

**APPROVED BY SENATE**  
**04/22/2019**



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## **Proposal to the Senate Educational Policy Committee**

### **PROPOSAL TITLE:**

Establish a Graduate Concentration in Pharmaceutical Engineering within the Master of Engineering in Bioengineering in the Department of Bioengineering in the College of Engineering

### **SPONSOR:**

Michael Insana, Interim Department Head, Department of Bioengineering, 217-244-0739, [mfi@illinois.edu](mailto:mfi@illinois.edu)

### **COLLEGE CONTACT:**

Harry Dankowicz, Associate Dean for Graduate, Professional and Online Programs, College of Engineering, 217-244-1231, [danko@illinois.edu](mailto:danko@illinois.edu)

### **BRIEF DESCRIPTION:**

This proposal seeks to establish a Concentration in Pharmaceutical Engineering in the Master of Engineering in Bioengineering degree in the Department of Bioengineering. This concentration is professionally-oriented and aimed at providing students with integrated technical knowledge in pharmaceutical science, relevant regulations, and process engineering. The program will require 32 credit hours organized as follows (see Appendix A for details):

- 18 credit hours of coursework in Bioengineering: 10 hours of technical coursework and 8 hours of business coursework,
- 8 credit hours of elective coursework to be chosen in consultation with advisor,
- 6 credit hours of professional development; with
- at least 12 credit hours at the 500-level overall.

### **JUSTIFICATION:**

Pharmaceutical engineers are involved in the development and optimization of production and formulation processes of drugs, as well as facilitating and validating the design of production plants and processes of quality assurance. Production of highly engineered drugs is carefully regulated and requires a strong interaction between pharmaceutical science and various engineering disciplines. Integrating these disciplines in practice is often difficult and may require long years of work experience after graduation from science- and research-based pharmaceutical engineering programs. There is an urgent need to train professionals who possess a combination of necessary knowledge and skills, specifically the application of engineering and business principles to the manufacturing and large-scale production of therapeutics following advanced protocols. Indeed, a survey conducted by the American Association of Pharmaceutical Scientists noted the shortage of entry-level workers with appropriate background in product development and pharmaceutical technology.

The proposed Concentration in Pharmaceutical Engineering aims to fill this gap through an emphasis on a professionally-oriented program that combines technical core coursework with business courses and practical training. Similar professionally-oriented master's degree in pharmaceutical engineering programs

exist at Purdue University, University of Washington, and the University of Michigan. By establishing this concentration at the University of Illinois at Urbana-Champaign, the Bioengineering department will be able to leverage unique expertise, including that associated with the new Carle-Illinois College of Medicine, to attract prospective students seeking a professionally-oriented program in a growing industry, who might otherwise go elsewhere.

**BUDGETARY AND STAFF IMPLICATIONS:** *(Please respond to each of the following questions.)*

1) Resources

- a. How does the unit intend to financially support this proposal?

The proposed concentration will be under the Master of Engineering in Bioengineering program, which is a self-supporting degree program, and will follow its funding model. The graduate tuition dollars returned to the department from the College of Engineering will provide the department with the resources needed to support this degree program. The funds returned to the college from campus are considered state, recurring funds that are used to fund faculty and lecturer salaries, support instruction, or resources that may be needed as the program grows.

- b. How will the unit create capacity or surplus to appropriately resource this program? If applicable, what functions or programs will the unit no longer support to create capacity?

The proposed program relies on a combination of existing courses and new offerings that are currently in the shared-governance approval process to be implemented as early as Fall 2019. The department hired 5 new faculty members in 2017 and 2 additional faculty in 2018. In 2019, the department plans to hire 4 additional faculty. In addition, faculty in other units within the university, e.g., the Carle-Illinois College of Medicine or the Department of Chemistry, may be asked to teach courses within their expertise.

Existing administrative staff will be able to accommodate the addition of this new concentration to complete the necessary student services functions. Therefore, it is anticipated that sufficient capacity exists to support this new concentration within the Master of Engineering in Bioengineering degree. No current functions or programs will be affected by the implementation of this new concentration.

- c. Will the unit need to seek campus or other external resources? If so, please provide a summary of the sources and an indication of the approved support.

No campus or external resources are needed. With the number of course options in the elective area, it is not anticipated that additional course sections will be needed to accommodate the students in this concentration. The students will work with their advisors to select applicable courses that have open enrollment availability. The anticipated enrollment for this concentration is 10 to 15 students per year. Since the enrollment in this concentration is minimal and students complete the program in one year, this will not significantly affect the current faculty-to-student advising ratio.

- d. Please provide a letter of acknowledgment from the college that outlines the financial arrangements for the proposed program.

Please see attached MOU Agreement between the College of Engineering and Bioengineering in Appendix C.

2) Resource Implications

- a. Please address the impact on faculty resources including the changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc.

