UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN SENATE
COMMITTEE ON EDUCATIONAL POLICY
(Final; Information)

EP.23.051   Report of Administrative Approvals through March 27, 2023

Senate committees are authorized to act for and in the name of the Senate on minor matters. Below is a listing of the administrative approvals the Senate Committee on Educational Policy approved at its meeting on March 27. For each program listing, there is no change to the total hours required. Additional information for each approval is attached.

A. <u>Graduate Programs</u>
   1) **Revise the Master of Science in Biomedical Image Computing in the Grainger College of Engineering and the Graduate College (key 957)** – adds online modality to increase accessibility to the program and removes duplicate listing of cross-listed course.

B. <u>Undergraduate Programs</u>
   1) **Revise the Bachelor of Science in Bioengineering in the Grainger College of Engineering (key 112)** – removes 2 required courses and replaces them with one required course and revises free elective hours.

Program Change Request

Date Submitted: 02/15/23 3:53 pm

Viewing: **1PKS6019MS : Biomedical Image Computing, MS (on-campus and online)**

Last approved: 03/01/22 12:55 pm

Last edit: 03/24/23 4:12 pm

Changes proposed by: Maddie Darling

Biomedical Image Computing, MS

Catalog Pages Using this Program	

Proposal Type:

Approval Path

1. 02/16/23 1:50 pm
   Deb Forgacs
   (dforgacs):
   Approved for U
   Program Review
2. 02/16/23 1:53 pm
   Mark Anastasio
   (maa): Approved
   for 1343 Head
3. 02/28/23 12:57 pm
   Ashley Hallock
   (ahallock):
   Approved for KP
   Committee Chair
4. 02/28/23 1:02 pm
   Cindy Pruitt
   (cpruitt):
   Approved for KP
   Dean
5. 03/03/23 10:03

am
Chris Prom
(prom): Approved
for University
Librarian
6. 03/06/23 8:58 am
Brenda Clevenger
(bmclvngr):
Approved for
COTE Programs
7. 03/08/23 4:05 pm
Allison McKinney
(agrindly):
Approved for
Grad_College
8. 03/09/23 11:02
am
Brooke Newell
(bsnewell):
Rollback to
Grad_College for
Provost
9. 03/20/23 11:43
am
Allison McKinney
(agrindly):
Approved for
Grad_College
10. 03/24/23 12:06
pm
Brooke Newell
(bsnewell):
Approved for
Provost

History

1. Jul 21, 2021 by
Maddie Darling
(darling4)
2. Mar 1, 2022 by
Maddie Darling
(darling4)

Major (ex. Special Education)

This proposal is
for a:
Revision

Administration Details

Official Program Name	Biomedical Image Computing, MS (on-campus and online)
Diploma Title	
Sponsor College	Grainger College of Engineering
Sponsor Department	Bioengineering
Sponsor Name	Mark Anastasio; Maddie Darling ~~Mark Anastasio~~
Sponsor Email	maa@illinois.edu; darling4@illinois.edu ~~maa@illinois.edu~~
College Contact	Keri Carter Pipkins
College Contact Email	kcp@illinois.edu
College Budget Officer	
College Budget Officer Email	

List the role for rollbacks (which role will edit the proposal on questions from EPC, e.g., Dept Head or Initiator) and/or any additional stakeholders. Purpose: List here who will do the editing work if proposal needs rolled back. And any other stakeholders.

Maddie Darling, darling4@illinois.edu; Keri Carter Pipkins, kcp@illinois.edu.

Does this program have inter-departmental administration?

No

Proposal Title

Effective Catalog Term	Fall 2023

Proposal Title (either Establish/Revise/Eliminate the Degree Name in Program Name in the College of XXXX, i.e., Establish the Bachelor of Science in Entomology in the College of Liberals Art and Sciences, include the Graduate College for Grad Programs)

Revise the Master of Science in Biomedical Image Computing in the Grainger College of Engineering and the Graduate College

Does this proposal have any related proposals that will also be revised during the next 6 weeks? Consider Majors, Minors, Concentrations & Joint Programs in your department. Please know that this information is used administratively to move related proposals through workflow efficiently. Example: If you are revising the BS proposal and one related concentration within the next 6 weeks, "This BS proposal (key 567) is related to the Concentration A proposal (key 145)."

Program Justification

| Provide a brief description of what changes are being made to the program. | Introduce an online version of the approved MS in BIC on-campus program. The degree requirements would mirror those of the on-campus MS in BIC program.

All degree requirements remain the same. The removal of CS 543 was to correct a duplicate listing of a cross-listed course ECE 549/CS 543: Computer Vision. |

Did the program content change 25% or more in relation to the total credit hours, since the 2020-2021 catalog. (http://catalog.illinois.edu/archivedacademiccatalogs/2020-2021/)

<u>No</u>

Why are these changes necessary?

Offering the MS-BIC program in an online format will allow increased accessibility to the program, providing high-quality education on biomedical imaging, machine learning and high-performance computing to students outside of the immediate Champaign-Urbana campus. Further, we believe the online offering modality will allow for increased enrollment, which feedback from our industry partners and advisory board supports. An online program offering will allow us to effectively leverage existing on-campus instructional resources through online section offerings to expand the degree program to a wider population of students, including those that may wish to complete the program on a part-time basis, while employed in industry or clinical settings.

Instructional Resources

Will there be any reduction in other course offerings, programs or concentrations by your department as a result of this new program/proposed change?

No

Does this new program/proposed change result in the replacement of another program?

No

Does the program include other courses/subjects outside of the sponsoring department impacted by the creation/revision of this program?

Yes

Courses outside of the sponsoring department/interdisciplinary departments
ECE 534 - Random Processes
ECE 543 - Statistical Learning Theory
ECE 547 - Topics in Image Processing
ECE 549 - Computer Vision
ECE 558 - Digital Imaging
ECE 564 - Modern Light Microscopy
ECE 561 - Statistical Inference ENG & DS
ECE 569 - Inverse Problems in Optics

ECE 580 - Optimiz by Vector Space Methds

~~CS 543~~ - ~~Computer Vision~~

CS 547 - Deep Learning

ECE 544 - Topics in Signal Processing

ECE 513 - Vector Space Signal Processing

ECE 566 - Computational Inference

Please attach any letters of support/acknowledgement for any Instructional Resources consider faculty, students, and/or other impacted units as appropriate.

BIC online program support letter - ECE.pdf

CS LOS for MSBIC.pdf

Program Regulation and Assessment

Plan to Assess and Improve Student Learning

Illinois Administrative Code: 1050.30(b)(1)(D) Provision is made for guidance and counseling of students, evaluations of student performance, continuous monitoring of progress of students toward their degree objectives and appropriate academic record keeping.

List the program's student learning outcomes. Each outcome should identify what students are expected to know and/or be able to do upon completing this program.

The MS program in Biomedical Image Computing is being created to rigorously train students in biomedical imaging science and machine learning; beginning with foundational coursework that builds into a curriculum comprised of in-depth statistical and deep learning for biomedical imaging applications. The program will culminate with a capstone project in which students will develop and implement machine learning solutions to real-world problems in biomedical imaging.

