

June 4, 2021

## Biomedical Engineering Advising Guide Graduating Years 2021 & 2022 Version 3.0

The degree requirements for Biomedical Engineering are detailed in the Academic Catalog which is available here: <https://catalog.union.edu/>. You can also find archived copies of the catalog at this location.

In the following pages, we have provided

- a check-sheet for the degree requirements
- a flowchart showing the prerequisite structure of the curriculum
- a course planning guide which shows when courses are offered
- a sample student schedule

Please see the catalog listings or the ECBE website for a list of upcoming courses offered.

### Version History

Date	Version	Changes
02/10/2020	1.0	Initial Version
02/17/2020	1.1	<ul style="list-style-type: none"><li>• Added PHY120 as prerequisite for BME201</li><li>• Changed ECE248 to blue as it is a BME elective</li><li>• Corrected some terms in which courses are offered.</li></ul>
05/02/2020	2.0	Changed schedule and sample schedule for 2020-21 based on offerings: -- BME495 Winter & BME496 Spring -- BME311 Winter Changed PreReq Chart -- Added BME495 & BME496 -- Added BME336
06/04/2021	3.0	Changed PreReq Chart -- Corrected BME495 Corequisites

## Biomedical Engineering -- 40 Course Credits Required

### Core Math and Science

#### Sequence Option One

Course Name	Term Taken
MTH 110 - Calculus 1: Differential Calculus	
MTH 112 - Calculus 2: Integral Calculus	
MTH 115 - Calculus 3: Differential Vector Calculus and Matrix Theory	
MTH 117 - Calculus 4: Integral Vector Calculus	
PHY 120 - Matter in Motion	
PHY 121 - Principles of Electromagnetics	

#### Sequence Option Two

Course Name	Term Taken
MTH 113 - Accelerated Single-Variable Calculus	
MTH 115 - Calculus 3: Differential Vector Calculus and Matrix Theory	
MTH 117 - Calculus 4: Integral Vector Calculus	
PHY 120 - Matter in Motion	
PHY 121 - Principles of Electromagnetics	

#### Sequence Option Three

Course Name	Term Taken
MTH 113 - Accelerated Single-Variable Calculus	
IMP 120 - Integrated Math/Physics (2 Credits)	
IMP 121 - Integrated Math/Physics (2 Credits)	

*Other calculus sequences are possible depending upon a student's background.*

### Additional Math and Science Requirements

Course Name	Term Taken
MTH 130 - Ordinary Differential Equations OR MTH 234 - Differential Equations	
CHM 101 - Introductory Chemistry 1 OR CHM 110H - Honors Introductory Chemistry	

### Biological Science Requirements

Course Name	Term Taken
BIO 104 - (112) Cellular Foundations of Life	
BIO 205 - Topics in Molecular Biology	
BIO 206 - Topics in Physiology	
BIO 3xx - One Biological Science elective numbered 300 or higher (*)	

\* BME students may take BIO 3xx courses with BIO 103 listed as a prerequisite (waived by BIO department)