The proposed core technical courses for this new concentration will be different than those currently being offered under the bioinstrumentation and computational genomics concentrations. The new courses proposed will impact faculty resources and teaching loads as described under 1b. Student faculty-ratios should not be impacted, given the projected enrollment for this concentration (between 10 to 15 students/cohort). Tuition funds returned to the department will be used to hire additional instructors and support the hire of teaching assistants as the program grows.

- b. Please address the impact on course enrollment in other units and provide an explanation of discussions with representatives of those units.

There will be minimal impact on course enrollments in other units. Most of the curriculum requires students to complete bioengineering coursework. Students enrolled in this concentration will have a large range of options available to fulfill the elective coursework requirement.

- c. Please address the impact on the University Library.

No significant impact on the University Library. See attached letter.

- d. Please address the impact on technology and space (e.g. computer use, laboratory use, equipment, etc.)

There is no impact on research labs and minimal impact on engineering workstations labs.

- 3) Briefly describe how this program will support the University's mission, focus, and/or current priorities. Include specific objectives and measurable outcomes that demonstrate the program's consistency with and centrality to that mission.

The establishment of MEng programs at the University of Illinois Urbana-Champaign is a strategic priority for the College of Engineering. Such programs are needed for students who are preparing for a career in a specific industry and do not desire a research-based graduate degree. Professionally-oriented degree programs are particularly valuable for students who seek to develop technical depth that is unavailable at the undergraduate level while also acquiring skills that are essential for project leadership, and knowledge of the regulatory environment. The Bioengineering department currently offers an MEng in Bioengineering with three transcriptable concentrations: Bioinstrumentation, Computational Genomics, and General Bioengineering. This proposal seeks to establish a 4th concentration in Pharmaceutical Engineering.

Graduates of the proposed concentration will have the competence required to make significant contributions to the development and optimization of production and formulation processes of drugs, as well as the design of production plants and processes of quality assurance. They will be trained to integrate knowledge in pharmaceutical science with tools from process engineering and an understanding of regulatory frameworks and business aspects to pursue leadership careers in industry-scale production of drug therapeutics. To ensure academic rigor typical of graduate courses offered by the College of Engineering, modeling principles and critical thinking will be woven in with practical concepts relating to the pharmaceutical industry.

In cases where a student becomes interested in the doctoral program, the Bioengineering Department will guide the student through the process of applying for admission into the PhD program after completion of

the MEng degree.

- 4) Please provide an analysis of the market demand for this degree program. What market indicators are driving this proposal? What type of employment outlook should these graduates expect? What resources will be provided to assist students with job placement?

Biopharmaceuticals is a \$192 billion industry, based on 2016 data, with projected growth to \$291 billion by 2021. Industry reports from McKinsey and Co (a pharmaceutical and medical-products consulting company), BioPlan Associates, Inc. (a biotechnology market information service provider), and Future Market Insights (a leading market intelligence and consulting firm) have identified the following areas that are driving dramatic and fundamental shifts in the drug manufacturing industry and workforce needs:

- Strong demand for biopharmaceuticals, especially due to the increase of low-cost genetic profiling, resulting in market interest in targeted drug therapies that can treat diseases at the cellular level.
- Large U.S. pharmaceutical companies shifting their manufacturing focus to more sophisticated methods required to produce biopharmaceuticals.
- Complexity of biopharmaceutical supply chains and operations, along with rising quality compliance needs and regulatory scrutiny.

This proposed concentration will help meet industry demands for highly skilled technical workers by preparing graduates for jobs, such as pharmaceutical consultants, process and quality improvement specialists, as well as lab operations and project leaders. These graduates will be poised to have a unique combination of technical skills with big-picture business and manufacturing understanding, positioning them to pursue leadership careers in the pharmaceutical industry.

**National Trend (17-2041 SOC code; Bureau of Labor Statistics)**

United States	Employment		Percent Change
	2016	2026	
Chemical Engineers/Chemical Process Engineers	32,700	35,100	+8%

- 5) If this is a proposed graduate program, please discuss the programs intended use of waivers. If the program is dependent on waivers, how will the unit compensate for lost tuition revenue?


This concentration will follow the self-supporting status of the MEng in Bioengineering degree. Students enrolled in this degree program are not eligible for BOT tuition-generating waiver assistantship. See self-supporting status form attached.

**DESIRED EFFECTIVE DATE:** Fall 2019 or sooner upon approval

**STATEMENT FOR PROGRAMS OF STUDY CATALOG:** See Appendix B

**CLEARANCES:** (Clearances should include signatures and dates of approval. *These signatures must appear on a separate sheet. If multiple departments or colleges are sponsoring the proposal, please add the appropriate signature lines below.*)

Signatures:

  
\_\_\_\_\_  
Unit Representative:

October 18, 2018  
Date

  
\_\_\_\_\_  
Unit Representative:

1-22-2019  
Date:

  
\_\_\_\_\_  
Graduate College Representative:

3/1/19  
Date:

\_\_\_\_\_  
Council on Teacher Education Representative:

\_\_\_\_\_  
Date:

## Appendix A: Curricula Design and Coursework Requirements

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### A. Curricular Design

This concentration aims to provide students with integrated technical knowledge in pharm-science, relevant regulations, and process engineering. Emphasis is placed on design-based approaches to pharmaceutical engineering, coupled with topics in advanced therapeutics, business innovation, and leadership. Students participate in two semesters of a seminar course, a mandatory analytical laboratory course, and a graduate capstone project. As part of the curriculum, there will be two new courses developed, BIOE 531 and 532.