Student learning objectives will be as follows:

• Ability to apply quantitative skills, engineering principles, and computational principles to propose novel and practical solutions to biomedical imaging problems
• Ability to recognize and understand professional and ethical responsibilities
• Ability to identify and communicate real-world biomedical imaging problems with bigger vision and offer solutions, as well as their impact, effectively to a diverse audience and stakeholders, both orally and in writing
• Ability to develop effective leadership skills in order to foster the ability to collaborate and work with a diverse team, which is essential for a career in either academia or industry

Student learning objectives will be assessed in a variety of ways, including:
• Coursework performance
• Presentations on capstone projects
• Capstone mentor feedback
• Progress meetings with the Program Director
• Exit interviews/survey
• Job/graduate school placement data

Students who elect to participate in the optional boot camp will take an exam at the end, strictly to determine baseline knowledge in Python programming concepts and data science tools. The results of this exam will be compared to coursework performance throughout the program, in an effort to track learning progress through the program. The capstone projects will be assessed based on the rigor of the evaluation studies and quality of the final presentation and report. The Program Director will hold mandatory advising meetings throughout the program and conduct exit interviews with each student at the end of the program. At the end of the program, students will also complete an anonymous online exit survey with questions pertaining to their level of preparation for either additional graduate study or their career. The program's governing committee, led by the Program Director, will convene at the end of each year to review the surveys and propose program modifications, if needed, based on student feedback. Job placement data will also be reviewed on an annual basis by the program committee, via responses to required Graduate College surveys and the Illini Success Survey.

This program does not involve licensure, certification, and/or entitlement requirements.

Describe how, when, and where these learning outcomes will be assessed.

Describe here:

Identify faculty expectations for students' achievement of each of the stated student learning outcomes. What score, rating, or level of expertise will signify that students have met each outcome? Provide rating rubrics as necessary.

Explain the process that will be implemented to ensure that assessment results are used to improve student learning.

Program
Description and
Requirements
Attach Documents

Is the career/profession for graduates of this program regulated by the State of Illinois?
　　　　　　　　No

Program of Study

Baccalaureate degree requires at least 120 semester credit hours or 180 quarter credit hours and at least 40 semester credit hours (60 quarter credit hours) in upper division courses" (source: https://www.ibhe.org/assets/files/PublicAdminRules2017.pdf). For proposals for new bachelor's degrees, if this minimum is not explicitly met by specifically-required 300- and/or 400-level courses, please provide information on how the upper-division hours requirement will be satisfied.

Revised programs　　[MS BIC Suggested Sequence 01272023.xlsx](#)

Attach a revised Sample Sequence (for undergraduate program) or college-level forms.

Catalog Page Text - Overview Tab

Description of program for the catalog page. This is not official content, it is used to help build the new catalog page for the program. Can be edited in the catalog by the college or department.

bioengineering.illinois.edu

Head of Department: Mark Anastasio
Associate Head of Graduate Programs: Wawrzyniec Dobrucki
MS in BIC Faculty Program Director: Fan Lam
1102 Gregory Underhill 1240 Everitt Laboratory
1406 W. Green St.
Urbana, IL 61801
(217) 333-1867
E-mail: bioe-gradprograms@illinois.edu

Major: Biomedical Image Computing
Degree Offered: M.S.

Graduate Degree Programs
The M.S. in Biomedical Image Computing blends together the fields of biomedical imaging science and machine learning. Students will receive a rigorous training in imaging systems and analysis, computational imaging, and machine learning, in preparation for an industry career.

Admission
Applicants should have a bachelor's degree in an engineering or other quantitative discipline from an accredited college or university. Students 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 imaging and machine learning through their personal statement. Students in the program do not have automatic admission to the Ph.D. program in any engineering department.

All applicants whose native language is not English must submit a minimum TOEFL score of 102 (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. 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.S. in Biomedical Image Computing are the standard Graduate and Professional Programs rates for the College of Engineering. Students in the M.S. in Biomedical Image Computing program are not eligible for tuition-waiver generating assistantships.

Statement for Programs of Study Catalog

Course List

Code	Title	Hours

Code	Title	Hours
Required Coursework		
BIOE 483	Biomedical Computed Imaging Systems	4
BIOE 484	Statistical Analysis of Biomedical Images	4
BIOE 485	Computational Mathematics for Machine Learning and Imaging	4
BIOE 486	Applied Deep Learning for Biomedical Imaging	4
BIOE 488	Applied High-Performance Computing for Imaging Science	3
BIOE 489	Regulations, Ethics and Logistics in Biomedical Applications of Machine Learning	4
BIOE 580	Foundations of Imaging Science	4
BIOE 588	Biomedical Image Computing Capstone Project Literature Review	1
BIOE 589	Biomedical Image Computing Capstone Project	4
Choose one of the following:		4
BIOE 586	Deep Generative Models in Bioimaging	
	OR	
Approved Elective Course (see below)		
Approved Elective Courses:		
Advisor Approval is required for elective courses not listed below		
BIOE 504	Analytical Methods in Bioeng	
BIOE 505	Computational Bioengineering	
BIOE 507	Advanced Bioinstrumentation	
BIOE 597	Individual Study	
CS 543	Computer Vision	
CS 547	Deep Learning	
ECE 513	Vector Space Signal Processing	
ECE 534	Random Processes	
ECE 543	Statistical Learning Theory	
ECE 544	Topics in Signal Processing	
ECE 547	Topics in Image Processing	
ECE 549	Computer Vision	
ECE 558	Digital Imaging	
ECE 561	Statistical Inference for Engineers and Data Scientists	
ECE 564	Modern Light Microscopy	
ECE 566	Computational Inference and Learning	
ECE 569	Inverse Problems in Optics	
ECE 580	Optimiz by Vector Space Methds	
Total Hours		36

Other Requirements

Course List

Code	Title	Hours
Minimum 500-level hours required overall:		12
Minimum GPA:		3.0
Minimum credit hours taken from the University of Illinois at Urbana-Champaign campus:		12
Maximum number of previous University of Illinois at Urbana-Champaign graduate-level coursework not applied to any other degree that may be transferred and applied to the major pending department and Graduate College approval.		12

Some elective courses may not be available online. Check the course schedule.

Corresponding Degree	MS Master of Science

Program Features

Academic Level	Graduate
Does this major have transcripted concentrations?	No

What is the typical time to completion of this program?
 ~~5 years~~ ~~3 Semesters~~

What are the minimum Total Credit Hours required for this program?
 36

What is the required GPA?	3.0
CIP Code	140501 - Bioengineering and Biomedical Engineering.

Is This a Teacher Certification Program?
 No

Will specialized accreditation be sought for this program?

 No

Delivery Method

This program is available:
~~On Campus - Students are required to be on campus, they may take some online courses.~~
On Campus and Online - 2 program types. Students can receive the entire program either on campus or online. Students can choose to take courses in either modality.

Describe the use of this delivery method:
 The online program will be fully online without any required on-campus component. Courses will be offered in an asynchronous format and faculty will hold scheduled online office hours.

 The on-campus program will be offered fully on-campus, with courses occurring at a singular time and date in an on-campus instructional building.

Admission Requirements

Desired Effective Admissions Term	Fall 2023

Is this revision a change to the admission status of the program?

No

Provide a brief narrative description of the admission requirements for this program. Where relevant, include information about licensure requirements, student background checks, GRE and TOEFL scores, and admission requirements for transfer students.

Applicants to the program must hold a minimum of a baccalaureate degree from an accredited college or university. Applicants will be expected to possess an undergraduate education in an engineering or other quantitative discipline. 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 serious interest in imaging and machine learning through their personal statement.

Enrollment

Describe how this revision or phase down/elimination will impact enrollment and degrees awarded. If this is an elimination/phase down proposal include the plans for the students left in the program.

