

10KP0408BS: BIOENGINEERING, BS

Completed Workflow

1. U Program Review (dforgacs@illinois.edu; eastuby@illinois.edu; aledward@illinois.edu)
2. 1343 Head (maa@illinois.edu; gunderhi@illinois.edu; smi@illinois.edu)
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6. Provost (kmartens@illinois.edu)
7. Senate EPC (bjlehman@illinois.edu)
8. Senate (jtempel@illinois.edu)
9. U Senate Conf (none)

Approval Path

1. Tue, 15 Oct 2019 21:19:55 GMT
Deb Forgacs (dforgacs): Approved for U Program Review
2. Tue, 15 Oct 2019 22:38:56 GMT
Greg Underhill (gunderhi): Approved for 1343 Head
3. Wed, 13 Nov 2019 13:54:30 GMT
Brooke Newell (bsnewell): Approved for KP Committee Chair
4. Wed, 13 Nov 2019 16:35:40 GMT
Candy Deaville (candyd): Approved for KP Dean
5. Wed, 13 Nov 2019 17:58:48 GMT
John Wilkin (jpwilkin): Approved for University Librarian
6. Thu, 14 Nov 2019 14:57:00 GMT
Kathy Martensen (kmartens): Approved for Provost
7. Tue, 19 Nov 2019 15:01:01 GMT
Barbara Lehman (bjlehman): Approved for Senate EPC
8. Tue, 10 Dec 2019 19:34:25 GMT
Jennifer Roether (jtempel): Approved for Senate
9. Mon, 27 Jan 2020 23:29:18 GMT
Kathy Martensen (kmartens): Approved for U Senate Conf

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)

Date Submitted: Thu, 30 Jan 2020 15:23:30 GMT

Viewing: 10KP0408BS : Bioengineering, BS

Changes proposed by: Maddie Darling

Proposal Type

Proposal Type:

Major (ex. Special Education)

This proposal is for a:

Revision

Proposal Title:

if this proposal is one piece of a multi-element change please include the other impacted programs here. *example: A BS revision with multiple concentration revisions*

Revising how general education requirements are shown; revising how free and liberal education electives are shown. This could not be part of the bulk degree program revisions because they were in workflow at the time. Revising the Programs of Study Catalog section to include additional track electives that students can now take as part of the program. Including information about program regulation and assessment.

EP Control Number

EP:20.133

Official Program Name

Bioengineering, BS

Effective Catalog Term

Fall 2020

Sponsor College

Grainger College of Engineering

Sponsor Department

Bioengineering

Sponsor Name

Maddie Darling

Sponsor Email

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Program Description and Justification

Justification for proposal change:

These minor changes are to clarify the requirements for the degree program for students. The addition to track electives under programs of study is to include additional courses the department has approved students to take in their focus (track) areas. Updating the program regulation and assessment to reflect current practices.

Corresponding Degree

BS Bachelor of Science

Is this program interdisciplinary?

No

Academic Level

Undergraduate

CIP Code

140501 - Bioengineering and Biomedical Engineering.

Is This a Teacher Certification Program?

No

Will specialized accreditation be sought for this program?

No

Admission Requirements

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

Describe how critical academic functions such as admissions and student advising are managed.

No changes

Enrollment

Describe how this revision will impact enrollment and degrees awarded.

No changes

Estimated Annual Number of Degrees Awarded

What is the matriculation term for this program?

Fall

Delivery Method

Is this program available on campus and online?

No

This program is available:

On Campus

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

Resource Implications

Facilities

Will the program require new or additional facilities or significant improvements to already existing facilities?

No

Technology

Will the program need additional technology beyond what is currently available for the unit?

No

Non-Technical Resources

Will the program require additional supplies, services or equipment (non-technical)?

No

Resources

Faculty Resources

Please address the impact on faculty resources including any changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc. Describe how the unit will support student advising, including job placement and/or admission to advanced studies.

No changes

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.

No changes

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 impacted by the creation/revision of this program?

No

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

Will an existing tuition rate be used or continue to be used for this program?