In the BIOE 531 course, students will gain an in-depth understanding of compounds and materials that help designers predict and measure compound properties to define and characterize their constitutive behaviors. Gaining knowledge in ingredient interaction (thermodynamics vs. kinetics) and how the delivery requirements determine the ingredients and the corresponding processing is also vital. For processes, students will learn that identifying the critical variables and their effect on quality is important. Moreover, students will understand that developing and validating mathematical models for contributing to the successful operation of a chemical laboratory is necessary. These concepts along with consideration of how materials and process parameters affect the quality of pharmaceutical products (utilizing Quality by Design (QbD) principles) will be other key topics. FDA has identified QbD as a significant transformation in quality regulation, from an empirical process, i.e., Quality by Testing (QbT), to a more scientific and design-centric approach. The application of QbD in drug formulation and process design is based on a good understanding of the sources of variability and the manufacturing process.

Lastly, BIOE 532 is designed as a combination lecture/discussion/laboratory course to cover key topics in the following areas: Tablet Statistical Analysis, Process of Making Coated Tablet, Fluidization of Pharmaceutical Ingredients, Design of a Pharmaceutical Delivery Device, Controlled Release Principles of Drug Delivery and Pharmacokinetics, and Pharmacodynamics. This course will provide a transformative, applied experience for the students. The class will utilize lab equipment and resources already available within the BIOE teaching laboratories, Analytical Chemistry Lab facilities over at MRL, and the BioMaker facility which was funded by the Carver Foundation.

### B. Pharmaceutical Engineering Concentration Coursework Requirements

Credit Hours	Hours
<b>Core Courses:</b> Complete the required courses in each of the areas below. <ul style="list-style-type: none"><li>• Technical courses from approved list</li><li>• Business courses from approved list</li></ul>	18
Elective Courses chosen in consultation with advisor	8
Professional Development Courses	6
<b>Total Coursework Hours</b>	<b>32</b>

### **Technical Courses (10 hours)**

- BIOE 570: Seminar series (1 credit hour each semester)

This is an existing core class for the M.Eng. in BIOE degree program. We will add a section under this existing class that would allow the program to invite speakers to talk about topics appropriate for the pharmaceutical engineering concentration, including:

- Overview of cGMP
- Environmental Health and Safety (EHS)
- Intellectual property and competitive analysis
- Regulatory FDA
- Advanced digital design of pharmaceutical therapeutics
- Advanced regulatory FDA
- Facility design

- BIOE 531: Principles of Pharmaceutical Engineering (4 credit hours)

New course that will cover the following topics:

- Introduction to manufacturing process
- Process development and design (QbD vs. QbT)
- Pharmaceutical materials and dosage form
- Case studies

- BIOE 532: Advanced Pharmaceutical Engineering (4 credit hours)

New course that will cover the following topics:

- Advanced pharmaceuticals and drug delivery (lecture)
- Process development and design (lecture)
- Laboratory

### **Business Courses (8 credit hours)**

- BIOE 573: Managing Business Operations (4 credit hours)
- BIOE 574: Innovation and Finance (4 credit hours)

### **Elective Courses (8 credit hours)**

Possible courses include

- IE 431: Design for Six Sigma
- ChBE 451: Transport Phenomena
- ChBE 471: Biochemical Engineering
- MSE 470: Design and Use of Biomaterials
- MSE 474: Nanomedicine
- BIOE 476: Tissue Engineering
- BIOE 477: Imaging and Therapeutic Probes
- ChBE 551: Chemical Kinetics and Catalysis
- ChBE 424: Chemical Reaction Engineering
- ChBE 431: Process Design
- ChBE 476: Biotransport
- ABE 446: Biological Nanoengineering
- ECE 481: Nanotechnology
- MSE 403: Synthesis of Materials

- MSE 473: Biomolecular Materials Science
- MSE 480: Surfaces and Colloids

### **Professional Development Courses (6 hours)**

- BIOE 575: Capstone Project (6 credit hours)

This course will follow the Advanced Pharmacy Practice Experience in Research (APPER) model. Final deliverable will be a research paper and a presentation. Topics covered will include:

- Research design, statistical methods, literature search strategies, survey questions, and elements of a research paper
- IRB and IACUC
- Pharmaceutical plant/facility design (Guest lecture)
- Process simulation

On a case-by-case basis, students with internships may be allowed to work on an independent study project for their employer. Each situation will be evaluated and subject to approval by the appropriate program faculty director and the student's internship supervisor. A clear project scope and outcome must be outlined at the onset to make sure the independent study project is in line with the learning objectives of the class. The student will still be required to do a submit a written report as well as participate in a formal presentation at the end of their independent study project for a grade.