We expect the creation of an online degree program option for the MS in Biomedical Image Computing degree will lead to a robust increase in enrollment, strengthening the reputation of our professional degree programs.

Estimated Annual Number of Degrees Awarded

| Year One Estimate | 0 | 5th Year Estimate (or when fully implemented) | 40 |

| What is the matriculation term for this program? | ~~Fall~~ Spring/Summer/Other |

Please give an explanation of why fall matriculation is not applicable:

Online Students may begin this program in either fall, spring, or summer. On-campus students will begin this program in the fall.

Budget

| Are there budgetary implications for this revision? | No |

Will the program or revision require staffing (faculty, advisors, etc.) beyond what is currently available?

No ~~Yes~~

Additional Budget Information

This revision to create an online program option will not require additional staffing. The current Assistant Director of M.Eng programs will advise students in this program, and existing faculty instructing the on-campus MS-BIC courses will offer an online section alongside their teaching of the on-campus sections, in the terms they are teaching on-

campus courses.

Attach File(s)

Financial Resources

How does the unit intend to financially support this proposal?

The proposal to offer an online degree program will not require additional funding beyond what has been allocated and approved for the on-campus version of this program. As described in the budget section, the unit will support the new degree through strategic hiring of faculty as supported by existing commitments from GraingerEngineering.For the first two years, while the program is ramping up, we will leverage our existing staff to support the administrative needs of theprogram.We will also work with Professor Dankowicz to leverage Grainger Engineering's Graduate Program Office shared-service staff to provide additional support asnecessary.In Year 3, using program revenue, we will hire a new staff position at the coordinatorlevel.This person would oversee the marketing, scheduling, budgeting and other day-to-day business of running theprogram.

Will the unit need to seek campus or other external resources?

No

Attach letters of support

Tuition Waiver Policy MS Biomed.pdf

What tuition rate do you expect to charge for this program? e.g, Undergraduate Base Tuition, or Engineering Differential, or Social Work Online (no dollar amounts necessary)

1ENG - ONL Engineering Rate

Are you seeking a change in the tuition rate or differential for this program?

No

Is this program requesting self-supporting status?

Yes

Faculty Resources

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

Our proposed curriculum and delivery method for the online version of BIC program will not substantially increase the teaching loads of the faculty and will not require faculty hires beyond what is required for the approved on-campus version of the degree. The class size of the on-campus and online sections combined is estimated to be approximately 40 students, which meets the goals of the proposed programs.

Library Resources

Describe your proposal's impact on the University Library's resources, collections, and services. If necessary please consult with the appropriate disciplinary specialist within the University Library.

Library collections, resources and services are sufficient to support this program.

EP Documentation

EP Control Number   EP.23.051

Attach Rollback/Approval Notices

This proposal requires HLC inquiry   No

DMI Documentation

Attach Final Approval Notices

Banner/Codebook Name   MS:Biomed Image Computing-UIUC

Program Code: 1PKS6019MS

Minor Code	Conc Code	Degree Code	Major Code
6019		MS	

Senate Approval Date

Senate Conference Approval Date

BOT Approval Date

IBHE Approval Date

HLC Approval Date

DOE Approval Date

Effective Date:

Attached Document

Justification for
this request

Program Reviewer
Comments

Mary Lowry (lowry) (02/13/23 11:50 am): Rollback: Please include the program designation form. (I'll email it to you.) And complete the tuition question under Financial Resources.
Allison McKinney (agrindly) (03/08/23 4:05 pm): Administratively approved.
Brooke Newell (bsnewell) (03/09/23 11:02 am): Rollback: per Mary request

Key: 957

First Year				
FIRST SEMESTER	**HOURS**	**SECOND SEMESTER**		**HOURS**
BIOE 485: Computational Mathematics for Machine Learning and Imaging	4	BIOE 484: Statistical Analysis of Biomedical Images		4
BIOE 483: Biomedical Computed Imaging Systems	4	BIOE 486: Applied Deep Learning for Biomedical Imaging		4
	8			8

Second Year				
THIRD SEMESTER	**HOURS**	**FOURTH SEMESTER**		**HOURS**
BIOE 489: Regulations, Ethics and Logistics in Biomedical Applications of Machine Learning	4	BIOE 580: Foundations of Imaging Science		4
BIOE 488: Applied High-Performance Computing for Imaging Science	3	BIOE 588: Capstone Project Literature Review		1
	7			5

Third Year				
FIFTH SEMESTER	**HOURS**			
BIOE 589: Capstone Project	4			
BIOE 586 Deep Generative Models in Bioimaging OR	4			
Approved Elecitve Course (see list "Approved Electives")				
	8			

Approved Electives Offered On-Campus:

Advisor Approval is required for elective courses not listed below

BIOE 504: Analytical Methods in Bioengineering
BIOE 505: Computational Bioengineering
BIOE 507: Advanced Bioinstrumentation
BIOE 597: Individual Study
CS 543: Computer Vision
CS 547: Deep Learning
ECE 513: Vector Space Signal Processing
ECE 534: Random Processes
ECE 543: Statistical Learning Theory
ECE 544: Topics in Signal Processing
ECE 547: Topics in Image Processing
ECE 549: Computer Vision
ECE 558: Digital Imaging
ECE 561: Detection & Estimation Theory
ECE 564: Modern Light Microscopy
ECE 566: Computational Inference and Learning
ECE 569: Inverse Problems in Optics
ECE 580: Optimiz by Vector Space Methds

Approved Electives Offered Online:

Advisor Approval is required for elective courses not listed below

BIOE 597: Individual Study
CS 547: Deep Learning
ECE 513: Vector Space Signal Processing
ECE 558: Digital Imaging

First Year			
FIRST SEMESTER	**HOURS**	**SECOND SEMESTER**	**HOURS**
BIOE 485: Computational Mathematics for Machine Learning and Imaging	4	BIOE 484: Statistical Analysis of Biomedical Images	4
BIOE 483: Biomedical Computed Imaging Systems	4	BIOE 486: Applied Deep Learning for Biomedical Imaging	4
BIOE 488: Applied High-Performance Computing for Imaging Science	3	BIOE 580: Foundations of Imaging Science	4
a 1-hour seminar course, BIOE 598: Advanced Topics in Biomedical Imaging Science will be offered for students who wish to maintain 12 credit hours; completion of this course is not required.	1	BIOE 588: Capstone Project Literature Review	1
	11-12		**13**

Second Year			
THIRD SEMESTER	**HOURS**		
BIOE 489: Regulations, Ethics and Logistics in Biomedical Applications of Machine Learning	4		
BIOE 589: Capstone Project	4		
BIOE 586 Deep Generative Models in Bioimaging OR	4		
Approved Elecitve Course (see list "Approved Electives")			
	12		

Approved Electives Offered On-Campus:

Advisor Approval is required for elective courses not listed below

BIOE 504: Analytical Methods in Bioengineering
BIOE 505: Computational Bioengineering
BIOE 507: Advanced Bioinstrumentation

BIOE 597: Individual Study
CS 543: Computer Vision
CS 547: Deep Learning

ECE 513: Vector Space Signal Processing
ECE 534: Random Processes
ECE 543: Statistical Learning Theory
ECE 544: Topics in Signal Processing
ECE 547: Topics in Image Processing
ECE 549: Computer Vision
ECE 558: Digital Imaging
ECE 561: Detection & Estimation Theory
ECE 564: Modern Light Microscopy
ECE 566: Computational Inference and Learning
ECE 569: Inverse Problems in Optics
ECE 580: Optimiz by Vector Space Methds

Approved Electives Offered Online:

Advisor Approval is required for elective courses not listed below
BIOE 597: Individual Study
CS 547: Deep Learning
ECE 513: Vector Space Signal Processing
ECE 558: Digital Imaging

ILLINOIS

GRADUATE COLLEGE

110 Coble Hall, MC-322
801 S. Wright St.
Champaign, IL 61820

PROGRAM TUITION WAIVER POLICY PROPOSAL

Proposals to establish or revise tuition waiver policy for a graduate program will follow a shared governance approval process (Department, School, College, Graduate College).