Yes

Program Regulation and Assessment

Briefly describe the plan to assess and improve student learning, including the program's learning objectives; when, how, and where these learning objectives will be assessed; what metrics will be used to signify student's achievement of the stated learning objectives; and the process to ensure assessment results are used to improve student learning. (Describe how the program is aligned with or meets licensure, certification, and/or entitlement requirements, if applicable).

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

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.

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/PrivateAdminRules2017.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.

All proposals must attach the new or revised version of the Academic Catalog program of study entry. Contact your college office if you have questions.

Attach a side-by-side comparison with the existing program AND, if the revision references or adds “chosed-from” lists of courses students can select from to fulfill requirements, a listing of these courses, including the course rubric, number, title, and number of credit hours.

Catalog Page Text

Statement for Programs of Study Catalog

Graduation Requirements

Minimum Technical GPA (<https://wiki.illinois.edu/wiki/display/ugadvise/Degree+Requirements/#DegreeRequirements-TechnicalGPAREquirement>):**2.0**

TGPA is required for Math, Engineering, and Science courses. See **Technical GPA** to clarify requirements.

Minimum Overall GPA:2.0

Minimum hours required for graduation:128 hours

General education:Students must complete the Campus General Education (<https://courses.illinois.edu/gened/DEFAULT/DEFAULT>) requirements including the campus general education language requirement.

Orientation and Professional Development

Code	Title	Hours
ENG 100	Engineering Orientation	0
BIOE 100	Bioengineering Freshman Seminar	1
BIOE 120	Introduction to Bioengineering	1
Total Hours		2

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 ¹	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

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	Comp Tools Bio Data	3
BIOE 360	Transport & Flow in Bioengrg	3
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 ²	4
CS 101	Intro Computing: Engrg & Sci	3
MCB 150	Molec & Cellular Basis of Life	4
Total Hours		51

Track Electives

Code	Title	Hours
Track electives selected from a departmentally approved list of track elective courses below. Alternately a student may devise a special track and set of courses which must be approved by the Bioengineering Department.		15

Biomechanics Track

List of Pre-Approved Biomechanics Track Required Courses

TAM 211	Statics	3
TAM 212	Introductory Dynamics	3
TAM 251	Introductory Solid Mechanics	3

List of Pre-Approved Biomechanics Electives to choose remaining hours from:

BIOE 461	Cellular Biomechanics	4
BIOE 498	Special Topics (Surgical Techniques)	3
BIOE 498	Special Topics (Finite Element Methods in Biomedicine)	3
BIOE 498	Special Topics (Experimental Design in Automation)	3
ME 330	Engineering Materials	4
ME 481	Whole-Body Musculoskel Biomech	3
ME 482	Musculoskel Tissue Mechanics	3
ME 483	Mechanobiology	4
NPRE 498	Special Topics (Advanced Risk Analysis)	3
SE 402	Comp-Aided Product Realization	3
SE 423	Mechatronics	3
TAM 445	Continuum Mechanics	4
TMGT 461	Tech, Eng, & Mgt Final Project	2
Pre-Approved Biomechanics Track recommended free elective		
SE 101	Engineering Graphics & Design	3

