

APPROVED BY SENATE

05/02/2016



## Proposal to the Senate Educational Policy Committee

*Please replace all text in italic with appropriate information before submitting your proposal.  
Your entries should be in regular (not italic) font.*

### PROPOSAL TITLE:

Curriculum Revision to the Ph.D. Requirements for the Department of Bioengineering, College of Engineering

### SPONSOR:

Rashid Bashir, Abel Bliss Professor of Engineering and Head, Department of Bioengineering, 217-333-1867, [rbashir@illinois.edu](mailto:rbashir@illinois.edu)

### COLLEGE CONTACT:

Bill Buttlar, Associate Dean, Graduate, Professional, and Online Programs, College of Engineering, [buttlar@illinois.edu](mailto:buttlar@illinois.edu), 333-0678

### BRIEF DESCRIPTION:

We propose to add a 96 credit hour option to the current Ph.D. curriculum in Bioengineering to allow students a direct admit into the Ph.D. program. Currently, graduate students are required to hold an approved MS degree before they can enter the Ph.D. program. Students without an approved master's degree must first complete our master's with thesis program in Bioengineering before entering our Ph.D. program. The current Ph.D. curriculum is a 64 credit hour curriculum.

Under the 96 credit hour curriculum, students will complete the following requirements, which are outlined in detail in Appendix A.

- 41 credit hours of graduate level coursework
  - 21 credit hours of 500-level Bioengineering coursework
  - 20 credit hours of 400-500 level elective coursework per advisor approval
- 55 credit hours of thesis research
- Successful completion of the Qualifying, Preliminary, and Final exams.

### JUSTIFICATION:

The motivation to add a 96 credit hour Ph.D. program is to remain competitive with our peers that offer a direct admit into their Ph.D. program from the bachelor's degree.

- Johns Hopkins University
- Georgia Institute of Technology
- University of California San Diego
- Duke University
- Massachusetts Institute of Technology
- Stanford University
- University of California Berkeley

Under the current curriculum, students without an approved master's degree must first be admitted into our master's with thesis program and then petition into our Ph.D. program. This is hindering our department from recruiting top talent to our program. Students applying to Bioengineering Ph.D. program want to be directly admitted into the Ph.D. program without the requirement of first completing the master's degree. More than 90% of peer Bioengineering doctoral programs directly admit students to the PhD program without requiring a prior MS degree. This difference places Illinois at a distinct competitive disadvantage when recruiting top applicants who primarily desire a PhD.

In addition, the current Ph.D. program in Bioengineering delays the doctoral qualifying exam until after students complete the MS degree and have entered in the Ph.D. program. This means they complete the qualifying exam in the third year. With a direct admit into the Ph.D. program from their bachelor's degree, this allows students to complete the qualifying exam at the end of the first year or in the beginning of the second year.

#### **BUDGETARY AND STAFF IMPLICATIONS:**

##### 1) Resources

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

*There will not be any budgetary obligations due to this change. The program implementation will be carried out with existing resources.*

- 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?

*There are no capacity implications with respect to this proposed change. There will be no additional enrollment beyond the numbers currently supported by the department. Graduate student enrollment is limited by the number of Research Assistantships (faculty grants) and by available Teaching Assistantships.*

- 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, there will be no additional financial obligations resulting from this change.*

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

*There are no financial implications for the requested change.*

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.

*There will be no impact on faculty resources.*

- 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 no impact on course enrollment in other units.*

- c. Please address the impact on the University Library

*There will be no impact on the University Library*

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

*There will be no impact on technology and space.*

For new degree programs only:

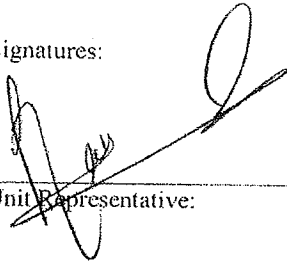
- 3) Briefly describe how this program will support the University's mission, focus, and/or current priorities. Include specific objectives and measurable outcomes that demonstrate the program's consistency with and centrality to that mission.
- 4) Please provide an analysis of the market demand for 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?
- 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?

**DESIRED EFFECTIVE DATE:** August 16, 2016


**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.*)

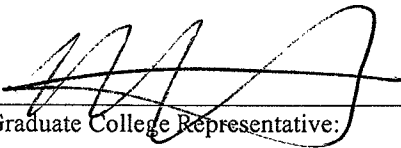
Signatures:

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

12/2/15  
\_\_\_\_\_  
Date:

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

12-14-15  
\_\_\_\_\_  
Date:

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

2/22/16  
\_\_\_\_\_  
Date:

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

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

## Appendix A: Proposed Curriculum Revisions

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Ph.D. Degree	Entering with approved M.S. Degree (current Ph.D. Curriculum)	Entering with B.S. Degree (addition to Ph.D. curriculum)
<i>Total credit towards degree</i>	<b>64 hours</b>	<b>96 hours</b>
BIOE 599 Research (minimum applied toward degree)	52 hours	<b>55 hours</b>
Coursework	12 hours	<b>41 hours</b> <ul style="list-style-type: none"> <li>• 21 hours of 500-level BioE coursework: see approve list</li> <li>• 20 hours of 400/500 elective coursework per advisor approval</li> </ul>
Other Requirements and Conditions (may overlap)		
Minimum hours of BIOE course work	8 hours	21 hours
<p><b><i>Other requirements and conditions</i></b></p> <p>The minimum program GPA is 3.0            International Students must demonstrate English proficiency (equivalent to that necessary to be a TA-see Financial Aid) before taking the Qualifying Exam.            Ph.D. exam and dissertation requirements:</p> <ul style="list-style-type: none"> <li>• Qualifying exam</li> <li>• Preliminary exam</li> <li>• Final exam</li> <li>• Dissertation deposit</li> </ul>		

**Coursework\* (minimum 21 hours 500-level BIOE Coursework)**

- BIOE 500 (2 semesters)
- BIOE 501
- BIOE 502
- BIOE 504
- BIOE 505
- 8 hours of BIOE electives

# Appendix B: Proposed Program of Study

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

Head of Department: [Rashid Bashir](#)  
Director of Graduate Studies: [Deborah Leckband](#)  
Graduate Programs Coordinator: [Krista Smith](#)  
1270 Digital Computer Laboratory  
1304 West Springfield Avenue  
Urbana, IL 61801  
(217) 333-1867  
E-mail: [bioengineering@illinois.edu](mailto:bioengineering@illinois.edu)

Major: Bioengineering  
Degrees Offered: M.S., Ph.D.

Major: Bioinstrumentation  
Degrees Offered: M.Eng.

Graduate Concentrations: Bioengineering, Biomechanics, Cancer Nanotechnology

Medical Scholars Program: Doctor of Philosophy (Ph.D.) in Bioengineering and Doctor of Medicine (M.D.) through the [Medical Scholars Program](#)

## Graduate Degree Programs

The Department of Bioengineering offers studies leading to the Master of Engineering in Bioinstrumentation (M.Eng.), the Master of Science in Bioengineering (M.S.), and the Doctor of Philosophy (Ph.D.) in Bioengineering. The Bioengineering Graduate Program provides students with educational and research experiences that integrate the sciences of biology and medicine with the practices and principles of engineering. For the M.S. and Ph.D. programs, areas of focus include Bio-imaging, Cell & Tissue Engineering, Micro and Molecular Technologies, and Computational Biology. Opportunity also exists for specializing in (1) computational science and engineering and (2) energy and sustainability engineering via the [Computational Science and Engineering \(CSE\) Concentration](#) and the [Energy and Sustainability Engineering \(EaSE\) Certificate](#). The [Medical Scholars Program](#) permits highly qualified students to integrate the study of medicine with study for a graduate degree in a second discipline, including Bioengineering.

## Admission

For the M.S. and Ph.D. programs, applicants should have an undergraduate degree in a natural science, computer science, or engineering. A minimum grade point average of 3.00 (A = 4.00) for the last two years of undergraduate study is required. Applicants should show evidence of strong quantitative skills and of serious interest in the life sciences. Applicants with a grade point average of greater than 3.00 (A = 4.00) may be considered for admission to the Ph.D. program. In addition, applicants to the Ph.D. program must submit results from the [Graduate Record Examination \(GRE\)](#) general test.

All applicants whose native language is not English must submit a minimum [TOEFL](#) score of 97 (iBT), 243 (CBT), or 590 (PBT); or minimum [International English Language Testing System \(IELTS\)](#) academic exam scores of 6.5 overall and 6.0 in all subsections. Applicants may be exempt from the TOEFL if [certain criteria](#) are met. For those taking the TOEFL or IELTS, [full admission status](#) is granted for scores of 103 (TOEFL iBT) or greater, 253 (TOEFL CBT), 610 (TOEFL PBT), or 6.5 (IELTS). [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.

Please see the admission requirements for the M.Eng. in Bioinstrumentation under the "Masters" tab.

## Degree Requirements

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

## Medical Scholars Program

The Medical Scholars Program permits highly qualified students to integrate the study of medicine with study for a graduate degree in a second discipline, including Bioengineering. Students may apply to the Medical Scholars Program prior to beginning graduate school or while in the graduate program. Applicants to the Medical Scholars Program must meet the admissions standards for and be accepted into both Bioengineering and the College of Medicine. Students in the dual degree program must meet the specific requirements for both the medical and graduate degrees. On average, students take eight years to complete both degrees. An application to the Medical Scholars Program will also serve as the application to the Bioengineering graduate program. Further

information on this program is available by contacting the Medical Scholars Program, 125 Medical Sciences Building, (217) 333-8146, [mspo@illinois.edu](mailto:mspo@illinois.edu) or at [www.med.illinois.edu/msp](http://www.med.illinois.edu/msp).