Definitions of Tuition Waiver Policy Designations:

Traditional Programs. Programs either designated as generating **full or base-rate** tuition waivers. Base rate waivers waives only the Resident Graduate Base tuition amount. Non-Residents or students in a program with an additional tuition differential will be responsible for the remaining portion of tuition.

Reimbursable Programs. Programs identified as programs that would be reimbursed from an appointing unit outside their academic college.

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. Students in these programs are not eligible to hold a waiver generating graduate appointment (Assistantship or Fellowship). Full time employees may be admitted to these programs, but their employee waiver is not eligible for use towards a program with this designation.

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

PROGRAM INFORMATION

COLLEGE OR SCHOOL: Grainger College of Engineering

PROGRAM(s) (Include Program Codes if applicable):
MS: Biomedical Image Computing (online)

REQUESTED DESIGNATION (Select desired designation type):

Self-Supporting

Comments:

See attached for justification

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. What type of financial assistance will be offered to students in the program?

3. Has this program had past practice of offering graduate assistantships? If so, please describe.

4. What provisions will be made to communicate the new classification to prospective and newly admitted students?

APPROVALS: (May use Adobe Signature or print and sign the document)

Department Executive Officer Signature and Date: Anastasio, Mark Digitally signed by Anastasio, Mark Date: 2023.02.17 13:21:37 -06'00'

Disciplinary College Signature and Date: Daniel J. Bodony Digitally signed by Daniel J. Bodony Date: 2023.02.16 19:03:44 -06'00'

Graduate College Signature and Date: *Allison McKinney* 3/20/23

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

- 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.

    a) This is a request to establish a new self-supporting, non-thesis, professional master's degree online program (MS in Biomedical Image Computing). The degree will provide a relevant and rigorous technical training in biomedical imaging and machine learning through a remote learning platform. It will result in highly sought-after graduates who are prepared to work in industry, as well as research organizations. The self-supporting classification for the online MS in Biomedical Image Computing program is consistent with other professional master's degree programs offer by the Department of Bioengineering.

    b) The requested classification will not adversely affect the quality of the program in any way. The curriculum has been carefully designed to provide a high value education to students. The courses will also be made available to certain advanced undergraduate and other graduate students in the Department of Bioengineering and The Grainger College of Engineering, to be taken as electives in their degree programs. The new courses that have been developed are innovative and address topics of great interest to UIUC students.

- What type of financial assistance will be offered to students in the program?

    a) This is a new online program. All students entering program will need to pay out-of-pocket tuition. No financial aid that involves state funds will be offered to students.

- Has this program had past practice of offering graduate assistantships? If so, please describe.
    a) No

- What provisions will be made to communicate the new classification to prospective and newly admitted students?

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

DEPARTMENT OF COMPUTER SCIENCE

Thomas M. Siebel Center for Computer Science
201 N. Goodwin Ave.
Urbana, IL 61801-2302   USA

NANCY M. AMATO

Abel Bliss Professor and Head
2248 Siebel Center
namato@illinois.edu

Dear Mark Anastasio,

I am writing in support of the proposed MS in Biomedical Image Computing program.

The Department of Computer Science is delighted to support the MS in Biomedical Image Computing program. A distinguishing feature of our campus is the longstanding cross-campus collaborations both in research and education, and we are excited to support initiatives such as this that continue and build on that tradition.

We will make every effort to make the proposed CS elective courses available subject to the availability of course staff and the demand for the courses by students in CS degree programs and other campus programs that we have made commitments to support.

Sincerely,

Nancy M. Amato
Abel Bliss Professor and Head
Department of Computer Science
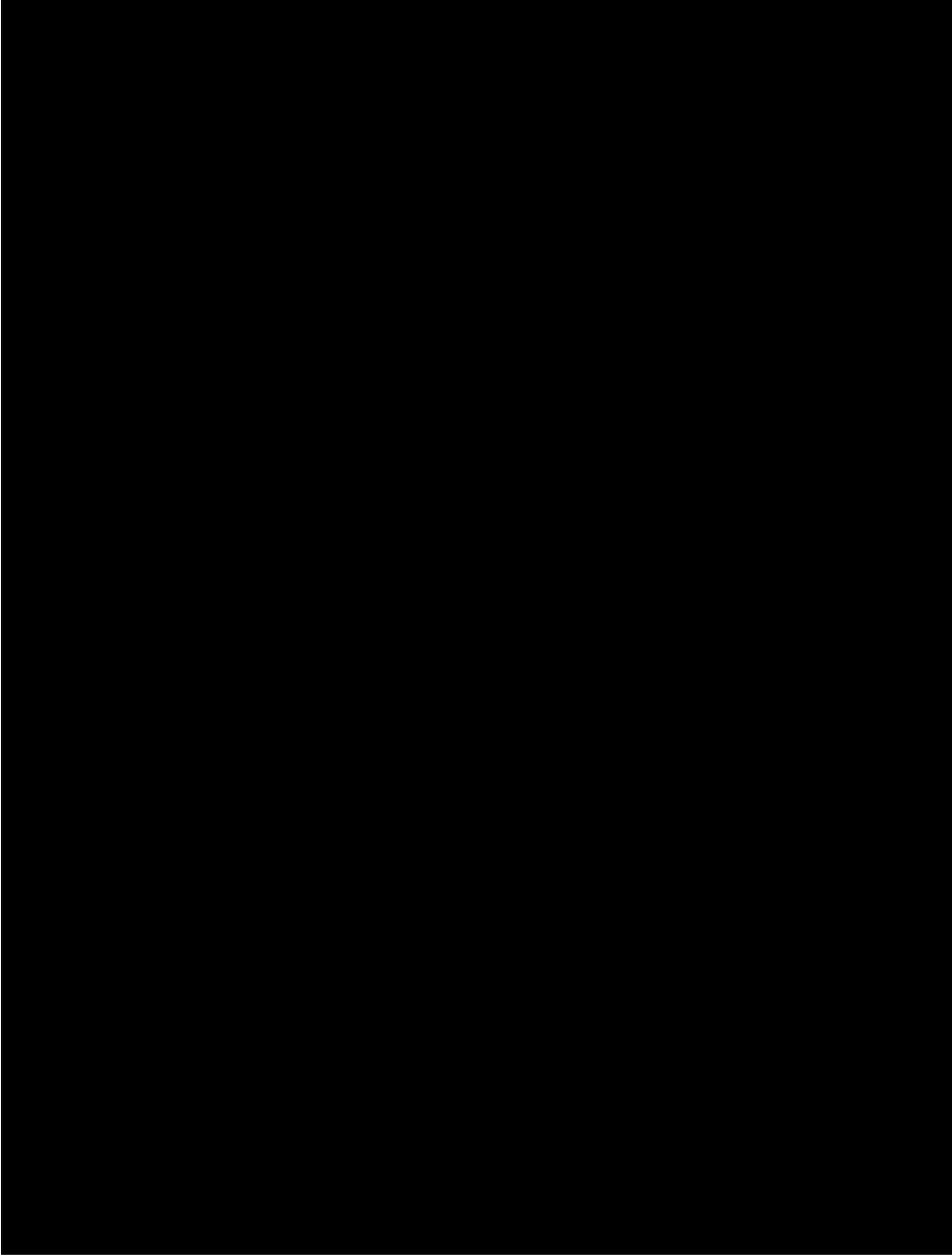
On 12/19/22 10:06 AM, Anastasio, Mark -- BIOE Department Head wrote:

Dear Nancy,

I write to request your support for a revision to our existing Master of Science in Biomedical Image Computing (MS in BIC) in the Department of Bioengineering, Grainger College of Engineering program.