The overall objective of this course is to provide a multidisciplinary experience, integrating knowledge from the core, intermediate, and advanced courses in pharmaceutical engineering. The capstone design course is the culmination of the entire pharmaceutical engineering concentration.

- Demonstrate an in-depth understanding of pharmaceutical chemistry.
- Demonstrate an understanding of and an ability to apply core concepts of up- and downstream pharmaceutical engineering to an extent that will allow them to be successful.
- Demonstrate an understanding of the foundations and application of chemical and pharmaceutical principles of drug synthesis, isolation and analysis, and pharmacokinetics and dynamics.
- Apply principle of pharmaceutical Quality by Design (QbD) as a systematic approach to a predefined objective of a pharmaceutical problem and emphasizes product and process understanding and process control.
- Identify and follow regulations for safe handling and use of chemical and laboratory equipment.
- Use advanced instrumentation and conventional techniques, to design experiments, and to properly record the results of their experiment.
- Interpret experimental data and describe its significance.
- Use computers and software in data acquisition and post-processing as a tool for data analysis and representation.
- Learn to effectively communicate on chemical and biochemical topics.



## Appendix B: Statement for the Programs of Study Catalog

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### Master of Engineering in Bioengineering

[bioemeng.illinois.edu](http://bioemeng.illinois.edu)

Head of Department: Mark Anastasio  
Associate Head for Graduate Programs: Dipanjan Pan  
Academic Program Contacts: Liezl Bowman (Program Coordinator)  
1102 Everitt Laboratory  
1406 W. Green St.  
Urbana, IL 61801  
(217) 333-1867  
E-mail: [liezlb@illinois.edu](mailto:liezlb@illinois.edu)

**Major:** Bioengineering

**Degrees Offered:** MEng

**Concentration:** Bioinstrumentation, Computational Genomics, General Bioengineering, and Pharmaceutical Engineering

### Graduate Degree Programs

The M.Eng. in Bioengineering is designed to bridge the skills gap by developing students with advanced technical know-how, a better understanding of the medical healthcare industry and more business acumen through coursework and project work, which provides students exposure to real world industry issues. For more information, visit [bioemeng.illinois.edu](http://bioemeng.illinois.edu).

### Admission

Students must select and apply to one of the concentrations under the M.Eng. in Bioengineering program. Students will not be able to complete multiple concentrations. Students should have an undergraduate degree in an engineering or a science related field. Applicants should have a minimum grade point average of 3.00 (A = 4.00) or equivalent for the last two years of undergraduate study and show evidence of strong quantitative skills and of serious interest in the life sciences through their personal statement. Students with less than a 3.0 GPA may be considered for a limited status admission. The M.Eng. is a professional degree and is not intended for students interested in obtaining traditional research experience typically offered through a thesis-based M.S. or Ph.D. program. Students interested in a research-oriented career and all students interested in obtaining a Ph.D. should instead apply to the Bioengineering M.S. program. Students in an M.Eng. program who discover an interest for the Ph.D. program may apply for admission following the completion of the M.Eng. degree.

All applicants whose native language is not English must submit a minimum TOEFL score of 103 (iBT), 257 (CBT), or 613 (PBT); or minimum International English Language Testing System (IELTS) academic exam scores of 7.0 overall and 6.0 in all subsections. Applicants may be exempt from the TOEFL if certain criteria are met as described at <https://grad.illinois.edu/admissions/instructions/04c>. Applicants with lesser scores may still apply. Limited status is granted for lesser scores and requires enrollment in English as a Second Language (ESL) courses based on an ESL Placement Test (EPT) taken upon arrival to campus.

### Financial Aid

The tuition and fees for the M.Eng. in Bioengineering are the standard Graduate and Professional Programs rates for the College of Engineering, plus a one-time \$2000 program fee. For tuition information and external funding resources, please visit [bioemeng.illinois.edu](http://bioemeng.illinois.edu). Students in the M.Eng. in Bioengineering program are not eligible for tuition-waiver generating assistantships.

### Master of Engineering in Bioengineering with a Concentration in Bioinstrumentation

Requirements	
Credit Hours	Hours
Total Credits for the Degree	32
Coursework	
<b>Core Courses:</b> Complete the required courses in each of the areas below. <ul style="list-style-type: none"><li>• Technical courses from approved list</li><li>• Business courses from approved list</li></ul>	18
Elective Courses chosen in consultation with advisor	8
Professional Development Courses from approved list	6
<b>Other Requirements and Conditions (may overlap):*</b>	
A minimum of 20 credit hours must be taken from the University of Illinois at Urbana-Champaign campus.	
A minimum of 12 500-level credit hours overall.	
The minimum program GPA is 3.0.	
At most, 12 credit hours of previous University of Illinois Urbana-Champaign graduate-level coursework not applied to any other degree may be transferred and applied to the major pending department and Graduate College approval.	

