scholarship. The assessment report will be based on the major program goals, as described in section 2.3:

1) Broad Knowledge
2) In-Depth Knowledge in Focused Area
3) Original Research Project
4) Professional Skills

The SLOs derived from these goals, which will be assessed in the report, are also described in detail in section 2.3, so they will not be repeated here.

The following tools will be used to generate data for assessment:

- Performance in core 4-credit courses (6 for Ph.D. and M.A., 4 for M.S.)
- Performance in placement exams
- Results from literature review exam.
- Results from preliminary oral examinations in several categories.
- Performance in the graduate seminar class
- Results from research proposal
- Number of publications/presentations
- Thesis defense
- Teaching assistant evaluations

CHEM532, ORGANIC SYNTHESIS	4		
CHEM583C, MODERN CATALYTIC REACTIONS	4		
Total required credits: 40			
Independent study (research) courses and thesis research, for example CHEM597-699 are not listed here.			

Financial Plan

Expenses (in dollars)
Only new expenses are listed

Program Expense Categories	Before Start	Academic Year

Advanced Biochemistry course, and new Methods in Biochemistry and Chemical Biology), as well as to offer research opportunity to be able to absorb the number of graduate students coming into the program. This will be especially important if the growth in the MS part of the program is higher than expected. The new faculty hire should be in the research area of imaging-/microscopy/fluorescence, as suggested by reviewer 1. Binghamton University currently does not have strength in this research area, despite its growing importance in life science research.

b) Library: No need for new library resources are anticipated.

c) Equipment: Equipment for the program is currently available as part of the core facilities in the Smart Energy Building, as well as shared resources in the TAE Health Sciences facility, and the ADL. Specialized equipment will be available in the laboratories of the faculty members who contribute to the program. This equipment is acquired through external funding. Therefore, no funds for acquiring equipment are requested, but a small annual budget ($2,000) is requested for maintenance of equipment.

d) Laboratories: Ample laboratory space is currently present in the Smart Energy Building, as well as the Science III Building. The Smart Energy Building has space for expansion to accommodate at least three additional faculty members and their laboratories. Therefore, laboratory space is not needed.

e) Supplies: Office supplies for administrative purposes will be shared with the Chemistry graduate program.

f) Capital Expenses: No capital expenses are necessary.

g) Other: It is expected that the MS track will be a substantial part of the new graduate program, with the Stipend for possible admission of up to 5 MS students per year. In order to attract top students to this track, MS student we request funds for one merit-based "thesis semester" MS stipend, plus tuition. We are planning to use this stipend as a tool to enhance the quality of MS theses, an award to recognize the best students, and as a recruiting tool. This stipend will be merit based and available for one MS student per semester. Each MS student can only receive this stipend for a maximum of one year. Therefore, not all MS students will receive this stipend. The rationale behind this stipend is that it will facilitate acceptance of MS offers by the best students. Second, it will give faculty members incentive to accept MS students into their laboratories. Overall, we anticipate that such a stipend could greatly enhance the MS track of the program, in both quality and quantity.

g) Other, Recruiting: We request $6,000 for advertising the new program before its start. In year 2, this budget will be reduced to $4,000 per year in the second year, and $3,000 per year in the third year and thereafter. It will be critical for the new program to be able to advertise, in order to quickly build up a substantial applicant pool.

g) Other, Seminar: A seminar series will be important for students to be in

The proposal of a Biochemistry and Chemical Biology graduate program originates from a long-standing effort at Binghamton University to expand the existing undergraduate Biochemistry program to graduate education. This effort started in 2013 by the establishment of a Biochemistry task force by Provost Nieman, chaired by Dr. Christof Grewer from the Chemistry Department. The program was designed by a group of faculty members from Chemistry, including department chair Dr. Eriks Rozners, in close collaboration with the faculty from the Biological Sciences Department, in particular current chair Dr. Karin Sauer.

Both, Departments of Chemistry and Biological Sciences have continued to expand in numbers of faculty members with research expertise at the interface of the chemical and biological sciences. For example, following its strategic plan, the Chemistry Department has hired eight faculty members at the interface between Chemistry and Biology over the past 10 years. These faculty members perform research in the area of the proposed program and could accept graduate students from the program into their laboratory. Nine of these faculty members are currently funded by the NIH and/or NSF, and one is holding PRF funding (see faculty table, section 4). The Department of Biological Sciences has likewise hired three faculty members at the interface between Chemistry and Biology in the last 7 years. Three Biological Sciences faculty members are currently funded by the NIH/NSF (see faculty table, section 4). They have resources to support independent research by Masters/Ph.D. track students who are expected
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