

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

EP.10.10

Office of the Provost and Vice Chancellor
for Academic Affairs

Swanlund Administration Building
601 East John Street
Champaign, IL 61820



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SEP 25 2009

OFFICE OF THE SENATE

September 25, 2009

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

Dear Professor Aminmansour:

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

This proposal has been approved by the College of Engineering Executive Committee and the Graduate College Executive Committee. It now requires Senate review.

Sincerely,

Kristi A. Kuntz
Assistant Provost

KAK/dkk

Enclosures

c: I. Adesida
D. Beck
V. Coverstone
D. Dutta
J. Hsia
M. Insana
C. Livingstone
B. Osgood
M. Rood
M. Pleck

UNIVERSITY OF ILLINOIS
AT URBANA - CHAMPAIGN

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SEP 18 2009

OFFICE of the PROVOST



Graduate College
202 Coble Hall, MC-322
801 South Wright Street
Champaign, IL 61820-6210
www.grad.uiuc.edu

September 10, 2009

Kristi Kuntz
Assistant Provost
Office of the Provost
207 Swanlund, MC-304

Dear Kristi:

Enclosed is the 'Proposal for Revisions to the Bioengineering M.S. and Ph.D. requirements for the Department of Bioengineering'. The Graduate College Executive Committee voted unanimously to approve it. Because the hours for both the M.S. and Ph.D. degrees are revised, this proposal will require additional approvals.

I send it to you now for further review.

Sincerely,

Debasish Dutta
Dean of the Graduate College

Enclosure

c: I. Adesida
D. Beck
V. Coverstone
J. Hsia
M. Insana
B. Osgood
M. Rood
M. Pleck

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

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FEB 19 2009

GRADUATE COLLEGE

College of Engineering

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



February 12, 2009

Kristi Kuntz
Assistant Provost
217 Swanlund Administration Building
MC-304

Via: Ilesanmi Adesida, Engineering College

Dear Ms. Kuntz:

The College of Engineering Executive Committee has reviewed and approved the following:

“Revised M.S. and Ph.D. Degree Requirements – Bioengineering”

Attached is a copy of the request.

Sincerely yours,

Mark Rood, Secretary
Executive Committee

Approval Recommended:

Ilesanmi Adesida, Dean
College of Engineering

02/16/09
Date

MJR/bro
Enclosure

c: Michael Insana
K. Jimmy Hsia
Michael Pleck
Doug Beck
Victoria Coverstone
Becky Osgood

PROPOSAL TO THE SENATE COMMITTEE ON EDUCATIONAL POLICY

TITLE OF THE PROPOSAL:

Revisions to the Bioengineering M.S. and Ph.D. Degree Requirements for the Department of Bioengineering, College of Engineering.

SPONSOR:

Dr. Michael F. Insana, 217-244-0739, mfi@illinois.edu

BRIEF DESCRIPTION:

A. Master's Degree Requirements

1. *M.S. (with Thesis) Credit Requirements:* Reduction in required M.S. credit to 32 credit hours from 36 credit hours. Requirement for BIOE 599 Thesis Research is reduced from 8 credit hours to 4 credit hours. Proposed requirements include the core courses, BIOE 504, 505, 506, and 507 (16 credit hours); BIOE 500 (twice), 501, and 502 (4 credit hours S/U graded); eight (8) hours of 400/500 elective coursework; and four (4) hours of BIOE 599 Thesis Research.
2. *M.S. Core Courses:* Four specific courses replace a portion of a general graduate course work requirement.

B. Ph.D. Degree Requirements

1. *Ph.D. Credit Requirements:* Increase Ph.D. credit requirement from 60 credit hours to 64 credit hours. Post-M.S. BIOE 599 Thesis Research requirements increase by 4 because Pre-M.S. BIOE 599 Thesis Research requirements are reduced by 4. Total Ph.D. credit hours required remains 96.
2. *Ph.D. Graded Course Work:* The current 48-hour graded course work requirement is reduced to 36. The 24 credit hours required pre-M.S. remains the same. The 24 hours post-M.S. is reduced to 12. Accordingly, the BIOE 599 Thesis Research credit hours is increased by 12 from 36 to 48 and then increased additionally by 4 (See A1 and B1 above) because of the change to pre-M.S. requirement to a total of 52 .
3. *Ph.D. Qualifying Exam GPA Requirement:* The current 3.0 cumulative graduate GPA is raised to 3.25.