\* For additional details and requirements for all degrees, please refer to the department's [Graduate Studies Web site](#) and the [Graduate College Handbook](#).

### Master of Engineering in Bioengineering with a Concentration in Computational Genomics

Requirements	
Credit Hours	Hours
Total Credits for the Degree	32
Coursework	

<b>Core Courses:</b> Complete the required courses in each of the areas below. <ul style="list-style-type: none"> <li>• Technical courses from approved list</li> <li>• Business courses from approved list</li> </ul>	18
Elective Courses chosen in consultation with advisor	8
Professional Development Courses from approved list	6
<b>Other Requirements and Conditions (may overlap):*</b>	
A minimum of 20 credit hours must be taken from the University of Illinois at Urbana-Champaign campus.	
A minimum of 12 500-level credit hours overall.	
The minimum program GPA is 3.0.	
At most, 12 credit hours of previous University of Illinois Urbana-Champaign graduate-level coursework not applied to any other degree may be transferred and applied to the major pending department and Graduate College approval.	

\* For additional details and requirements for all degrees, please refer to the department's [Graduate Studies Web site](#) and the [Graduate College Handbook](#).

### Master of Engineering in Bioengineering with a General Bioengineering Concentration

Requirements	
Credit Hours	Hours
Total Credits for the Degree	
Coursework	32
<b>Core Courses:</b> Complete the required courses in each of the areas below. <ul style="list-style-type: none"> <li>• Technical courses from approved list</li> <li>• Business courses from approved list</li> </ul>	18
Elective Courses chosen in consultation with advisor	8
Professional Development Courses from approved list	6
<b>Other Requirements and Conditions (may overlap):*</b>	
A minimum of 20 credit hours must be taken from the University of Illinois at Urbana-Champaign campus.	
A minimum of 12 500-level credit hours overall.	
The minimum program GPA is 3.0.	

At most, 12 credit hours of previous University of Illinois Urbana-Champaign graduate-level coursework not applied to any other degree may be transferred and applied to the major pending department and Graduate College approval.

\* For additional details and requirements for all degrees, please refer to the department's [Graduate Studies Web site](#) and the [Graduate College Handbook](#).

**Master of Engineering in Bioengineering with a Pharmaceutical Engineering Concentration**

<b>Requirements</b>	
<b>Credit Hours</b>	<b>Hours</b>
Total Credits for the Degree	
Coursework	32
<b>Core Courses:</b> Complete the required courses in each of the areas below. <ul style="list-style-type: none"> <li>• Technical courses from approved list</li> <li>• Business courses from approved list</li> </ul>	18
Elective Courses chosen in consultation with advisor	8
Professional Development Courses	6
<b>Other Requirements and Conditions (may overlap):*</b>	
A minimum of 20 credit hours must be taken from the University of Illinois at Urbana-Champaign campus.	
A minimum of 12 500-level credit hours overall.	
The minimum program GPA is 3.0.	
At most, 12 credit hours of previous University of Illinois Urbana-Champaign graduate-level coursework not applied to any other degree may be transferred and applied to the major pending department and Graduate College approval.	

\* For additional details and requirements for all degrees, please refer to the department's [Graduate Studies Web site](#) and the [Graduate College Handbook](#).

# Appendix C: MOU Agreement

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MEMORANDUM OF UNDERSTANDING BETWEEN THE

**COLLEGE OF ENGINEERING (CoE)**

AND THE

**DEPARTMENT OF BIOENGINEERING (BioE)**

For the distribution of tuition funds for tuition-generating enrollments in the  
Professional Master's degree program in BioE

This MOU applies to tuition paying M.Eng. Bioengineering students in the BioE Department and establishes a formula for the transfer of tuition funds between the CoE and BioE. This is a new agreement, which follows the CoE Guidance Document for Professional Master's Program Tuition Sharing ratified in July 2014. This agreement is not applicable to online programs or enrollments.

- For tuition generated by BioE self-supporting M.Eng. students, net tuition funds (those returned to the CoE from campus) will be split as follows: 20% CoE, 80% BioE.

Using the Campus Budget Office's report on net tuition received, tuition as non-recurring funds will be distributed to BioE at the end of each fiscal year. This agreement is effective August 16<sup>th</sup>, 2017 (or when program is official approved by IBHE) and valid through August 15, 2020.

