

Cover Sheet: Request 12232

Biomedical Engineering - Reducing Credits

Info

Process	Degree Change Credits Ugrad/Pro
Status	Pending at PV - University Curriculum Committee (UCC)
Submitter	Kristin Theus undergrad@bme.ufl.edu
Created	1/17/2018 2:05:11 PM
Updated	2/16/2018 10:58:08 AM
Description of request	Requesting to reduce to 131 credit hours.

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	ENG - Biomedical Engineering 021934001	Daniel Ferris		1/18/2018
Biomedical Engineering Catalog Entry_Jan 2018.docx					1/17/2018
Biomedical Engineering Catalog Entry_Jan 2018.docx					1/17/2018
College	Approved	ENG - College of Engineering	Heidi Dublin	Approved by HWCOE Curriculum Committee and Faculty Council	2/16/2018
No document changes					
Associate Provost for Undergraduate Affairs	Approved	PV - Associate Provost for Undergraduate Affairs	Angela Lindner		2/16/2018
No document changes					
University Curriculum Committee	Pending	PV - University Curriculum Committee (UCC)			2/16/2018
No document changes					
Faculty Senate Steering Committee					
No document changes					
Faculty Senate					
No document changes					
Academic Affairs					
No document changes					
Board of Trustees					
No document changes					
Board of Governors					
No document changes					
Academic Affairs Notified					
No document changes					
Office of the Registrar					
No document changes					

Step	Status	Group	User	Comment	Updated
OIPR Notified					
No document changes					
Student Academic Support System					
No document changes					
Catalog					
No document changes					
College Notified					
No document changes					

Degree|Change_Credits for request 12232

Info

Request: Biomedical Engineering - Reducing Credits
Description of request: Requesting to reduce to 131 credit hours.
Submitter: Kristin Theus undergrad@bme.ufl.edu
Created: 1/10/2018 8:29:45 AM
Form version: 1

Responses

Degree Name Biomedical Engineering
CIP Code 14.0501
Current Total Credits 132
Proposed Total Credits 131
Effective Term Fall
Effective Year 2018

Pedagogical Rationale/Justification The rationale for over 120 credits hours is the same as the previous curriculum design. The change from 132 to 131 reflects a change from Circuits with Laboratory (4 credits) to Elements of Electrical Engineering (3 credits). This reduction is due to the following reasons:

- 1) Biomedical Engineering has increased enrollment from 50 to 120 students per year. Circuits laboratory is taught by Electrical and Computer Engineering, not Biomedical Engineering, overloading their teaching capacity for this lab.
- 2) Biomedical Engineering has increased their faculty and hired a lecturer. This allows more sections of our existing Biomedical Instrumentation lab to be taught, and that these sections are taught by a full-time, dedicated teaching faculty.

Hence, we are replacing the Circuits course with a lecture based Elements of Electrical Engineering course, and incorporating elements of the circuits laboratory into our existing Biomedical Instrumentation Lab.

- 3) We are approved for 132 credit hours but reducing to be more in line with other SUS BME programs and to help with increasing 4-year graduation rates.

Impact on Initial Enrollment/Retention/Graduation We do not expect any impact on enrollment or retention of students. The change in credits should positively impact the number of students that can complete the degree within 4 years, as Elements of Electrical Engineering offers multiple sections and thus is easier for students to schedule.

Assessment Data Review Data was collected on peer institutions that indicated a similar structure – an out-of-department circuits laboratory and an in-department instrumentation laboratory were rare among peer BME departments. Student learning outcomes are unaffected by the change.

Academic Learning Compact and Academic Assessment Plan No modifications.

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[Course Descriptions](#)

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Biomedical Engineering

The biomedical engineering (BME) field has grown rapidly in the last 20 years. This growth was fueled by breakthroughs in molecular biology and many engineering technologies, symbolized by the Human Genome Project, arguably the greatest biomedical engineering accomplishment ever, and realized with creation of the National Institute of Biomedical Imaging and Bioengineering. BME now is clearly recognized as an integral part of the nation's and the world's efforts to deliver more effective and efficient medical care.

About this Major

- **College:** Herbert Wertheim College of Engineering
- **Degree:** Bachelor of Science in Biomedical Engineering
- **Credits for Degree:** ~~43~~2131
- **Academic Learning Compact**
- **Additional Information**

To graduate with this major, students must complete all university, college, and major requirements.

[Critical Tracking Model Semester Plan](#)

Overview

A biomedical engineer uses traditional engineering expertise to analyze and solve problems in biology and medicine, providing an overall enhancement of health care. Students choose biomedical engineering to serve people, to work with living systems and to apply advanced technology to the complex problems of medical care. The biomedical engineer is called upon to design instruments, devices and software, to bring together knowledge from many technical sources to develop new procedures and to conduct the research needed to solve clinical problems.