Our degree revision proposal outlines the launch of an online version of our MS in BIC program. The residential, on-campus version of this program launched in Fall 2022, and we are looking to expand the program to meet anticipated student demand.

In our plan document, we request your approval of the following:
Each MS in BIC student will be permitted one-time access, subject to capacity and course availability, to CS 400- or 500-level graduate courses that are relevant to the fields of biomedical imaging, image processing, and machine learning and available as online courses. The MS in BIC graduate degree program will review your department's course offering, and we will select and pre-approve appropriate elective courses prior to student enrollment. Prerequisite, level, and other restrictions may apply.

Although our MS in BIC's online program maximum enrollment is projected at 40 students per year, because there will be several courses listed as approved electives, we anticipate fewer than 5 students per term would request enrollment in these courses offered by your department.

Technical elective coursework will allow our students to further explore their technical interest areas, and we are hopeful that your unit will be able to absorb extra students as outlined above.

An email response is sufficient and would be appreciated at your earliest convenience and no later than December 30.

Best regards,
Mark

MARK ANASTASIO
Donald Biggar Willett Professor in Engineering
Head, Department of Bioengineering
Affiliate Professor, Department of Computer Science
Affiliate Professor, Department of Electrical and Computer Engineering
Affiliate Professor, Carle Illinois College of Medicine
Member, Beckman Institute for Advanced Science and Technology

Department of Bioengineering | The Grainger College of Engineering
1406 W. Green Street | 1102G Everitt Lab, MC 278 | Urbana, IL 61801
(P) 217.300.0314 | maa@illinois.edu
https://bioengineering.illinois.edu/
Lab Website: https://anastasio.bioengineering.illinois.edu

Subject: FW: Letter of Support

Date: Wednesday, January 25, 2023 at 8:46:42 AM Central Standard Time

From: Bowman, Liezl

From: Hajek, Bruce <b-hajek@illinois.edu>
Sent: Thursday, January 5, 2023 8:40 PM
To: Anastasio, Mark -- BIOE Department Head <bioe-head@illinois.edu>
Cc: Oelze, Michael L <oelze@illinois.edu>
Subject: Re: Letter of Support

Dear Mark,

   I am happy, on behalf of ECE, to support your request, however with a caveat.   The caveat is that while we will do our best to offer courses that would be of interest, so far our online MEng offering is subcritical.   We have about 20 MEng online students, so if you reach 40 your program will be twice the size as our current program.   We do have plans to grow our program.   Michael Oelze, in his role as ECE Associate Head for Graduate Affairs has been working on it.
   Regards,
   Bruce

p.s. Sorry to have not responded sooner to this email.   I just now unburied it

---

From: "Anastasio, Mark -- BIOE Department Head" <bioe-head@illinois.edu>
Date: Monday, December 19, 2022 at 10:03 AM
To: Bruce Hajek <b-hajek@illinois.edu>
Cc: "Anastasio, Mark A" <maa@illinois.edu>
Subject: Letter of Support

Dear Bruce,

I write to request your support for a revision to our existing Master of Science in Biomedical Image Computing (MS in BIC) in the Department of Bioengineering, Grainger College of Engineering program.

Our degree revision proposal outlines the launch of an online version of our MS in BIC program. The residential, on-campus version of this program launched in Fall 2022, and we are looking to expand the program to meet anticipated student demand.

In our plan document, we request your approval of the following:

Each MS in BIC student will be permitted one-time access, subject to capacity and course availability, to ECE 400- or 500-level graduate courses that are relevant to the fields of biomedical imaging, image processing, and machine learning and available as online courses. The MS in BIC graduate degree program will review your department's course offering, and we will select and pre-approve appropriate elective courses prior to student enrollment. Prerequisite, level, and other restrictions may apply.

Although our MS in BIC's online program maximum enrollment is projected at 40 students per year,

because there will be several courses listed as approved electives, we anticipate fewer than 5 students per term would request enrollment in these courses offered by your department.

Technical elective coursework will allow our students to further explore their technical interest areas, and we are hopeful that your unit will be able to absorb extra students as outlined above. Your response as soon as possible is appreciated.

An email response is sufficient and would be appreciated at your earliest convenience and no later than December 30.

Best regards,

Mark

MARK ANASTASIO
Donald Biggar Willett Professor in Engineering
Head, Department of Bioengineering
Affiliate Professor, Department of Computer Science
Affiliate Professor, Department of Electrical and Computer Engineering
Affiliate Professor, Carle Illinois College of Medicine
Member, Beckman Institute for Advanced Science and Technology

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Lab Website: https://anastasio.bioengineering.illinois.edu

Program Change Request

Date Submitted: 02/24/23 3:19 pm

Viewing: **10KP0408BS : Bioengineering, BS**

Last approved: 04/05/22 2:01 pm

Last edit: 03/24/23 1:12 pm

Changes proposed by: Maddie Darling

Catalog Pages Using this Program	[Bioengineering, BS](#)

Proposal Type:

Approval Path

1. 02/27/23 11:57 am
   Emily Stuby (eastuby): Approved for U Program Review
2. 02/27/23 12:37 pm
   Mark Anastasio (maa): Approved for 1343 Head
3. 03/21/23 12:50 pm
   Ashley Hallock (ahallock): Approved for KP Committee Chair
4. 03/21/23 1:10 pm
   Cindy Pruitt (cpruitt): Approved for KP Dean
5. 03/24/23 9:43 am

Chris Prom (prom): Approved for University Librarian
6. 03/24/23 10:28 am
Brenda Clevenger (bmclvngr): Approved for COTE Programs
7. 03/24/23 5:12 pm
Brooke Newell (bsnewell): Approved for Provost

History

1. Dec 13, 2018 by Deb Forgacs (dforgacs)
2. Apr 9, 2019 by Deb Forgacs (dforgacs)
3. Jul 23, 2019 by Brooke Newell (bsnewell)
4. Jul 31, 2019 by Deb Forgacs (dforgacs)
5. Aug 12, 2019 by Deb Forgacs (dforgacs)
6. Jan 27, 2020 by Maddie Darling (darling4)
7. Apr 2, 2020 by Maddie Darling (darling4)
8. Apr 16, 2021 by Maddie Darling (darling4)
9. Oct 8, 2021 by Brooke Newell (bsnewell)
10. Apr 5, 2022 by Maddie Darling (darling4)

Major (ex. Special Education)

This proposal is
for a:
  Revision

Administration Details

Official Program Name	Bioengineering, BS
Diploma Title	
Sponsor College	Grainger College of Engineering
Sponsor Department	Bioengineering
Sponsor Name	Maddie Darling
Sponsor Email	darling4@illinois.edu
College Contact	Jonathan Makela

College Contact Email

jmakela@illinois.edu

College Budget Officer	Tessa Hile
College Budget Officer Email	tmhile@illinois.edu

List the role for rollbacks (which role will edit the proposal on questions from EPC, e.g., Dept Head or Initiator) and/or any additional stakeholders. Purpose: List here who will do the editing work if proposal needs rolled back. And any other stakeholders.