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Signatures:



10-8-2015

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by Bill Buttler  
Associate Dean of Graduate, Professional & Online Programs  
College of Engineering

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Date



10-8-2015

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by Rashid Bashir  
Head, Department of Bioengineering

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Date



PROGRAM TUITION WAIVER POLICY REQUEST FORM

Definitions of Tuition Waiver Policy Designations:

Traditional Programs. Programs either designated as generating full or base-rate tuition waivers. Please note, new programs seeking Traditional classification with a full waiver do not need to complete this form.

Reimbursable Programs. Programs that have been approved to seek reimbursement from the student's employing unit. The academic program may seek reimbursement for the amount equal to the tuition waiver received by the student, which would have been a result from a waiver-generating appointment.

Cost-recovery and self-supporting programs. Students in approved cost-recovery and self-supporting programs are not eligible to receive tuition and fee waivers except statutory waivers. For example, these students may not hold waiver-generating appointments, receive stand-alone waivers or receive employee waivers. However students are eligible to receive tuition scholarships.

Information related to these tuition waiver classifications can be found here: http://www.grad.illinois.edu/gradhandbook/2/chapter7/tuition-waivers#otherprovisions.

Please contact the Graduate College if you have questions or seek clarifications, (217) 333-0035.

COLLEGE OR SCHOOL: Engineering

PROGRAM: Bioengineering

REQUESTED CLASSIFICATION: [ ] TRADITIONAL [ ] REIMBURSABLE [X] SELF-SUPPORTING

JUSTIFICATION: On a separate sheet, please address the following.

- 1. Describe the reasons for this request and explain: (a) the pros and cons of the classification requested, and (b) how the requested classification will benefit and not adversely affect the academic quality of the program.
2. Describe how these measures affect the affordability of the program. What type of financial aid, if any, will be offered?
3. What provisions will be made to communicate the classification to prospective and newly admitted students?
4. Name the college and program contact persons in charge of implementing and communicating the classification details to students.

Unit Head Signature and Date [Signature] October 18, 2018

College Dean Signature and Date [Signature] 3/1/19

**1) Describe the reasons for this request and explain: (a) the pros and cons of the classification requested, and (b) how the requested classification will benefit and not adversely affect the academic quality of the program.**

This is a request to establish Self-supporting status within the MEng in Bioengineering with a concentration in Pharmaceutical Engineering. This is not a research-oriented program. It is designed so that it can be completed in two or three semesters. So it would in any case be very unusual for a student to find a suitable 25% or more time assistantship that would be require a tuition waiver with a Traditional or Reimbursable classification. The Self-supporting classification will provide clarity that some of the tuition revenue will be adequate to support the additional costs of making the program available to students.

**2) Describe the expected impact of the requested classification to new students. How will these measures affect the affordability of the program? What type of financial aid, if any, will be offered? Note: Continuing students will not be affected as they are subject to the rules in effect at the time of their admission.**

This is a new program. All students entering this new concentration in the MEng in Bioengineering degree will need to pay tuition. No financial aid is offered to students enrolled in any concentration under the MEng in Bioengineering degree program.

**3) What provisions will be made to communicate the implications of the classification to prospective and newly admitted students?**

The self-supporting nature of the program will be clearly explained on the program's website and in any and all communications to prospective students.

**4) Name the college and program contact persons in charge of implementing and communicating the classification and its consequences to students.**

Professor Dipanjan Pan, Director of MEng in Bioengineering Program, and Liezl Bowman, Assistant Director of MEng Programs in Bioengineering, will be responsible for communicating with prospective students. The College of Engineering contacts for this program are Harry Dankowicz, Associate Dean for Graduate, Professional and Online Programs, and Rhonda McElroy, Executive Director of Engineering Graduate Programs.

**Subject:** RE: Revised pharma proposal

**Date:** Tuesday, October 30, 2018 at 5:27:31 PM Central Daylight Time

**From:** Insana, Michael

**To:** McElroy, Rhonda Kay, Bowman, Liezl

**CC:** Pan, Dipanjan

Hi Rhonda:

The matter of the new concentration was placed before the voting faculty in bioengineering. Of the 20 faculty, 15 yes votes, 0 no votes, and 5 did not respond. We had a quorum respond, so unanimous vote is YES.

mike



UNIVERSITY OF ILLINOIS  
AT URBANA-CHAMPAIGN

University Library

Office of University Librarian and Dean of Libraries  
230 Main Library, MC-522  
1408 West Gregory Drive  
Urbana, IL 61801



November 1, 2018

Rhonda McElroy  
Director of Graduate and Professional Programs  
College of Engineering @ ILLINOIS  
Engineering Hall 405  
1308 West Green Street  
Urbana, IL 61801

Dear Rhonda:

Thank you for providing the University Library with the opportunity to review the College of Engineering's proposals to the Senate's Committee on Educational Policy. The proposal to establish a MEng in Engineering with a Concentration in Plasma Engineering and the proposal to establish a MEng in Bioengineering with a concentration in Pharmaceutical Engineering were reviewed by several librarians that provide support for engineering and the biomedical sciences. They believe that the Library is well-positioned to support.