JUSTIFICATION:

A. Master's Degree Requirements

1. *M.S. Credit Requirements:* This change makes Bioengineering credit hour requirements similar to those of other departments in the College of Engineering.
2. *M.S. Core Courses:* The original Guidelines did not specify the courses to be taken beyond BIOE 500 – Seminar, BIOE 501 – Seminar Discussion, and BIOE 502 – Bioengineering

Professionalism. The revised program requires all first-year students to take four core graduate courses, unless they can demonstrate having had an equivalent course previously. The goal of the core courses is to establish a common knowledge base for all Bioengineering graduate students regardless of their undergraduate training. Students entering the BIOE graduate program have a wide range of undergraduate experiences. Those from physics, electrical, mechanical, civil engineering programs frequently do not have the biological sciences background we expect. Those from life sciences, chemistry and sometimes computer sciences do not have all the engineering background that we expect. The core courses are designed to provide a common experience for all graduate students, removing the need for remediation in most cases, and ensuring anyone graduating from Illinois has a shared background.

The core courses are:

- BIOE 504—Analytical Methods in Bioengrg: Advanced engineering mathematics specifically for biological systems. Heavy emphasis on Matlab modeling applications. This course provides the mathematical background and experience with linear systems required for BIOE 507. No course on campus offers this breadth with a bio-focus.
- BIOE 505—Computation of Biological Data: Computational methods with a focus on bioinformatics, functional genomics, and systems biology. Emphasis on modeling biological problems that span the range of research areas in bioengineering at Illinois. There is a shared project with BIOE 504 as a final exam.
- BIOE 506—Molecular & Cellular Bioengrg: Introduction into the quantitative methods of modern cellular and molecular biology. The goal is to review the basics of cell biology by introducing the instrumentation and methodologies that led to fundamental discoveries. There is a distinct focus on quantitative measurement techniques that is not available in MCB courses.
- BIOE 507—Advanced Bioinstrumentation: Review of bioinstrumentation principles, control systems, and interactions between radiation and matter leading to sensing and imaging. Advanced linear systems analysis is applied to many of the basic instruments used in biology to explain design and evaluation principles. There is a shared project with BIOE 506.

Courses 504 and 507 have been campus approved, while 505 and 506 have been approved by the College of Engineering and are being reviewed at the campus level.

B. Ph.D. Degree Requirements

1. *Ph.D. Credit Requirements:* Increase to 64 credit hours to conform to Graduate College standards for Ph.D. credit hour requirements.
2. *Ph.D. Graded Course Work:* The original degree program requirement of 48 graded course work hours (24 hours before Ph.D. candidacy and 24 hours after) was modeled by the original Department Head, Bruce Wheeler, after the comparable requirement for the Electrical and Computer Engineering graduate program at Illinois. Considering courses to be 4 semester hours each, our revised Ph.D. program would require 9 graded courses, which would make our program consistent with our peer institutions: the Biological Engineering program at MIT, the Biomedical Engineering program at University of Michigan, and the Bioengineering program at UCSD.

3. *Ph.D. Qualifying Exam GPA Requirement:* Originally the minimum GPA requirement for Qualifying Exam candidacy was 3.0, above the Graduate College's 2.75 minimum. However, Bioengineering faculty feel that a higher standard of academic performance is required. This will be administered internally with the department as a Qualifying Exam requirement.