### Engineering and Computer Science

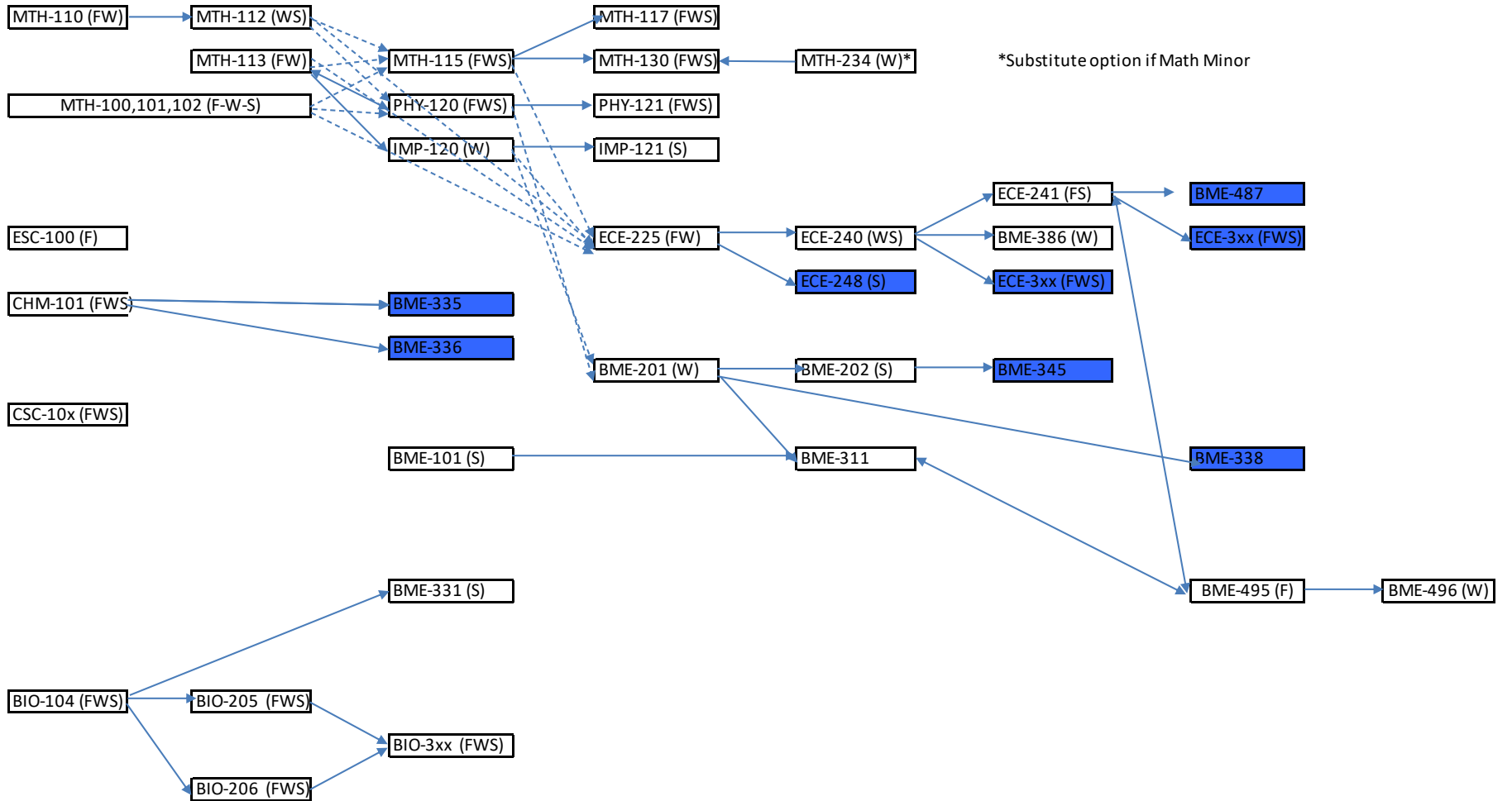
Course Name	Term Taken
ESC 100 - Exploring Engineering	
CSC 10x - Introduction to Computer Science (choose a course from CSC103-109)	

### Biomedical Engineering Core

Course Name	Term Taken
BME 101 - Graphics and Image Processing for Biomedical Systems	
BME 201 - Biomechanics 1	
BME 202 - Biomechanics 2	
BME/ECE 225 - Electric Circuits	
BME/ECE 240 - Circuits and Systems [WAC]	
BME/ECE 241 - Discrete Systems [WAC]	
BME 311 - Advanced Biomechanics	
BME 331 - Cell-Tissue-Material Interaction	
BME 386 - Introduction to Biomedical Instrumentation	

