

**Notice of Change for the Bachelor of Science in Biomedical Engineering**  
**Date: Oct. 11, 2016**

**A. PROGRAM INFORMATION**

**1. Name of institution**

University of Rhode Island

**2. Name of department, division, school or college**

Department: Electrical, Computer, and Biomedical Engineering

College: Engineering

**3. Intended initiation date of program change. Include anticipated date for granting first degrees or certificates, if appropriate.**

Initiation date: Fall 2017

First degree date: Spring 2018

**4. Intended location of the program**

Kingston

**5. Summary description of proposed program (not to exceed 2 pages).**

Under URI's new General Education criteria the senior capstone sequence, BME 484 and 485 (5 credits total), has recently been approved for the General Education Outcome designation of "Integrate and Apply" (D1). Given the General Education Outcomes satisfied by the established requirements of the BME program, and the stated flexibility of the new general education requirements allowing satisfaction of 1 or 2 outcomes within a single course, the Department feels confident students can complete all BME degree requirements within 120-121 credits. Therefore, the currently required 3 credits above the minimum required for BS degree conferral (120) appears unnecessary. The program therefore requests to reduce its required credit total from the current 123-124 credits to 120-121 credits.

As proposed the major will consist of 34 credits in the major, 68-69 supporting credits, and 18 additional credits for a total of 120-121 credits:

Major credits (34): BME 181 (1), 281 (1), 207 (3), 307 (3), 360 (3), 361 (1), 362 (3), 363 (1), 461 (3), 464 (3), 465 (1), 466 (3), 468 (3), 484 (3), and 485 (2).

Supporting credits (68-69): BIO 121 (4), 242 (3), 244 (1), 341 (3); CHM 101 (3), 102 (1), 124 (3); ECN 201 (3); ELE 201 (3), 202 (1), 212 (3), 215 (2); 313 (3), 314 (3), 400 (1); EGR 105 (1), 106 (2); ISE 311 or STA 409 (3); MTH 141 (4), 142 (4), 243 (3), 362 (3); PHY 203 (3), 204 (3), 273 (1), 274 (1); and professional elective (3-4).

Additional credits (18): additional general education requirements

If applicable, please include the existing URI catalog language and proposed catalog language changes that relate to your request.

Current excerpt:

The biomedical engineering major requires ~~123-124~~120-121 credits.

Freshman Year First semester: 15 credits

CHM 101 (3), 102 (1); ECN 201 (3); EGR 105 (1); MTH 141 (4); and general education outcome(s)<sup>1</sup> (3).

Second semester: ~~17~~14 credits

BME 181 (1); CHM 124 (3); EGR 106 (2); MTH 142 (4); PHY 203 (3), and 273 (1); ~~and general education outcome(s)<sup>1</sup> (3).~~

Sophomore Year First semester: 16 credits

BIO 121 (4); BME 281 (1); ELE 201 (3), 202 (1); MTH 362 (3); and PHY 204 (3), 274 (1).

Second semester: 15 credits

BIO 242 (3), 244 (1); BME 207 (3); ELE 212 (3), 215 (2); and MTH 243 (3).

Junior Year First semester: 16 credits

BIO 341 (3); BME 307 (3), 360 (3), 361 (1); ELE 313 (3); and general education outcome(s)<sup>1</sup> (3).

Second semester: 16 credits

BME 362 (3), 363 (1); ELE 314 (3); ISE 311 (3) or STA 409 (3); general education outcome(s)<sup>1</sup> (6).

Senior Year First semester: 14-15 credits

BME 461 (3), 464 (3), 465 (1), 484 (3) [capstone]; ELE 400 (1); and approved professional elective<sup>2</sup> (3-4).

Second semester: 14 credits

BME 466 (3), 468 (3), 485 (2) [capstone]; and general education outcome(s)<sup>1</sup> (6).

<sup>1</sup> General Education Outcomes (A1-D1): if all outcomes are satisfied in fewer spaces than provided, you must take a course of your choice (Free Elective) to fill each remaining space in order to meet the required earned credit total of your degree plan. A complete detailing of these requirements are listed in the college's curriculum requirements section of this catalog.