The University Library and the College of Engineering have a long history of working closely together. We look forward to utilizing the resources committed in order to grow in the areas necessary to provide support for this program.

Sincerely,



John P. Wilkin  
Juanita J. and Robert E. Simpson  
Dean of Libraries and University Librarian

c: Bill Mischo  
Thomas Teper

**From:** [McElroy, Rhonda Kay](#)  
**To:** [McKinney, Allison Ann](#); [Insana, Michael](#)  
**Cc:** [Dankowicz, Harry](#)  
**Subject:** Re: Proposal to Establish a Graduate Concentration in Pharmaceutical Engineering  
**Date:** Friday, March 1, 2019 2:11:08 PM  
**Attachments:** [BIOE-PharmaConcentrationFollowup.pdf](#)

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Good Afternoon, Allison –

Attached is an email from Mike Insana, Interim Department Head for BIOE, confirming that students can successfully complete the Concentration in Pharmaceutical Engineering without relying on courses outside of engineering.

If you need any additional documentation, please let me know. Thank you!

Rhonda

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## **Rhonda McElroy**

Executive Director of Graduate Programs  
College of Engineering  
University of Illinois Urbana-Champaign  
400 Engineering Hall | 1308 W. Green Street | Urbana, IL 61801  
(217) 244-2745 | [rmcelroy@illinois.edu](mailto:rmcelroy@illinois.edu)

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**From:** "McKinney, Allison Ann" <[agrindly@illinois.edu](mailto:agrindly@illinois.edu)>  
**Date:** Wednesday, February 20, 2019 at 1:53 PM  
**To:** "Insana, Michael" <[mfi@illinois.edu](mailto:mfi@illinois.edu)>  
**Cc:** "Dankowicz, Harry" <[danko@illinois.edu](mailto:danko@illinois.edu)>, "McElroy, Rhonda Kay" <[rmcelroy@illinois.edu](mailto:rmcelroy@illinois.edu)>  
**Subject:** Proposal to Establish a Graduate Concentration in Pharmaceutical Engineering

Dear Professor Insana,

The Graduate College Executive Committee reviewed the attached proposal to **“Establish a concentration in Pharmaceutical Engineering for the Master of Engineering in Bioengineering”** at their February meeting (which was yesterday). The committee approved the proposal pending the receipt clarification on the following:

It was noted that it might be reasonable to think that courses found in the Biochemistry department would be of interest to students in this program. Will all of the courses, including electives be chosen among courses within the College of Engineering? If not, has there been conversation with other units that might be relied on for fulfillment of elective requirements (such as Biochemistry)?

Please let me know if you have any questions.

Sincerely,

Allison McKinney  
Senior Director  
Academic Affairs  
Graduate College

**Subject:** pharma concentration

**Date:** Friday, March 1, 2019 at 2:00:21 PM Central Standard Time

**From:** Insana, Michael

**To:** McElroy, Rhonda Kay

Hi Rhonda

Thanks for clearing things up for us this afternoon regarding the agreements that might be needed for initiate for offering existing and new grad programs and concentrations.

Regarding our proposed new MEng concentration: Students can successful complete this concentration by completing courses offered in the Department of Bioengineering (BIOE) and other departments in the College of Engineering. BIOE is not relying on additional courses outside of the college for students to be successful in this program.

Thank you, mike

UNIVERSITY OF ILLINOIS  
AT URBANA-CHAMPAIGN

Office of the Provost and Vice Chancellor for Academic  
Affairs

Swanlund Administration Building  
601 East John Street  
Champaign, IL 61820



March 4, 2019

Gay Miller, Chair  
Senate Committee on Educational Policy  
~~Office of the Senate~~  
228 English Building, MC-461

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Dear Professor Miller:

Enclosed is a proposal from the College of Engineering to establish the graduate concentration in  
Pharmaceutical Engineering in the Master of Engineering.

Sincerely,



Kathryn A. Martensen  
Assistant Provost

Enclosures

c: A. McKinney  
J. Hart  
R. McElroy  
H. Dankowicz  
M. Insana  
A. Edwards  
E. Stuby

**Graduate College**

110 Coble Hall  
801 South Wright Street  
Champaign, IL 61820-6210



**Executive Committee**

**2018-2019 Members**

Wojtek Chodzko-Zajko  
Dean & Chair  
Graduate College

*Members*

Conrad Bakker  
Art & Design

Zachary Berent  
Graduate Student, Mechanical  
Science & Engineering

Xiaoling Chen  
Accountancy

Lee DeVille  
Mathematics

Lilya Kaganovsky  
Comparative & World  
Literature

Becky Fuller  
Animal Biology

Justine Murison  
English

Denice Hood  
Education

Tania Ionin  
Linguistics

Brian Bailey  
Computer Science

Lori Raetzman  
Molecular & Integrative  
Physiology

Katie Ranard  
Graduate Student, Nutritional  
Sciences

Sandra Rodriguez-Zas  
Animal Sciences

Sela Sar  
Advertising

Mark Steinberg  
History

Terri Weissman  
Art & Design

March 1, 2019

Kathy Martensen  
Office of the Provost

Dear Kathy,

Included is a proposal from the College of Engineering to **“Establish a concentration in Pharmaceutical Engineering for the Master of Engineering in Bioengineering”**.