Bioengineering integrates sciences and engineering for the study of biology, medicine, behavior or health. It advances fundamental concepts, creates knowledge for the molecular to the organ systems levels, and develops innovative biologics, materials, processes, implants and devices.

Biomedical engineers create informatics approaches to prevent, diagnose and treat disease, applying systematic, quantitative and integrative thinking and solutions to problems important to biology, medical research and population studies.

BME typically is among the three most popular engineering majors and very often is the largest. The job market in biomedical engineering is the fastest growing of all engineering disciplines. It has become clear that the nation needs a variety of engineers with knowledge of biomedicine, including a cadre of exceptional people whose education thoroughly immerses them in engineering and biomedicine. The intellectual foundation of this limited-access undergraduate program is captured in this vision: Biomedicine comprises the science core while engineering provides the framework for inquiry. The curriculum incorporates exceptional rigor in both.

[Back to Top](#)

Educational Objectives

The program educational objectives of the J. Crayton Pruitt Family Department of Biomedical Engineering at the University of Florida are that:

1. Graduates will excel in top graduate programs of professional schools and will have successful careers in a multi-disciplinary, global industry.
2. Graduates will be active leaders in their profession, creating innovative, ethical and socially beneficial solutions to human health problems.

[Back to Top](#)

Department Vision Statement

~~The J. Crayton Pruitt Family Department of Biomedical Engineering will be one of the leading biomedical engineering programs in the nation. The department will leverage the unique co-localization of talent and resources in engineering, medicine, veterinary sciences, dentistry and technology commercialization to maximize opportunities for interdisciplinary student training and the clinical translation of technologies that will advance and improve health care in the state of Florida and worldwide.~~

[Back to Top](#)

Department Mission

The J. Crayton Pruitt Family Department of Biomedical Engineering at the University of Florida is dedicated to developing innovative and clinically translatable biomedical technologies, ~~training~~

educating future generations of biomedical engineers, and cultivating leaders, by nurturing the integration of engineering, science, and healthcare in a discovery-centered collaborative and dynamic educational and research environment.

[Back to Top](#)

Admission Requirements

The biomedical engineering undergraduate major is a limited enrollment program. Students who enter the University of Florida as freshmen identify pre-BME as their major of choice and begin enrolling in the required critical tracking courses to prepare for upper division.

During the fall semester of sophomore year (semester 3), pre-BME majors apply for admission to the upper division major, which begins in the spring semester of sophomore year (semester 4).

Current UF students must meet the following minimum requirements to be considered for admission to the upper division program.

- Minimum 3.0 grade point average in critical tracking courses (best attempt)*
- No more than two attempts allowed for each critical tracking course (withdrawals included)
- Minimum grade of C in each critical tracking course
- Completion of the first three semesters of the Model Plan of Study by Fall semester of application
- BME Departmental online application

*Only the best attempt in each critical tracking course is considered for admission to the upper division program.

All application requirements and details are available on the department website.

[Back to Top](#)

Department Requirements

Minimum grades of C are required for BME3508, BME3053C, CHM3217, COP2271, COP2271L, EEL3003, and ENC3246. The minimum C grade is part of the prerequisite requirement for several 3000/4000-level BME courses. The prerequisite course and subsequent course cannot be taken in the same term, even if the prerequisite is being repeated.

All BME Electives must be selected from an approved list. Students may petition to take courses not included in the approved list toward this requirement. The BME Electives allow students to explore topic areas within their interests and are designed to build upon biomedical engineering foundation courses and laboratories.

A biomedical engineering student whose cumulative, upper-division or department grade point average falls below a 2.0 or whose critical tracking grades do not meet department requirements will be placed on academic probation and be required to complete a probation contract with a BME academic advisor. Students normally are allowed a maximum of two terms (consecutive or non-consecutive) on academic probation. Students who do not satisfy the conditions of the first term of probation may be dismissed from the department.

All graduating seniors must complete an exit interview with their advisor before graduating.

[Back to Top](#)

Critical Tracking records each student's progress in courses that are required for entry to each major. Please note the critical-tracking requirements below on a per-semester basis.

Equivalent critical-tracking courses as determined by the State of Florida [Common Course Prerequisites](#) may be used for transfer students.