BUDGETARY AND STAFF IMPLICATIONS:

- a. *Additional staff and dollars needed:* When the Bioengineering Guidelines were created there were two Bioengineering faculty members. Since its inception the Department has added 5 additional faculty members. These faculty members have developed the four core classes and taught them for two years as BIOE 598. No additional faculty or faculty time is needed because sufficient faculty to teach the core courses has been hired in the interim.
- b. *Internal reallocations (e.g., change in class size, teaching loads, student-faculty ratio, etc.):* Revisions call for a reduction in total graded course work. All proposed core courses are currently taught by current Bioengineering Department faculty members.
- c. *Effect on course enrollment in other departments and explanations of discussions with representatives of those departments:* Reduction in graded course electives replaced by BIOE 504-507 will decrease course enrollments in other departments but only minimally, since there were many elective possibilities.
- d. *Impact on the University Library:* In discussion with the University Librarian, it has been determined that there will be no additional impact.
- e. *Impact on computer use, laboratory use, equipment, etc.:* No additional university computer or lab resources are needed for the core classes or other changes envisioned in the revised Guidelines.

GUIDELINES FOR UNDERGRADUATE EDUCATION: Does not apply.

CLEARANCES:

Dr. Michael F. Insana, Interim Head and Sponsor

Date

Dr. Ilesanmi Adesida, Dean

Date

Dr. Linda Katehi, Provost

Date

STATEMENT FOR PROGRAMS OF STUDY CATALOG:

See Appendix.

EFFECTIVE DATE: **Fall 2009**

APPENDIX

STATEMENT FOR PROGRAMS OF STUDY CATALOG

Changes to the Bioengineering Department's Programs of Study statement (http://courses.uiuc.edu/cis/programs/urbana/2008/fall/graduate/bio_engin.html) occur entirely in the Degree Requirements section, reproduced below as an excerpt.

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](#).

Master of Science

Required Courses	Thesis Option– Required Hours	Non-thesis Option– Required Hours
BIOE 504, 505, 506 and 507	16	16
BIOE 500 (max of 2 hours can be applied toward the degree)	2	2
BIOE 501	1	1
BIOE 502	1	1
Thesis Hours Required (min/max applied toward degree):	4	
Total Hours	32	40
Minimum 500-level Hours Required Overall:	12	12
Other Requirements:*		

Comment [MHP1]: Change reflects proposal Item A2.

Comment [S.J.S.2]: Change reflects proposal item A1.

Deleted: 8

Comment [S.J.S.3]: Change reflects proposal item A1.

Deleted: 36

Doctor of Philosophy

	Required Hours
Elective Hours to bring total course work hours	12
Thesis Hours Required (min/max applied toward degree):	52
Total Hours	64
Other Requirements:*	
Masters Degree Required for Admission to PhD?	Yes
Qualifying Exam Required	Yes
Preliminary Exam Required	Yes
Final Exam/Dissertation Defense Required	Yes
Dissertation Deposit Required	Yes

Comment [S.J.S.4]: Changes reflects proposal item B2.

Deleted: 24

Comment [S.J.S.5]: Changes reflects proposal items B1 and B2.

Deleted: 36

Comment [S.J.S.6]: Changes reflects proposal item B1.

Deleted: 60

Comment [S.J.S.7]: Graduate POS protocol is that the graduate cumulative GPA requirement for the Qualifying Exam (cf. B.2 in the main proposal), changed from 3.0 to 3.25, and which will be monitored by the department and not the Graduate College, will be found in the department's [Graduate Studies Web site](#) which is a link in the footnote under the header to this section.

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

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



Approved Minutes
College of Engineering Executive Committee Meeting
Tuesday, 1:00 p.m., January 27, 2009
301 Engineering Hall

Present:

I. Adesida (Admin)	G. Dullerud (MechSE)	C. Tucker (Admin)
D. Beck (PHY)	M. Rood (CEE)	R. Uddin (NPRE)
N. Cheng (MNTL)	P. Sauer (ECE)	J. Weaver (MatSE)
V. Coverstone (Admin)		

Absent:

R. Bhargava (BioE)	S. Kamin (CS)	R. Sreenivas (IESE)
L. Bode (ABE)	D. Nicol (CSL)	H. Zhao (ChBE)
B. Conway (AE)		

* = alternate

** = visitor

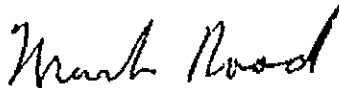
1. The meeting was called to order at 1:05 PM.
2. Draft Minutes from the January 20, 2009 meeting of the EC were unanimously approved without revisions.
3. Brief Review of Plans for the Semester
 - a. Bylaws, Standing Committees, and Promotion and Tenure sub-committees were appointed, charges were developed, and a schedule was established for completion during spring semester (Overall, Do these committees work? If not, what should be done?)
4. Course Outlines/Proposals/Reports
 - a. New/Revised Course Outlines and Program Proposals
 - ECE: Program Revision “Ph.D. in Electrical and Computer Engineering”
 1. Form a sub-committee with Charles Werth (Chairperson, CEE), George Gross (ECE), and Nick Glumac (MechSE) to review this proposal.
 - MatSE: “Establish a new combined Bachelor of Science-Master of Engineering degree in Materials Science and Engineering in the Department of Materials Science and Engineering, College of Engineering” and “Establish a new Master of Engineering degree in

Materials Science and Engineering in the Department of Materials Science and Engineering, College of Engineering”

1. Form a sub-committee with Klara Nahrstedt (Chairperson, CS), Brent Heuser (NPRE), Liang Liu (CEE) to review both of these proposals.
- PHYS 194 “Behavior of Complex Systems”
 1. Form a sub-committee with Harry Dankowicz (Chairperson, MechSE), Richard Weaver (PHYS), and C. Langbort (AE) to review this proposal.
- b. Subcommittee Reports
 - AE 523 “Nanoscale Contact Mechanics”
 1. This report was tabled by EC pending review by Narayana R. Aluru seeing that a representative from MechSE was not appointed to the sub-committee to review the proposed course description, which was an oversight by EC based on the content of the proposed course. It is of interest to know: Should the course be cross-listed, is there overlap, will the course be of interest to MechSE students? It would be good to receive the response from N. Aluru by Feb. 10.
 - BIOE “Revisions to the Bioengineering M.S. and Ph.D. Degree Requirements for the Department of Bioengineering”
 1. The sub-committee report was unanimously approved by EC.
 - ENG 451 “Success in the Workplace”
 1. The sub-committee report was unanimously approved by EC.
 - ME 481 “Whole-Body Musculoskel Biomech” and ME 482 “Musculoskel Tissue Mechanics”
 1. The sub-committee report was unanimously approved by EC.

5. The meeting was adjourned at 2:10 PM.

Respectfully submitted,



Mark J. Rood, Secretary

Siems, Erin E

From: Lowry, Mary K
Sent: Tuesday, August 04, 2009 3:54 PM
To: Siems, Erin E
Subject: FW: Bioengineering proposal
Attachments: Copy of PhD_Course_Requirements.xls

Categories: Subcommittee

Bioeng response and attachment.

From: Insana, Michael [mailto:mfi@illinois.edu]
Sent: Friday, April 24, 2009 10:52 AM
To: lowry@illinois.edu
Cc: Coverstone, Victoria Lynn; Smucker, Samuel J
Subject: RE: Bioengineering proposal

Hi Kelly

Thanks for your comments on our graduate program. We thought about this very carefully, and put together a sampling of course requirements (see attached) to support our request for a change in the number of graded courses from BS to PhD. The data include required hours for (a) programs in the college of engineering at Illinois, (b) biologically-oriented grad programs outside of the college of engineering but still at Illinois, and (c) bioengineering/biomedical engineering programs at peer institutions.

Our request is based on the observation that BioE graduate programs have evolved as a hybrid between biological programs and engineering programs. We draw on faculty and grad students from both traditions. The spreadsheet shows that biological programs at Illinois traditionally have less than 40 hrs required, whereas engineering programs frequently require more than 50 hrs. Since we are a hybrid program, we propose to adjust the requirements to fall between these two traditions and also to align with our peer institutions in bioengineering.

Another example in CoE is Physics, who requires just 32 hrs. They are traditionally an LAS program at other institutions and therefore I would guess have adjusted their requirements to be in line with their peers.

I spoke to Vickie Coverstone about this and she agreed that our request seems reasonable from the CoE perspective.

Please reconsider our request for a reduction in required hours. I am happy to visit to discuss this further.