<sup>2</sup> Professional Elective Requirement: One (1) course from the following: CHE 333, 347, 574; CSC 522; ELE 322, 338/339, 343/344, 435/436, 437, 438, 444/445, 447/448, 458/459, 470, 501, 506; ISE 304, 312; MCE 341, 354, 372; MTH 442, 451, 462, 471; with prior approval of the Electrical, Computer, and Biomedical Engineering department chairperson, any other 300-, 400-, or 500-level College of Engineering course not required by the BME major.

## **6. Signature of the President**

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David M. Dooley

# BIOMEDICAL ENGINEERING - Class of 2021 (DRAFT)

Total Credits = **120 -121**

## Freshman Year *Fall* Semester

Course Code	Description	Cr	
CHM 101	General Chemistry Lec I (A1)	3	
CHM 102	General Chemistry I Lab	1	
ECN 201	Principles of Microeconomics (A2)	3	
EGR 105	Foundations of Engineering I (A4)	1	
MTH 141	Calculus I (A1, B3)	4	
	General Education Outcome(s)*	3	

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## Freshman Year *Spring* Semester

Course Code	Description	Cr	
BME 181	Biomedical Engineering Seminar I	1	
CHM 124	Intro to Organic Chemistry	3	
EGR 106	Foundations of Engineering II (A4)	2	
MTH 142	Calculus II (B3)	4	
PHY 203	Elementary Physics I (A1)	3	
PHY 273	Elementary Physics Lab I (A1)	1	

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## Sophomore Year *Fall* Semester

Course Code	Description	Cr	
BIO 121	Human Anatomy	4	
BME 281	Biomedical Engineering Seminar II	1	
ELE 201	Digital Circuits Design	3	
ELE 202	Digital Circuits Design Lab	1	
MTH 362	Advanced Engineering Mathematics I	3	
PHY 204	Elementary Physics II (A1)	3	
PHY 274	Elementary Physics Lab II (A1)	1	

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## Sophomore Year *Spring* Semester

Course Code	Description	Cr	
BIO 242	Intro Human Physiology	3	
BIO 244	Intro Human Physiology Lab	1	
BME 207	Intro to Biomedical Engineering	3	
ELE 212	Linear Circuit Theory	3	
ELE 215	Linear Circuits Lab	2	
MTH 243	Calculus for Functions of Several Vars (A1, B3)	3	

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## Junior Year *Fall* Semester

Course Code	Description	Cr	
BIO 341	Principles of Cell Biology	3	
BME 307	Bioelectricity	3	
ELE 313	Linear Systems	3	
BME 360	Biomeasurement	3	
BME 361	Biomeasurement Lab	1	
	General Education Outcome(s)*	3	

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## Junior Year *Spring* Semester

Course Code	Description	Cr	
BME 362	Biomedical Instrumentation Design	3	
BME 363	Biomedical Instrumentation Design Lab	1	
ELE 314	Linear Systems and Signals	3	
ISE 311 <i>or</i> STA 409	Probability and Statistics for Engineers <i>or</i> Statistical Methods in Research I	3	
	General Education Outcome(s)*	3	
	General Education Outcome(s)*	3	

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## Senior Year *Fall* Semester

Course Code	Description	Cr	
BME 461	Physiological Modeling and Control	3	
BME 464	Medical Imaging	3	
BME 465	Medical Image Processing Lab	1	
BME 484	BME Capstone Design I (D1)	3	
ELE 400	Intro to Professional Practice	1	
	Professional Elective**	3-4	

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## Senior Year *Spring* Semester

Course Code	Description	Cr	
BME 466	Biomaterials	3	
BME 468	Neural Engineering	3	
BME 485	BME Capstone Design II (D1)	2	
	General Education Outcome(s)*	3	
	General Education Outcome(s)*	3	

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**\*General Education Outcomes:** if all Outcomes are satisfied in fewer spaces than provided, you must take a course of your choice (Free Elective) to fill each remaining space in order to meet the required earned credit total of your degree plan. See the "General Education Outcomes" section at the bottom of page two for more information on satisfying these requirements.