<b>Biomedical Engineering Electives</b>	
Four courses from BME, ECE, CSC 243 or other engineering courses subject to approval with at least three at the 300 level or higher. Students should consult with their advisors	
Course Name	Term Taken
BME/ECE	
BME/ECE (>300)	
BME/ECE (>300)	
BME/ECE (>300)	
<b>Biomedical Capstone Design</b>	
Course Name	Term Taken
BME 495 - Biomedical Engineering Capstone Design 1	
BME 496 - Biomedical Engineering Capstone Design 2	
<b>Common Curriculum Courses</b>	
A full description of Common Curriculum Requirements is available here: <a href="https://www.union.edu/files/general-education/201807/genedadvising170.pdf">https://www.union.edu/files/general-education/201807/genedadvising170.pdf</a>	
Course Name	Term Taken
SCLB, QMR, SET - these requirements are fulfilled automatically through courses in the major	
FYP - First Year Preceptorial	
SRS - Sophomore Research Seminar	
SOCS - Social Science (ANT/ECO/HST/PSC/PSY/SOC):	
HUM - Humanities (ATH/AVA/CLS/EGL/MLL/PHL):	
HUL - Humanities Literature:	
LCC - Linguistic and Cultural Competency (†):	
LCC - Linguistic and Cultural Competency (†):	
<i>† may be fulfilled by Study Abroad OR 2 LCC courses OR a sequence of 2 courses in the same language designated as LCC (note that the first course listed in any language (e.g., FRN 100, SPN 100, LAT 101, GRK 101 etc.) does not carry LCC credit)</i>	
<b>Free Electives</b>	
Course Name	Term Taken
<b>5 Writing Across the Curriculum (WAC) Courses [Drawn from Courses Above]</b>	
Course Name	Term Taken
BME/ECE 240 - Circuits and Systems	
BME/ECE 241 - Discrete Systems	
WAC from outside Engineering & Computer Science -	
<b>Course Selection Guidelines:</b>	
BME Electives: Some 300 level courses are not offered every year. Students should consult with their advisor so that their elective choices match their interests	
Senior Projects: Students interested in working with a faculty member on a two-term Senior Project should meet with potential faculty advisors during their junior year to identify a project. Interested students should meet with potential faculty advisors during their junior year to identify a project, and they should notify the BME Program Director when they have decided on a senior project. The first course (BME 497) will count as a Free Elective and the second course (BME 498) will count as a BME Elective.	
Electives: should be chosen in consultation with the student's advisor to meet the Common Curriculum requirements and enhance educational objectives. These elective courses can be customized to complete a double-major or minors.	
<b>Requirements for Honors:</b>	
The criteria for graduating with honors in Biomedical Engineering are: (1) a cumulative index of at least 3.3; (2) a cumulative index in major courses of at least 3.3, with an A or A- in at least three of those courses; (3) an A or A- in the capstone design course or a senior research project; (4) final six terms of courses at Union. The major courses are listed above under "Foundation and core courses for Biomedical Engineering," "Biomedical Engineering electives" and "Capstone design".	

### Prerequisites for Specific Required Courses in the Biomedical Engineering Curriculum (Graduates 2021 & 2022)



\*Substitute option if Math Minor

**KEY:**

- Prerequisite →
- Can be a co-requisite ↔
- Choice of pre-requisites - - - - ->

Blue - indicates some BME elective course options  
 For electives (science, math, or technical), see on-line catalog for prerequisites

## Union College BME Course Planning Guide Class 2021 & 2022

Freshman Year	Fall Term	Winter Term	Spring Term
Year:	<b>ESC100+L</b>	PHY120+L	PHY121+L
	MTH110	MTH112	MTH115
	FYP		<b>BME101+L</b>
	CHM101+L or BIO104+L		
Sophomore Year	Fall Term	Winter Term	Spring Term
Year:	<b>BME101+L</b>	<b>BME201+L</b>	<b>BME202+L</b>
	ECE225+L		
		ECE240+L	
	SRS		
	MTH117		
	CSC103-108+L		
	CHM101+L or BIO104+L		
	BIO205		
Junior Year	Fall Term	Winter Term	Spring Term
Year:	ECE241+L		ECE241+L
		<b>BME386+L</b>	<b>BME331</b>
	MTH130		
	BIO206		
	BIO Electives (BIO 3xx)		
BME Electives (BME/ECE/ME >300)			
Senior Year	Fall Term	Winter Term	Spring Term
Year:		<b>BME495</b>	<b>BME496</b>
		<b>BME311+L</b>	
	BME Electives (BME/ECE/ME >300)		
BIO Electives (BIO 3xx)			

Indicates offered in this term ONLY

# Union College BME Sample Schedule Grads 2021 & 2022

## Your Schedule may differ substantially

Freshman Year	Fall Term	Winter Term	Spring Term
Courses: 10	<b>ESC100+L</b>	MTH112	MTH115
	MTH110	PHY120+L	PHY121+L
	FYP	CHM101+L	HUM
		SOCS	
Sophomore Year	Fall Term	Winter Term	Spring Term
Courses: 10	ECE225+L	CS10x+L	BIO205
	BIO104+L	ECE240+L	HUL
	<b>BME101+L</b>	<b>BME201+L</b>	<b>BME202+L</b>
		SRS	
Junior Year	Fall Term	Winter Term	Spring Term
Courses: 10	ELECTIVE	BME Elective	
	LCC	<b>BME386+L</b>	<b>BME331</b>
	LCC	BIO206	ECE241+L
	ELECTIVE	MTH130	
Senior Year	Fall Term	Winter Term	Spring Term
Courses: 10	MTH117	<b>BME495</b>	<b>BME496</b>
	BME Elective	<b>BME311+L</b>	BME Elective
	BME Elective	ELECTIVE	
	ELECTIVE	BIO Elective	

TERM ABROAD OPTION

Indicates offered in this  
term ONLY