Thanks very much....mike

Michael Insana
Professor of Bioengineering and ECE
University of Illinois at Urbana-Champaign

From: Siems, Erin E **On Behalf Of** Tappenden, Kelly Anne
Sent: Wednesday, April 22, 2009 11:51 AM
To: Insana, Michael
Cc: Lowry, Mary K; Tewksbury, David H
Subject: Bioengineering proposal

Dear Mike,

The Graduate College's Program Subcommittee reviewed your department's "Proposal for Revisions to the Bioengineering M.S. and Ph.D. Degree Requirements for the Department of Bioengineering" at their last meeting of the year.

They were positive about all the changes except the request to make the PhD portion of the program require only 12 hours of coursework. Although there is no rule about the minimum amount of coursework required for a degree, they felt that the degree was being diluted with more thesis credit than is optimal. Bioengineering already requires only 24 hours of coursework in the Ph.D. part of the program, which makes it an exception, and the committee would like you to either provide more justification for the request to become even more of an outlier, or alternatively to reconsider adding more coursework hours back into the PhD portion.

They felt the statement that there are 48 coursework hours overall in the B.S. to Ph.D. program, and that this is comparable to peer institutions was not a good justification. They preferred a comparison to IL PhD programs, where the norm is 24-28 (MS) plus 32 (PhD) hours of coursework for a B.S. to Ph.D. program.

Please let us know if you have any questions or would like to discuss this matter.

Thank you,

Kelly

~~~~~  
Kelly A. Tappenden, Ph.D., R.D.  
Associate Dean, Graduate College  
Professor of Nutrition and Gastrointestinal Physiology  
204 Coble Hall, 801 South Wright Street  
Champaign, IL 61820-6210  
Telephone: (217) 333-6715 Fax: (217) 333-8019  
e-mail: [tappende@illinois.edu](mailto:tappende@illinois.edu) url: <http://tappenden-lab.fshn.uiuc.edu/>

## Minimum Graded Coursework Requirements for the Ph.D. at Illinois Engineering Departments

| Department                            | <u>MS</u><br><u>Graded</u><br><u>Course</u><br><u>Work</u> | <u>Add. PHD</u><br><u>Graded</u><br><u>Course</u><br><u>Work</u> | <u>PhD Total</u><br><u>Graded</u><br><u>Course</u><br><u>Work</u> | <u>Comments</u> |
|---------------------------------------|------------------------------------------------------------|------------------------------------------------------------------|-------------------------------------------------------------------|-----------------|
| Aerospace Engr.                       |                                                            | 56                                                               | 56                                                                | PhD with no MS  |
| Ag & Bio Engr.                        | 25                                                         | 32                                                               | 57                                                                |                 |
| Chemical Engr.                        | 20                                                         | 32                                                               | 52                                                                |                 |
| Civil & Enviro Engr.                  | 24                                                         | 32                                                               | 56                                                                |                 |
| Computer Science                      | 28                                                         | 20                                                               | 48                                                                |                 |
| Electrical & Comp Engr.               | 24                                                         | 32                                                               | 56                                                                |                 |
| Material Science & Engr.              | 24                                                         | 20                                                               | 44                                                                |                 |
| Mechanical Engineering                | 24                                                         | 32                                                               | 56                                                                |                 |
| Physics                               | 24                                                         | 8                                                                | 32                                                                |                 |
| <b><i>Bioengineering Proposed</i></b> | <b>28</b>                                                  | <b>12</b>                                                        | <b>40</b>                                                         |                 |

### Graded Course Work Requirements for PhD in Bioengineering at Peer Institutions.

|                             |    |
|-----------------------------|----|
| Johns Hopkins               | 36 |
| Georgia Technical Institute | 33 |
| University of Michigan      | 33 |
| University of Wisconsin     | 54 |
| Washington University       | 36 |
| Duke                        | 36 |
| Purdue                      | 29 |

### Graded Course Work Requirements for PhD in Peer Illinois Departments, Non-Engineering

|                                      |                                                                                                             |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Division of Nutritional Sciences     | 40                                                                                                          |
| Neuroscience                         | 7* Requirements vary beyond 7 credit hours as curriculum is designed for each student by faculty committee. |
| Molecular and Integrative Physiology | 26                                                                                                          |
| Cell and Developmental Biology       | 32                                                                                                          |
| Microbiology                         | 36                                                                                                          |