## Faculty Research Interests

Bioengineering faculty perform research in the areas of Bio-Imaging at Multi-Scale, Molecular, Cellular and Tissue Engineering, Bio-Micro and Nanotechnology, Computational Bioengineering, and Synthetic Bioengineering. In addition to [Bioengineering faculty](#), Department of Bioengineering has more than [50 affiliate faculty](#).

## Financial Aid

For the M.S. and Ph.D. programs, qualified students may apply for financial aid in the form of fellowships, teaching and research assistantships, and waivers of tuition and service fees. All applicants, regardless of U.S. citizenship, whose native language is not English and who wish to be considered for teaching assistantships must demonstrate [spoken English language proficiency](#) by achieving a minimum score of 24 on the speaking subsection of the TOEFL iBT or 8 on the speaking subsection of the IELTS. For students who are unable to take the iBT or IELTS, a minimum score of 4CP is required on the [EPI test](#), offered on campus. All new teaching assistants are required to participate in the [Graduate Academy for College Teaching](#) conducted prior to the start of the semester. Please see the financial aid eligibility for the M.Eng. in Bioinstrumentation under the "Masters" tab.

## Master of Science in Bioengineering

### Thesis Option

<a href="#">BIOE 599</a>	Thesis Research (min-max applied toward degree)	4
<a href="#">BIOE 500</a>	Graduate Seminar ( <a href="#">BIOE 500</a> must be taken at least twice. A maximum of 2 hours may be applied toward the degree.)	2
<a href="#">BIOE 501</a>	Seminar Discussion	1
<a href="#">BIOE 502</a>	Bioengineering Professionalism	2
<a href="#">BIOE 504</a>	Analytical Methods in Bioeng	4
<a href="#">BIOE 505</a>	Computational Bioengineering	4
<a href="#">BIOE 506</a>	Molecular Biotechniques	4
<a href="#">BIOE 507</a>	Advanced Bioinstrumentation	4
Elective Courses		7
<b>Total Hours</b>		<b>32</b>

### Other Requirements and Conditions<sup>1</sup>

Minimum GPA: 3.0

<sup>1</sup> For additional details and requirements for all degrees, please refer to the department's [Graduate Studies Web site](#) and the [Graduate College Handbook](#).

### Non-Thesis Option

<a href="#">BIOE 500</a>	Graduate Seminar ( <a href="#">BIOE 500</a> must be taken at least twice. A maximum of 2 hours may be applied toward the degree.)	2
<a href="#">BIOE 501</a>	Seminar Discussion	1
<a href="#">BIOE 502</a>	Bioengineering Professionalism	2
<a href="#">BIOE 504</a>	Analytical Methods in Bioeng	4
<a href="#">BIOE 505</a>	Computational Bioengineering	4
<a href="#">BIOE 506</a>	Molecular Biotechniques	4
<a href="#">BIOE 507</a>	Advanced Bioinstrumentation	4
Elective Courses		19
<b>Total Hours</b>		<b>40</b>

### Other Requirements and Conditions<sup>1</sup>

Minimum GPA: 3.0

<sup>1</sup> For additional details and requirements for all degrees, please refer to the department's [Graduate Studies Web site](#) and the [Graduate College Handbook](#).

## Doctor of Philosophy Entering with approved M.S. degree

BIOE 599	Thesis Research (min-max applied toward degree)	52
Elective courses		12
<b>Total Hours</b>		<b>64</b>
<b>Other Requirements and Conditions<sup>1</sup></b>		
Other Requirements and Conditions may overlap		
Minimum program GPA:		3.0
Qualifying exam <sup>2</sup>		
Preliminary exam		
Final exam and dissertation defense		

Dissertation deposit

<sup>1</sup> For additional details and requirements for all degrees, please refer to the department's [Graduate Studies Web site](#) and the [Graduate College Handbook](#).

<sup>2</sup> [Qualifying Examination information](#)

## Entering with B.S. degree (New options being proposed)

BIOE 599	Thesis Research (min-max applied toward degree)	55
500-level BioE courses: see approved list		21
Elective courses: At least 12 hours must be engineering graduate-level courses. See website for more details.		20
<b>Total Hours</b>		<b>96</b>
<b>Other Requirements and Conditions<sup>1</sup></b>		
Other Requirements and Conditions may overlap		
Minimum program GPA:		3.0
Qualifying exam <sup>2</sup>		
Preliminary exam		
Final exam		

Dissertation deposit

<sup>1</sup> For additional details and requirements for all degrees, please refer to the department's [Graduate Studies Web site](#) and the [Graduate College Handbook](#).