~~Brooke Newell (bsnewell@illinois.edu), GCOE;~~ Maddie Darling (darling4@illinois.edu), BIOE

Does this program have inter-departmental administration?
No

Proposal Title

Effective Catalog Term   Fall 2023

Proposal Title (either Establish/Revise/Eliminate the Degree Name in Program Name in the College of XXXX, i.e., Establish the Bachelor of Science in Entomology in the College of Liberals Art and Sciences, include the Graduate College for Grad Programs)

Revise the Bachelor of Science in Bioengineering in the Grainger College of Engineering

Does this proposal have any related proposals that will also be revised during the next 6 weeks? Consider Majors, Minors, Concentrations & Joint Programs in your department. Please know that this information is used administratively to move related proposals through workflow efficiently. Example: If you are revising the BS proposal and one related concentration within the next 6 weeks, "This BS proposal (key 567) is related to the Concentration A proposal (key 145)."

Program Justification

Provide a brief description of what changes are being made to the program.

Revising the BS-BIOE to remove BIOE 435 and BIOE 436 as required courses and replacing them with BIOE 400 as required. Recording LOTE in the suggested semester sequence, removing 4 free elective hours in its place. These revisions to the degree program have a net zero hour change in total program hours (128).

The 40 hours of upper-division classes for IBHE requirement are met by:
• 26 hours of 300 & 400 level classes individually specified in the Bioengineering Technical Core
• 15 hours of 200 level coursework with 2 or more prerequisites in Foundational Mathematics and Science
o MATH 241 (4 credit hours) - prerequisites of MATH 231 and MATH 220 or 221
o MATH 285 (3 credit hours) - prerequisites of MATH 241, MATH 231 and MATH 220 or 221
o PHYS 211 (4 credit hours) - prerequisites of MATH 231 and MATH 220 or 221
o PHYS 212 (4 credit hours) - prerequisites of PHYS 211, MATH 241, MATH 231 and MATH 220 or 221

Did the program content change 25% or more in relation to the total credit hours, since the 2020-2021 catalog. (http://catalog.illinois.edu/archivedacademiccatalogs/2020-2021/)

No

Why are these changes necessary?

BIOE 435 and 436 are being removed from the curriculum and replaced by a single 4-credit hour version of senior design, BIOE 400. BIOE 400 will replace the two distinct courses, BIOE 435 and 436, and operate as a single senior design capstone experience course. Beginning in Fall 2020, Bioengineering began offering BIOE 435 and 436 (Senior Design 1 and 2) in one semester compared to the previous model, which offered BIOE 435 in the fall and BIOE 436 in the spring, drawing the senior design capstone course to occur over the course of one academic year. Throughout the past two years while offering senior design as a one-semester experience, we have realized several benefits. Student project teams have a higher degree of contact with instructional staff due to smaller course sizes (half of the students take design in the fall, half in the spring), a one-term offering allows for more effective use of resources and instructional course design space, and meets course learning objectives per ABET assessment guidelines in one term, compared to over the course of one year. This modification updates our BS-BIOE curriculum to the current curricula offered.

Language Other Than English (LOTE) is being included in the suggested sequence, per campus requirements. 4 hours of free electives have been removed to accomodate for the inclusion of 4 hours of LOTE in the suggested sequence.

Instructional Resources

Will there be any reduction in other course offerings, programs or concentrations by your department as a result of this new program/proposed change?

No

Does this new program/proposed change result in the replacement of another program?

No

Does the program include other courses/subjects outside of the sponsoring department impacted by the creation/revision of this program?

No

Program Regulation and Assessment

Plan to Assess and Improve Student Learning

Illinois Administrative Code: 1050.30(b)(1)(D) Provision is made for guidance and counseling of students, evaluations of student performance, continuous monitoring of progress of students toward their degree objectives and appropriate academic record keeping.

List the program's student learning outcomes. Each outcome should identify what students are expected to know and/or be able to do upon completing this program.

Below in Table 4.1, we show the process by which we continuously improve our program and student learning. Data is collected and evaluated every 3 years, allowing for the program to make and assess changes in program curriculum, advising processes, and the assessment process itself.

Table 4.1 Outcomes Review Cycle

Collect data for analysis on all outcomes Every 3 years
(2012-2013, 2015-2016, 2018-2019) Assessment Lead Directs Faculty to Collect

Assess data and recommend action items for all outcomes Every 3 years
(2012-2013, 2015-2016, 2018-2019) Assessment Lead and Curriculum committee

Monitoring of changes and action items Reviewed annually at retreats All faculty

Monitoring of changes and action items Discussed at committee meetings (ongoing) Curriculum committee

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Program outcomes and learning objectives:
The Bioengineering Program prepares graduates to achieve the following student outcomes by the time of graduation:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. an ability to communicate effectively with a range of audiences.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Table 4.1 above addresses the process to ensure assessment results are used to improve student learning, in accordance with our accrediting board, ABET.

Describe how, when, and where these learning outcomes will be assessed.

Describe here:

Identify faculty expectations for students' achievement of each of the stated student learning outcomes. What score, rating, or level of expertise will signify that students have met each outcome? Provide rating rubrics as necessary.

Explain the process that will be implemented to ensure that assessment results are used to improve student learning.

Program Description and Requirements Attach Documents	
Is the career/profession for graduates of this program regulated by the State of Illinois?	No

---

Program of Study

Baccalaureate degree requires at least 120 semester credit hours or 180 quarter credit hours and at least 40 semester credit hours (60 quarter credit hours) in upper division courses" (source: https://www.ibhe.org/assets/files/PublicAdminRules2017.pdf). For proposals for new bachelor's degrees, if this minimum is not explicitly met by specifically-required 300- and/or 400-level courses, please provide information on how the upper-division hours requirement will be satisfied.

Revised programs	AY 23-24 revision Sample Sequence(with LOTE)3.xlsx
Attach a revised Sample Sequence (for undergraduate program) or college-level forms.	

Catalog Page Text - Overview Tab

Description of program for the catalog page. This is not official content, it is used to help build the new catalog page for the program. Can be edited in the catalog by the college or department.

Statement for Programs of Study Catalog

Graduation Requirements
Minimum Overall GPA: 2.0
Minimum hours required for graduation: 128 hours, to include a minimum of 40 hours of upper-division coursework generally at the 300 and/or 400 level.
General education: ~~128 hours Generaleducation:~~Students must complete the Campus General Education requirements including the campus general education language requirement.
Orientation and Professional Development ~~Foundational Mathematics and ScienceBioengineering Technical CoreTrack ElectivesFree Electives~~

Course List

Code	Title	Hours
ENG 100	Grainger Engineering Orientation Seminar (External transfer students take ENG 300.)	1
BIOE 100	Bioengineering Seminar	1
BIOE 120	Introduction to Bioengineering	1
Total Hours		3

Foundational Mathematics and Science

Code	Title	Hours
CHEM 102	General Chemistry I	3
CHEM 103	General Chemistry Lab I	1
CHEM 104	General Chemistry II	3
CHEM 105	General Chemistry Lab II	1
MATH 221	Calculus I (MATH 220 may be substituted. MATH 220 is appropriate for students with no background in calculus. 4 of 5 credit hours count towards degree.)	4
MATH 231	Calculus II	3
MATH 241	Calculus III	4
MATH 285	Intro Differential Equations	3
PHYS 211	University Physics: Mechanics	4
PHYS 212	University Physics: Elec & Mag	4
Total Hours		30