Semester 1

- Complete [2-3](#) of 11 critical-tracking courses with minimum grades of C within two attempts: BSC 2010; CHM 2045 or CHM 2095; CHM 2046 or CHM 2096; MAC 2311, MAC 2312, MAC 2313, MAP 2302, PHY 2048; PHY 2049; BME 3060 and PCB 3717C
- 3.0 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 2

- Complete [2-3](#) additional critical-tracking courses with minimum grades of C within two attempts
- 3.0 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 3

- Complete 2 additional critical-tracking courses with minimum grades of C within two attempts
- 3.0 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 4

- Complete ~~3 additional~~ all critical-tracking courses with minimum grades of C within two attempts
- 3.0 GPA required for all critical-tracking courses
- 2.0 UF GPA required

~~Semester 5~~

Model Semester Plan

To remain on track, students must complete the appropriate critical-tracking courses, which appear in bold. These courses must be completed by the terms as listed above in the Critical Tracking criteria.

This semester plan represents an example progression through the major. Actual courses and course order may be different depending on the student's academic record and scheduling availability of courses. Prerequisites still apply.

Semester 1	Credits
BME 1008 Introduction to Biomedical Engineering	1
BSC 2010 <u>Integrated Principles of Biology 1</u> <i>GE-B</i>	3
BSC 2010L <u>Integrated Principles of Biology 1 Laboratory</u> <i>GE-B</i>	1
CHM 2045 General Chemistry 1 (GE-P) or CHM 2095 Chemistry for Engineers 1	3

CHM 2045L General Chemistry 1 Laboratory
GE-P 1

IUF 1000 What is the Good Life
GE-H 3

MAC 2311 Analytic Geometry and Calculus 1
GE-M 4

Total 16

Semester 2

Credits

**CHM 2046 General Chemistry 2 (*GE-P*) or
CHM 2096 Chemistry for Engineers 2** 3

CHM 2046L General Chemistry 2 Laboratory
GE-P 1

ENC 1101 Expository and Argumentative Writing
State Core GE-C; WR6 3

MAC 2312 Analytic Geometry and Calculus 2
State Core GE-M 4

PHY 2048 Physics wWith Calculus 1
State Core GE-P 3

PHY 2048L Laboratory for Physics wWith Calculus 1 Laboratory
GE-P 1

Total 15

Semester 3	Credits
CHM 3217 Organic Chemistry/ <u>Biochemistry</u> 1 <i>Can substitute CHM 2210 and CHM 2211</i>	4
COP 2271 Computer Programming for Engineers***	2
COP 2271L Computer Programming for Engineers Laboratory***	1
MAC 2313 Analytic Geometry and Calculus 3 <i>GE-M</i>	4
PHY 2049 Physics <u>w</u>With Calculus 2 <i>GE-P</i>	3
PHY 2049L Laboratory for Physics <u>w</u> With Calculus 2 <i>GE-P</i>	1
	Total 15

Semester 4	Credits
EMA 3010 Materials or EGM 2511 Engineering Mechanics: Statics	3
ENC 3246 Professional Communication for Engineers GE-C; E6	
BME 3060 BME-Biomedical Fundamentals	3
EEL 311C Circuits 1	4.3

EEL 3003 Elements of Electrical Engineering

MAP 2302 Elementary Differential Equations
GE-M

3

PCB 3713C Cellular and Systems Physiology

4

BME 3053C Computer Applications for BME

2

Total 17,18

This program is limited access and competitive. Students cannot register for courses in semesters 5-8 before they have been admitted to the biomedical engineering major. Application for admission must be submitted by the deadline.

Semester 5

Credits

~~BME 3053C Computer Applications for BME~~

~~2~~

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EGM 2511 Engineering Mechanics: Statics

3

EMA 3010 Materials

3

BME 4311 Molecular Biomedical Engineering

3

~~BME 4409 Quantitative Physiology~~

~~3~~

~~BME 4503 Biomedical Instrumentation~~

~~3~~

BME 4503L Biomedical Instrumentation Laboratory

4

~~EMA 3010 Materials or
EGM 2511 Engineering Mechanics: Statics~~

~~3~~

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BME 3508 Biosignals and Systems

3

BME 3323L Cellular Engineering Laboratory

3

BME Elective

3

Total ~~45~~18

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Semester 6

Credits

~~BME 3323L Cellular Engineering Laboratory~~

~~3~~

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~~BME 4621 Biomolecular Thermodynamics and Kinetics~~

~~3~~

BME 4632 Biomedical Transport Phenomena

3

~~BME Specialization Track *~~

~~3~~

BME 3012 Clinically-Inspired Engineering Design

Social and Behavioral Science **
GE-S, N; E6

3

STA 3032 Engineering Statistics

3

BME 4503 Biomedical Instrumentation

3

<u>BME 4503L Biomedical Instrumentation Laboratory</u>	<u>1</u>
	Total 18 <u>16</u>