<sup>2</sup> [Qualifying Examination information](#)



UNIVERSITY OF ILLINOIS  
AT URBANA - CHAMPAIGN

**College of Engineering**  
Graduate, Professional & Online Programs  
401 Engineering Hall, MC-266  
1308 West Green Street  
Urbana, IL 61801



December 3, 2015

Rohit Bhargava, Vice Chair  
Executive Committee  
College of Engineering

Dear Professor Bhargava:

My office has reviewed the following curriculum proposal submitted by the Department of Bioengineering to add a 96 credit hour option to their existing Ph.D. curriculum.

**Curriculum Revision to the Ph.D. Requirements for the Department of Bioengineering, College of Engineering**

We are now submitting this proposal for review by the Executive Committee.

Sincerely,

William G. Buttlar  
Associate Dean  
Office of Graduate and Professional Programs



## Senate Educational Policy Committee Proposal Check Sheet

**PROPOSAL TITLE** (Same as on proposal): Curriculum Revision to the Ph.D. Requirements for the Department of Bioengineering, 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): Bioengineering

New or  Revised **Concentration** in (name of existing or proposed concentration): \_\_\_\_\_

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: \_\_\_\_\_

Revised 10/2012

UNIVERSITY OF ILLINOIS  
AT URBANA - CHAMPAIGN

EP.16.62

Office of the Provost and Vice Chancellor  
for Academic Affairs

Swanlund Administration Building  
601 East John Street  
Champaign, IL 61820



February 23, 2016

Bettina Francis, Chair  
Senate Committee on Educational Policy  
Office of the Senate  
228 English Building, MC-461

Dear Professor Francis:

Enclosed is a copy of a proposal from the College of Engineering and the Graduate College to revise the Ph.D. in Bioengineering.

Sincerely,

A handwritten signature in black ink that reads 'Kathryn A. Martensen'.

Kathryn A. Martensen  
Assistant Provost

Enclosures

c: W. Chodzko-Zajko  
B. Buttlar  
R. Bashir  
J. Hart  
A. McKinney

UNIVERSITY OF ILLINOIS  
AT URBANA-CHAMPAIGN

**Graduate College**

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



**Executive Committee**

**2015-2016 Members**

Wojtek Chodzko-Zajko  
Dean & Chair  
Graduate College

*Members*

Abbas Aminmansour  
Architecture

John D'Angelo  
Mathematics

Nicki Engeseth  
Food Science & Human  
Nutrition

Susan Fowler  
Special Education

Rutilio Fratti  
Biochemistry

Paul Hergenrother  
Chemistry

Kevin Jackson  
Accountancy

Samantha Knoll  
Mechanical Science &  
Engineering

John Lambros  
Aerospace Engineering

Isabel Molina  
Media and Cinema Studies &  
Latina/Latino Studies

Kirsten Phelps  
Library and Information  
Science

Sandra Rodriguez-Zas  
Animal Sciences

Mark Rood  
Civil & Environmental  
Engineering

Lisa Rosenthal  
Art & Design

Angeliki Tzanetou  
Classics

Michelle Wang  
Statistics/Psychology/  
Bioengineering

February 22, 2016

Kathy Martensen  
Office of the Provost  
207 Swanlund MC-304

Dear Kathy,

Enclosed please find the proposal titled: "Curriculum Revision to the Ph.D. Requirements for the Department of Bioengineering"

The proposal was received by the Graduate College on December 18, 2015. It was forwarded to the Graduate College Program Subcommittee for review on January 28, 2016. The committee requested one minor revision, which was received on February 3, 2016.

The proposal was then forwarded for review at the February 18, 2016 Graduate College Executive Committee. The proposed program was found to meet campus requirements and guidelines for graduate education, and so was approved.

I send the proposal to you now for further review.

Sincerely,

Wojtek Chodzko-Zajko  
Dean  
Graduate College

c: B. Buttler  
R. Bashir  
A. McKinney

UNIVERSITY OF ILLINOIS  
AT URBANA-CHAMPAIGN

College of Engineering  
Executive Committee  
306 Engineering Hall, MC-266  
1308 West Green Street  
Urbana, IL 61801



December 14, 2015

Associate Dean John Hart  
Graduate College  
204 Coble Hall  
MC-322

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Via: Andreas Cangellaris, Engineering College

Dear Dean Hart:

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

**“Curriculum Revision to the Ph.D. Requirements for the Department of Bioengineering,  
College of Engineering”**

Attached is a copy of the request

Sincerely yours,

Rohit Bhargava, Vice Chair  
Executive Committee

Approval Recommended:

Andreas Cangellaris, Dean  
College of Engineering

12-14-2015

Date

Bill Buttlar  
Rhonda McElroy  
Rohit Bhargava