Bioengineering Technical Core

Course List

Code	Title	Hours
BIOE 201	Conservation Principles Bioeng	3
BIOE 202	Cell & Tissue Engineering Lab	2
BIOE 205	Signals & Systems in Bioengrg	3
BIOE 206	Cellular Bioengineering	3
BIOE 210	Linear Algebra for Biomedical Data Science	3
BIOE 302	Modeling Human Physiology	3
BIOE 303	Quantitative Physiology Lab	2
BIOE 310	Computational Tools for Biological Data	3
BIOE 360	Transport & Flow in Bioengrg	3
BIOE 400	Bioengineering Senior Design	4
BIOE 414	Biomedical Instrumentation	3
BIOE 415	Biomedical Instrumentation Lab	2
BIOE 420	Intro Bio Control Systems	3
BIOE 435	Senior Design I	2
BIOE 436	Senior Design II	2
BIOE 476	Tissue Engineering	3
CHEM 232	Elementary Organic Chemistry I	4
CS 101	Intro Computing: Engrg & Sci (CS 124 may be taken instead of CS 101.)	3
MCB 150	Molec & Cellular Basis of Life	4
Total Hours		51

Track Electives

Course List

Code	Title	Hours
Students are required to complete 15 hours of credit from one track area listed below.		15
Biomechanics Track		
Required courses:		
TAM 211	Statics	3
TAM 212	Introductory Dynamics	3
TAM 251	Introductory Solid Mechanics	3
Select the remaining 6 hours from the below list:		
BIOE 461	Cellular Biomechanics	4

Code	Title	Hours
BIOE 498	Special Topics (Experimental Design in Automation)	3
BIOE 498	Special Topics (Finite Element Methods in Biomedicine)	3
BIOE 498	Special Topics (Quantitative Pharmacology)	3
BIOE 498	Special Topics (Regulatory Safety Issues in Bioengineering)	3
BIOE 498	Special Topics (Surgical Techniques)	3
ME 330	Engineering Materials	4
ME 481	Whole-Body Musculoskel Biomech	3
ME 482	Musculoskel Tissue Mechanics	3
ME 483	Mechanobiology	4
NPRE 461	Probabilistic Risk Assessment	3
SE 402	Comp-Aided Product Realization	3
SE 423	Mechatronics	3
TAM 445	Continuum Mechanics	4
TMGT 461	Tech, Eng, & Mgt Final Project	4
Recommended free elective:		
SE 101	Engineering Graphics & Design	3

Cell and Tissue Engineering Track

Select 15 hours from the list below:

Code	Title	Hours
BIOE 306	Biofabrication Lab	3
BIOE 416	Biosensors	3
BIOE 430	Intro Synthetic Biology	3
BIOE 460	Gene Editing Lab	3
BIOE 461	Cellular Biomechanics	4
BIOE 487	Stem Cell Bioengineering	3
BIOE 498	Special Topics (Experimental Design in Automation)	3
BIOE 498	Special Topics (Finite Element Methods in Biomedicine)	3
BIOE 498	Special Topics (Immunoengineering)	3
BIOE 498	Special Topics (Preclinical Molecular Imaging)	3
BIOE 498	Special Topics (Quantitative Pharmacology)	3
BIOE 498	Special Topics (Regulatory Safety Issues in Bioengineering)	3
BIOE 498	Special Topics (Systems Biology)	3
CHBE 471	Biochemical Engineering	3
CHBE 472	Techniques in Biomolecular Eng	3
IE 330	Industrial Quality Control	3
MSE 404	Laboratory Studies in Materials Science and Engineering	1.5
MSE 470	Design and Use of Biomaterials	3
MSE 474	Biomaterials and Nanomedicine	3
ME 483	Mechanobiology	4
TMGT 461	Tech, Eng, & Mgt Final Project	4
Recommended free elective		
MCB 450	Introductory Biochemistry	3

Therapeutics Engineering Track

Select 15 hours from the list below:

Code	Title	Hours
ABE 446	Biological Nanoengineering	3
BIOE 306	Biofabrication Lab	3
BIOE 430	Intro Synthetic Biology	3
BIOE 460	Gene Editing Lab	3

Code	Title	Hours
BIOE 479	Cancer Nanotechnology	3
BIOE 498	Special Topics (Experimental Design in Automation)	3
BIOE 498	Special Topics (Immunoengineering)	3
BIOE 498	Special Topics (Preclinical Molecular Imaging)	3
BIOE 498	Special Topics (Quantitative Pharmacology)	3
BIOE 498	Special Topics (Regulatory Safety Issues in Bioengineering)	3
BIOE 498	Special Topics (Surgical Technologies)	3
BIOE 498	Special Topics (Systems Biology)	3
BIOE 498	Special Topics (Technologies for Cancer Diagnosis and Therapy)	3
CHBE 472	Techniques in Biomolecular Eng	3
ECE 481	Nanotechnology	4
MSE 403	Synthesis of Materials	3
MSE 404	Laboratory Studies in Materials Science and Engineering	1.5
MSE 450	Polymer Science & Engineering	3
MSE 457	Polymer Chemistry	3 or 4
MSE 470	Design and Use of Biomaterials	3
MSE 473	Biomolecular Materials Science	3
MSE 474	Biomaterials and Nanomedicine	3
MSE 480	Surfaces and Colloids	3
TMGT 461	Tech, Eng, & Mgt Final Project	4

Computational and Systems Biology Track

Required courses:

Code	Title	Hours
CS 128	Introduction to Computer Science II	3
CS 225	Data Structures	4

Select the remaining 8 hours from the list below:

Code	Title	Hours
ABE 440	Applied Statistical Methods I	4
BIOE 483	Biomedical Computed Imaging Systems	3
BIOE 484	Statistical Analysis of Biomedical Images	3
BIOE 485	Computational Mathematics for Machine Learning and Imaging	4
BIOE 486	Applied Deep Learning for Biomedical Imaging	3
BIOE 430	Intro Synthetic Biology	3
BIOE 498	Special Topics (Experimental Design in Automation)	3
BIOE 498	Special Topics (Finite Element Methods in Biomedicine)	3
BIOE 498	Special Topics (Regulatory Safety Issues in Bioengineering)	3
BIOE 498	Special Topics (Systems Biology)	3
CS 411	Database Systems	3
CS 412	Introduction to Data Mining	3
CS 440	Artificial Intelligence	3
CS 446	Machine Learning	3 or 4
CS 465	User Interface Design	4
CS 466	Introduction to Bioinformatics	3
CS 498	Special Topics (Intro to Deep Learning)	3
ECE 490	Introduction to Optimization	3
ECE 498	Special Topics in ECE (Deep Learning in Hardware)	3
IE 310	Deterministic Models in Optimization	3
IE 370	Stochastic Processes and Applications	3
NPRE 461	Probabilistic Risk Assessment	3 or 4

Code	Title	Hours
SE 423	Mechatronics	3
TMGT 461	Tech, Eng, & Mgt Final Project	4

Imaging and Sensing Track

Required courses:

Code	Title	Hours
ECE 210	Analog Signal Processing	4
ECE 329	Fields and Waves I	3

Select the remaining 8 hours from the list below:

Code	Title	Hours
BIOE 498	Special Topics (Experimental Design in Automation)	3
BIOE 484	Statistical Analysis of Biomedical Images	3
BIOE 486	Applied Deep Learning for Biomedical Imaging	3
BIOE 498	Special Topics (Immunoengineering)	3
BIOE 498	Special Topics (Preclinical Molecular Imaging)	3
BIOE 498	Special Topics (Quantitative Pharmacology)	3
BIOE 498	Special Topics (Regulatory Safety Issues in Bioengineering)	3
BIOE 498	Special Topics (Surgical Techniques)	3
BIOE 498	Special Topics (Systems Biology)	3
BIOE 498	Special Topics (Technologies for Cancer Diagnosis and Therapy)	3
ECE 310	Digital Signal Processing	3
ECE 311	Digital Signal Processing Lab	1
ECE 365	Data Science and Engineering	3
ECE 380	Biomedical Imaging	3
ECE 416	Biosensors	3
ECE 417	Multimedia Signal Processing	4
ECE 418	Image & Video Processing	4
ECE 437	Sensors and Instrumentation	3
ECE 365	Data Science and Engineering	3
ECE 460	Optical Imaging	4
ECE 467	Biophotonics	3
ECE 472	Biomedical Ultrasound Imaging	3
ECE 473	Fund of Engrg Acoustics	3
ECE 480	Magnetic Resonance Imaging	3
ME 487	MEMS-NEMS Theory & Fabrication	4
NPRE 461	Probabilistic Risk Assessment	3
SE 423	Mechatronics	3
TMGT 461	Tech, Eng, & Mgt Final Project	4

Recommended Free Elective

Code	Title	Hours
CHEM 442	Physical Chemistry I	4

Free Electives

Course List

Code	Title	Hours
Additional coursework, subject to the Grainger College of Engineering restrictions to Free Electives, so that there are at least 128 credit hours earned toward the degree.		9
Total Hours of Curriculum to Graduate		128

Corresponding Degree	BS Bachelor of Science

Program Features

Academic Level   Undergraduate

Does this major
have transcripted   No
concentrations?

What is the typical time to completion of this program?
  4 years

What are the minimum Total Credit Hours required for this program?
  128

CIP Code   140501 - Bioengineering and Biomedical
Engineering.

Is This a Teacher Certification Program?
                   No

Will specialized accreditation be sought for this program?

  No

Delivery Method

This program is
available:
  On Campus - Students are required to be on campus, they may take some online courses.

Admission Requirements

Desired Effective
Admissions Term

Is this revision a change to the admission status of the program?

  No

Provide a brief narrative description of the admission requirements for this program. Where relevant,
include information about licensure requirements, student background checks, GRE and TOEFL scores, and
admission requirements for transfer students.

  No changes

Enrollment

Describe how this revision or phase down/elimination will impact enrollment and degrees awarded. If this is
an elimination/phase down proposal include the plans for the students left in the program.
            There will be no impact to the enrollment or degrees awarded.

Estimated Annual Number of Degrees Awarded

Year One Estimate	5th Year Estimate (or when fully implemented)

What is the matriculation term for this program?	Fall

Budget

Are there budgetary implications for this revision?	No

Will the program or revision require staffing (faculty, advisors, etc.) beyond what is currently available?

No

Additional Budget Information

Attach File(s)

Financial Resources

How does the unit intend to financially support this proposal?

No changes

Will the unit need to seek campus or other external resources?

No

Attach letters of support

What tuition rate do you expect to charge for this program? e.g, Undergraduate Base Tuition, or Engineering Differential, or Social Work Online (no dollar amounts necessary)

Are you seeking a change in the tuition rate or differential for this program?

No

Faculty Resources

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

This change will not result in any changes in numbers of faculty. Bioengineering senior design has previously been offered as a two-term course (435 and 436), which resulted in all 100 bioengineering students enrolling in BIOE 435 (fall) and BIOE 436 (spring) for a total class size of 100 students per class. Bioengineering senior design (BIOE 400) will now be offered in both fall and spring, as a one-term course. We expect to see even enrollments between fall and spring (50 and 50) resulting in a smaller senior design course in the fall, compared to previous years where all students were required to take the course in the fall.

Library Resources

Describe your proposal's impact on the University Library's resources, collections, and services. If necessary please consult with the appropriate disciplinary specialist within the University Library.

Library collections, resources and services are sufficient to support this program.

EP Documentation

EP Control
Number

Attach
Rollback/Approval
Notices

This proposal   No
requires HLC
inquiry

DMI Documentation

Attach Final
Approval Notices

Banner/Codebook   BS:Bioengineering - UIUC
Name

Program Code: 10KP0408BS

Minor Code	Conc Code	Degree Code	BS	Major Code
0408				

Senate Approval
Date

Senate
Conference
Approval Date

BOT Approval Date	
IBHE Approval Date	
HLC Approval Date	
DOE Approval Date	
Effective Date:	
Attached Document Justification for this request	
Program Reviewer Comments	**Brooke Newell (bsnewell) (11/11/22 11:09 am):** Rollback: Email sent to Maddie **Brooke Newell (bsnewell) (11/30/22 2:29 pm):** Rollback: . **Ashley Hallock (ahallock) (02/21/23 1:18 pm):** Rollback: Per Dept request - see email 2/21/23 **Brooke Newell (bsnewell) (02/23/23 10:16 am):** Rollback: Email sent to Maddie, Mike, and Ashley **Brooke Newell (bsnewell) (03/24/23 1:09 pm):** Received permission to add "to include a minimum of 40 hours of upper-division coursework generally at the 300 and/or 400 level" to the Program of Study table from the sponsor and college via email.

Key: 112

First Year			
FIRST SEMESTER	**HOURS**	**SECOND SEMESTER**	**HOURS**
BIOE 100	1	BIOE 120	1
CHEM 102	3	CHEM 104	3
CHEM 103	1	CHEM 105	1
MATH 221 (MATH 220 may be substituted. MATH 220 is appropriate for students with no background in calculus. 4 of 5 credit hours count towards degree.)	4	MATH 231	3
ENG 100 (External transfer students take ENG 300.)	1	PHYS 211	4
Composition I or MCB 150	4	MCB 150 or Composition I course	4
General Education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)	3		
Total Hours:	**17**		**16**
Second Year			
FIRST SEMESTER	**HOURS**	**SECOND SEMESTER**	**HOURS**
BIOE 201	3	BIOE 202	2
BIOE 206	3	BIOE 205	3
MATH 241	4	BIOE 210	3
PHYS 212	4	MATH 285	3
CS 101 (CS 124 may be taken instead of CS 101.)	3	CHEM 232	4
Total Hours:	**17**		**15**
Third Year			
FIRST SEMESTER	**HOURS**	**SECOND SEMESTER**	**HOURS**
BIOE 302	3	BIOE 310	3
BIOE 303	2	BIOE 360	3
BIOE 476	3	BIOE 414	3
Track Elective	3	BIOE 415	2
General Education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)	3	Track Elective	3
		Language Other Than English (3rd level)	4
Total Hours:	**14**		**18**
Fourth Year			
FIRST SEMESTER	**HOURS**	**SECOND SEMESTER**	**HOURS**
BIOE 400 or Free Elective	4	Free Elective or BIOE 400	4
Track Elective	3	BIOE 420	3
Track Elective	3	Track Elective	3
General Education course (General Education course (choose a Humanities or Social/Behavioral Science course that is also Advanced Composition)	3	Free Elective	3
Free Elective	2	General Education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)	3
Total Hours:	**15**		**16**

Program Hours: 128