Cell and Tissue Engineering Track

BIOE 306	Biofabrication Lab	3
BIOE 416	Biosensors	3
BIOE 424	Modeling for Angiogenesis	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 (Finite Element Methods in Biomedicine)	3
BIOE 498	Special Topics (Immunoengineering)	3
BIOE 498	Special Topics (Experimental Design in Automation)	3
BIOE 498	Special Topics (Systems Biology)	3
BIOE 498	Special Topics (Preclinical Molecular Imaging)	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	2
Recommended Free Elective		
MCB 450	Introductory Biochemistry	3
Therapeutics Engineering Track		
ABE 446	Biological Nanoengineering	3
BIOE 306	Biofabrication Lab	3
BIOE 424	Modeling for Angiogenesis	3
BIOE 430	Intro Synthetic Biology	3
BIOE 460	Gene Editing Lab	3
BIOE 477	Imaging and Therapeutic Probes	3
BIOE 479	Cancer Nanotechnology	3
BIOE 498	Special Topics (Preclinical Molecular Imaging)	3
BIOE 498	Special Topics (Immunoengineering)	3
BIOE 498	Special Topics (Technologies for Cancer Diagnosis and Therapy)	3
BIOE 498	Special Topics (Surgical Technologies)	3
BIOE 498	Special Topics (Experimental Design in Automation)	3
BIOE 498	Special Topics (Systems Biology)	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 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	2
Computational and Systems Biology Track		
CS 101	Intro Computing: Engrg & Sci (CS 125 may be taken instead of CS 101. Student must complete curriculum modification form with department advisor)	3
ABE 440	Applied Statistical Methods I	4
BIOE 424	Modeling for Angiogenesis	3
BIOE 430	Intro Synthetic Biology	3
BIOE 498	Special Topics (Finite Element Methods in Biomedicine)	3
BIOE 498	Special Topics (Experimental Design in Automation)	3
BIOE 498	Special Topics (Systems Biology)	3
CS 225	Data Structures	4
CS 398	Special Topics (Deep Learning)	3
CS 411	Database Systems	3
CS 412	Introduction to Data Mining	3
CS 440	Artificial Intelligence	3
CS 465	User Interface Design	3
CS 466	Introduction to Bioinformatics	3
ECE 490	Introduction to Optimization	3
IE 310	Deterministic Models in Optimization	3
IE 370	Stochastic Processes and Applications	3
NPRE 461	Probabilistic Risk Assessment	3 or 4
NPRE 498	Special Topics (Advanced Risk Analysis)	3
SE 423	Mechatronics	3
TMGT 461	Tech, Eng, & Mgt Final Project	2
Imaging and Sensing		

ECE 210	Analog Signal Processing	4
ECE 329	Fields and Waves I	3
and select remaining hours from:		
BIOE 477	Imaging and Therapeutic Probes	3
BIOE 498	Special Topics (Surgical Techniques)	3
BIOE 498	Special Topics (Preclinical Molecular Imaging)	3
BIOE 498	Special Topics (Immunoengineering)	3
BIOE 498	Special Topics (Technologies for Cancer Diagnosis and Therapy)	3
BIOE 498	Special Topics (Experimental Design in Automation)	3
BIOE 498	Special Topics (Systems Biology)	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 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 498	Special Topics (Advanced Risk Analysis)	3
SE 423	Mechatronics	3
TMGT 461	Tech, Eng, & Mgt Final Project	2
Recommended Free Elective		
CHEM 442	Physical Chemistry I	4

Electives

Code	Title	Hours
Free Electives		
	The Grainger College of Engineering Liberal Education course list, or additional courses from the campus General Education lists for Social and Behavioral Sciences or Humanities and the Arts. ³	6
	Free electives. Additional unrestricted course work, subject to certain exceptions as noted by the College, so that there are at least 128 credit hours earned toward the degree. ⁴	8
Total Hours of Curriculum to Graduate		128

¹ MATH 220 may be substituted, with four of the five credit hours applying toward the degree. MATH 220 is appropriate for students with no background in calculus.

² May be taken for 3 or 4 credit hours; the extra hour may be used to help meet free elective requirements.

³ The Grainger College of Engineering approved liberal education course list can be found here (<https://wiki.illinois.edu/wiki/display/ugadvice/Degree+Requirements/#DegreeRequirements-GeneralEducationElectives>). Note that these credit hours could carry the required cultural studies designation required for campus general education requirements.

⁴ The Grainger College of Engineering restrictions to free electives can be found here (<https://wiki.illinois.edu/wiki/display/ugadvice/Degree+Requirements/#DegreeRequirements-FreeElectives>).

EP Documentation

DMI Documentation

Banner/Codebook Name

BS:Bioengineering - UIUC

Program Code:

10KP0408BS

Degree Code

BS

Major Code

0408

Program Reviewer Comments

Deb Forgacs (dforgacs) (Thu, 06 Feb 2020 14:39:01 GMT):The KP UG Committee Chair role was incorrect in this workflow. I had to approve to move it out of that step in workflow.

Key: 112