Semester 7	Credits
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<u>BME 4531 Biomedical Imaging</u>	3
<u>Social and Behavioral Science **</u> <u>State Core GE-S</u>	
BME 4882 Senior Design, Professionalism and Ethics 1	3
<u>BME 4409 Quantitative Physiology</u>	<u>3</u>
<u>BME 4621 Biomedical Thermodynamics and Kinetics</u>	<u>3</u>
BME Elective *	<u>3.6</u>
<u>BME Specialization Track *</u>	6
<u>ENC 3246 Professional Communication for Engineers</u> <u>GE-C; E6</u>	3
	Total 18

Semester 8	Credits
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BME 4883 Senior Design, Professionalism and Ethics 2	3
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BME Elective ** 3.6

~~BME Specialization Track*~~ 6.3

~~BME 4531 Medical Imaging~~

Humanities ** 3
State Core GE-H; D

~~Social and Behavioral Science**~~ 3
State Core GE-S

Total ~~18~~ 15

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Students are also expected to complete the general education international (GE-N) and diversity (GE-D) requirements. This is often done concurrently with another general education requirement (typically, GE-C, H or S).

[Back to Top](#)

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[Back to Top](#)

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[Back to Top](#)

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[Back to Top](#)

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[Back to Top](#)

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[Back to Top](#)

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[Back to Top](#)

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~~Semester 5~~

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BSC 2010L <u>Integrated Principles of Biology 1</u> Laboratory <i>GE-B</i>	1
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CHM 2045L General Chemistry 1 Laboratory
GE-P 1

IUF 1000 What is the Good Life
GE-H 3

MAC 2311 Analytic Geometry and Calculus 1
GE-M 4

Total 16

Semester 2 Credits

**CHM 2046 General Chemistry 2 (*GE-P*) or
CHM 2096 Chemistry for Engineers 2** 3

CHM 2046L General Chemistry 2 Laboratory
GE-P 1

ENC 1101 Expository and Argumentative Writing
State Core GE-C; WR6 3

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PHY 2048 Physics wWith Calculus 1
State Core GE-P 3

PHY 2048L Laboratory for Physics wWith Calculus 1 Laboratory
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Total 15

Semester 3	Credits
CHM 3217 Organic Chemistry/ <u>Biochemistry</u> 1 <i>Can substitute CHM 2210 and CHM 2211</i>	4
COP 2271 Computer Programming for Engineers***	2
COP 2271L Computer Programming for Engineers Laboratory***	1
MAC 2313 Analytic Geometry and Calculus 3 <i>GE-M</i>	4
PHY 2049 Physics <u>w</u>With Calculus 2 <i>GE-P</i>	3
PHY 2049L Laboratory for Physics <u>w</u> With Calculus 2 <i>GE-P</i>	1
	Total 15

Semester 4	Credits
EMA 3010 Materials <i>or</i> EGM 2511 Engineering Mechanics: Statics	3
ENC 3246 Professional Communication for Engineers <i>GE-C; E6</i>	
BME 3060 BME-Biomedical Fundamentals	3
EEL 311C Circuits 1	4.3

EEL 3003 Elements of Electrical Engineering

MAP 2302 Elementary Differential Equations
GE-M

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PCB 3713C Cellular and Systems Physiology

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BME 3053C Computer Applications for BME

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Total 17, 18

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Semester 5

Credits

~~BME 3053C Computer Applications for BME~~

~~2~~

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EGM 2511 Engineering Mechanics: Statics

3

EMA 3010 Materials

3

BME 4311 Molecular Biomedical Engineering

3

~~BME 4409 Quantitative Physiology~~

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~~BME 4503 Biomedical Instrumentation~~

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BME 4503L Biomedical Instrumentation Laboratory

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BME 3508 Biosignals and Systems

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BME 3323L Cellular Engineering Laboratory

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BME Elective

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Total ~~15~~ 18

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Semester 6

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BME 4632 Biomedical Transport Phenomena

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BME 3012 Clinically-Inspired Engineering Design

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STA 3032 Engineering Statistics

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Semester 7	Credits
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BME 4882 Senior Design, Professionalism and Ethics 1	3
<u>BME 4409 Quantitative Physiology</u>	<u>3</u>
<u>BME 4621 Biomedical Thermodynamics and Kinetics</u>	<u>3</u>
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Semester 8	Credits
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BME 4883 Senior Design, Professionalism and Ethics 2	3
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[Back to Top](#)

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