The proposal was received on January 22, 2019 and reviewed at the Graduate College Executive Committee meeting on February 19, 2019. The committee approved the proposal pending receipt of clarification on the following:

*It was noted that it might be reasonable to think that courses found in the Biochemistry department would be of interest to students in this program. Will all of the courses, including electives be chosen among courses within the College of Engineering? If not, has there been conversation with other units that might be relied on for fulfillment of elective requirements (such as Biochemistry)?*

The proposal sponsor has provided a response on the above question, which is included now in the last page of the proposal document.

We find that this proposal meets the standards of Graduate Education at Illinois and we now forward for your review.

Sincerely,

John C. Hart  
Executive Associate Dean  
Graduate College

c: M. Insana  
H. Dankowicz



**COLLEGE OF ENGINEERING**

Office of the Dean  
306 Engineering Hall, MC-266  
1308 W. Green St.  
Urbana, IL 61801

Allison McKinney  
Graduate College  
204 Coble Hall  
MC-322

Via: Rashid Bashir, Engineering College

Dear Allison,

The College of Engineering Executive Committee has reviewed and approved the following program revision. We now submit for campus approval.

**“Graduate Concentration in Pharmaceutical Engineering within the Master of Engineering in BioEngineering degree program”**

Attached is a copy of the request.

Sincerely yours,

Henrique Reis, Vice Chair  
Executive Committee

Approval Recommended:

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Rashid Bashir, Dean  
College of Engineering

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January 22, 2019  
Date

Harry Dankowicz  
Rhonda McElroy

**Senate Educational Policy Committee  
Proposal Check Sheet**

**PROPOSAL TITLE** (Same as on proposal): Establish a Graduate Concentration in Pharmaceutical Engineering within the Master of Engineering in Bioengineering in the Department of Bioengineering in the College of Engineering

**PROPOSAL TYPE** (select all that apply below):

- A.  Proposal for a **NEW** or **REVISED** degree program. Please consult the Programs of Study Catalog for official titles of existing degree programs.

1. Degree program level:

Graduate                       Professional                       Undergraduate

2.  Proposal for a new **degree** (e.g. B.S., M.A. or Ph.D.):

    Degree name, "e.g., *Bachelor of Arts or Master of Science*": \_\_\_\_\_

3.  Proposal for a new or revised **major, concentration, or minor**:

New or  Revised **Major** in (name of existing or proposed major): \_\_\_\_\_

New or  Revised **Concentration** in (name of existing or proposed concentration):  
    Pharmaceutical Engineering

New or  Revised **Minor** in (name of existing or proposed minor): \_\_\_\_\_

4.  Proposal to rename an existing major, concentration, or minor:

Major                       Concentration                       Minor

    Current name: \_\_\_\_\_

    Proposed new name: \_\_\_\_\_

5.  Proposal to terminate an existing degree, major, concentration, or minor:

Degree                       Major                       Concentration                       Minor

    Name of existing degree, major, or concentration: \_\_\_\_\_



6.  Proposal involving a multi-institutional degree:

New                       Revision                       Termination

Name of existing Illinois (UIUC) degree: \_\_\_\_\_

Name of non-Illinois partnering institution: \_\_\_\_\_

Location of non-Illinois partnering institution:

State of Illinois       US State: \_\_\_\_\_       Foreign country: \_\_\_\_\_

B.  Proposal to create a new academic unit (college, school, department, program or other academic unit):

Name of proposed new unit: \_\_\_\_\_

C.  Proposal to rename an existing academic unit (college, school, department, or other academic unit):

Current name of unit: \_\_\_\_\_

Proposed new name of unit: \_\_\_\_\_

D.  Proposal to reorganize existing units (colleges, schools, departments, or program):

1.  Proposal to change the status of an existing and approved unit (e.g. change from a program to department)

Name of current unit including status: \_\_\_\_\_

2.  Proposal to transfer an existing unit:

Current unit's name and home: \_\_\_\_\_

Proposed new home for the unit: \_\_\_\_\_

3.  Proposal to merge two or more existing units (e.g., merge department A with department B):

Name and college of unit one to be merged: \_\_\_\_\_

Name and college of unit two to be merged: \_\_\_\_\_

Proposed name and college of new (merged) unit: \_\_\_\_\_

4.  Proposal to terminate an existing unit:

Current unit's name and status: \_\_\_\_\_

E.  **Other educational policy proposals** (e.g., academic calendar, grading policies, etc.)

Nature of the proposal: \_\_\_\_\_