**\*\*Professional Elective:** One (1) course from the following: CHE 333, 347, 574; CSC 522; ELE 322, 338/339, 343/344, 435/436, 437, 438, 444/445, 447/448, 458/459, 470, 501, 506; ISE 304, 312; MCE 341, 354, 372; MTH 442, 451, 462, 471; *with prior approval* of the ECBE department chairperson any other 300-, 400-, or 500- level College of Engineering course not required by the BME major.

Name \_\_\_\_\_

ID # \_\_\_\_\_

## BIOMEDICAL ENGINEERING - Class of 2021

120-121 Credits

SPECIFIED MATH, SCIENCE, AND ENGINEERING COURSES											
INTRODUCTORY ENGINEERING						ENGINEERING SCIENCE AND DESIGN (MAJOR)					
Sem	Course	Cr	Grade	QP	Note	Sem	Course	Cr	Grade	QP	Note
	EGR 105 (A4)	1					BME 181	1			
	EGR 106 (A4)	2					BME 207	3			
		<b>3</b>					BME 281	1			
SUPPORTING ENGINEERING							BME 307	3			
	ELE 201	3					BME 360	3			
	ELE 202	1					BME 361	1			
	ELE 212	3					BME 362	3			
	ELE 215	2					BME 363	1			
	ELE 313	3					BME 461	3			
	ELE 314	3					BME 464	3			
	ELE 400	1					BME 465	1			
							BME 466	3			
		<b>16</b>					BME 468	3			
NATURAL SCIENCES							BME 484 (D1) [capstone]	3			
	BIO 121	4					BME 485 (D1) [capstone]	2			
	BIO 242	3									
	BIO 244	1						<b>34</b>			
	BIO 341	3				**PROFESSIONAL ELECTIVE					
	CHM 101 (A1)	3						<b>3-4</b>			
	CHM 102	1				MATHEMATICS					
	CHM 124	3					MTH 141 (A1 & B3)	4			
	PHY 203 (A1)	3					MTH 142 (B3)	4			
	PHY 273 (A1)	1					MTH 243 (A1 & B3)	3			
	PHY 204 (A1)	3					MTH 362	3			
	PHY 274 (A1)	1					STA 409 <i>or</i> ISE 311	3			
		<b>26</b>						<b>17</b>			
*GENERAL EDUCATION OUTCOMES											
Sem	Course	Cr	Grade	QP	Note	Sem	Course	Cr	Grade	QP	Note
Science, Technology, Engineering, and Math (STEM) (A1)						Civic Knowledge & Responsibilities (C1)					
---	CHM & PHY (see above)	11	---	---	---						
Social and Behavioral Sciences (A2)						Global Responsibilities (C2)					
	ECN 201	3									
Humanities (A3)						Diversity & Inclusion (C3)					
Arts & Design (A4)						Ability to Synthesize (D1)					
---	EGR 105 & 106 (see above)	3	---	---	---	---	BME 484 & 485 (see above)	5	---	---	---
Write Effectively (B1)						Grand Challenge (at least one course must be coded with a "G")					
Communicate Effectively (B2)						Free Elective					
Mathematical, Statistical, or Computational Strategies (B3)						<i>If you fulfill all Outcomes in fewer spaces than indicated on page one, you must use those additional spaces to take course(s) of your choice to reach your degree credit total (120-121)</i>					
---	MTH (see above)	11	---	---	---						
Information Literacy (B4)											

\* **General Education Outcomes:** at least 40 credits must be completed. (A1-D1) must be met by at least three credits. A single course may satisfy one or two outcomes, and at least one course must be a "Grand Challenge". No more than twelve credits can be from the same course code except HPR. General education courses may also be used to meet requirements of your major(s) or minor(s) when appropriate.

\*\* **Professional Elective - One (1)** course from the following: CHE 333, 347, 574; CSC 522; ELE 322, 338/339, 343/344, 435/436, 437, 438, 444/445, 447/448, 458/459, 470, 501, 506; ISE 304, 312; MCE 341, 354, 372; MTH 442, 451, 462, 471; with prior approval of the ECBE department chairperson any other 300-, 400-, or 500- level College of Engineering course not required by the BME major.