

# Biomedical Engineering – Program Map: Computational Bioengineering Focus Area

<b>Semester 1</b>	Chem I / Lab CHEM:1110	Engr Calc I MATH:1550	Intro Engr Prob Solving ENGR:1100	Rhetoric RHET:1030	Engr Success First Year ENGR:1000	
<b>Semester 2</b>	Chem II / Lab CHEM:1120	Engr Calc II MATH:1560	Engr Matrix Alg MATH:2550	Physics I / Lab PHYS:1611	Intro Engr Computing ENGR:1300	BME Forum BME:1010
<b>Semester 3</b>	Foundations of Biology / Lab BIOL:1411	Engr Diff Equat MATH:2560	Statics ENGR:2110	Elec Circuits ENGR:2120	Thermo ENGR:2130 or *Intro AI & Mach Learning ENGR:3110	BME Prof Seminar BME:2010
<b>Semester 4</b>	Fund Human Physiology HHP:2400 or Quantitative Physiology BME:2260	Biostatistics BIOS:4120 or STAT:3510	Bioimaging & Bioinformatics / Lab BME:2210	Cell Biology for Engr / Lab BME:2400	Comp in Engr ENGR:2730	
<b>Semester 5</b>	Systems, Instrum, & Data Acquisition / Lab BME:2200	Biomaterials & Biomechanics / Lab BME:2500	Intro to Software Design ECE:3330	Computational Biochemistry BME:4310	Cultural Perspectives, Values, and Society	
<b>Semester 6</b>	Focus Area Elective #1	Focus Area Elective #2	Focus Area Elective #3	Computational Bioinformatics BME:5335	Be Creative	
<b>Semester 7</b>	BME Senior Design I BME:4910	Focus Area Elective #4	Focus Area Elective #5	Focus Area Elective #6	Approved GEC course	
<b>Semester 8</b>	BME Senior Design II BME:4920	Physics II / Lab PHYS:1612	Focus Area Elective #7	Approved GEC course	Approved GEC course	

- Math & Science Courses
- Required Engineering Courses
- Focus Area Required Courses
- General Education Courses
- Engineering Core Courses
- Biomedical Core Courses
- Focus Area Elective Courses
- Seminars

**\*If ENGR:3110 is not offered in Fall, it can be taken the following Spring. Students who want to take ENGR:3110 and not ENGR:2130 can take ENGR:2730 Computers in Engr in Semester 3 and ENGR:3110 in Semester 4.**

**At least two Focus Area Electives must be from the list of Engineering Topics.**

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## Computational Bioengineering Required Courses

ENGR:2730	Computers in Engineering	F/S	P: ENGR:1300
ECE:3330	Intro to Software Design	F/S	P: ENGR:2730
BME:4310	Computational Biochemistry	F	P: MATH:1560 or MATH:1860, CHEM:1120
BME:5335	Computational Bioinformatics	S	P: (ENGR:1300), (BIOS:4120 or STAT:3510)

## Computational Bioengineering Electives (Focus Area, Minor, or Certificate)

### Engineering Topics (must choose two)

BME:5240	Deep Learning in Medical Imaging	F	P: ENGR:3110; ECE:5480 recommended
ECE:5330	Graph Algorithms & Combinatorial Optimiz.	S	P: ECE:3330
ECE:5820	Software Engineering Languages & Tools	F	P: CS:2820 or ECE:3330
+ENGR:2130	Thermodynamics	ALL	P: PHYS:1611, CHEM:1110; C: MATH:1560
+ENGR:3110	Intro to AI and Machine Learning in Engr	S	P: ENGR:1300 & soph. standing; C: MATH:2550

### Suggested Electives

BME:5435	Systems Biology for BME	See MyUI	P: BME:2200 and BME:2400
BME:5441	Numerical & Statistical Methods for Bioengr	F §	P: MATH:2560 and MATH:2550
ANTH:2320	Origins of Human Infectious Disease	See MyUI	
BIOL:2512	Fundamental Genetics	All	P: BIOL:1411 w/min C-, CHEM:1110; Recommended: CHEM:2210
BIOL:3314	Genomics	S	P: BIOL:1412; (BIOL:2211 or BIOL:2512 or BIOL:2723)
BIOL:3212	Bioinformatics for Beginners	F	P: BIOL:2512 or BIOL:2211 or MICR:3170 or BMB:3120
CHEM:5431	Statistical Thermodynamics I	S §	Recommended: CHEM:4431
CS:2210	Discrete Structures	ALL	Check MyUI
CS:2230	Computer Science II: Data Structures	ALL	P: CS:1210 or ENGR:1300 w/min C-
CS:3330	Algorithms	All	P: CS:2210 and CS:2230 (min C-)
CS:5350	Design and Analysis of Algorithms	See MyUI	P: CS:3330 or CS:5340
ECE:5450	Machine Learning	F	P: ECE:2400 or BME:2200
ECE:5800	Fundamentals of Software Engineering	F/S	P: CS:2820 or ECE:3330
ECE:5995:0001	Cont. Topics in ECE: Applied Machine Learning	S	P: ECE:2400 or BME:2200
MATH:3550	Engineering Vector Calculus	F/S	P: MATH:1560 & (MATH:2550 or MATH:2700); C: MATH:2560
MATH:4750	Introduction to Mathematical Biology	S	P: MATH:3600 or MATH:2560

### Pre-Medicine

**BIOL:1412	Diversity of Form & Function	All	P: BIOL:1411 w/min C-
CHEM:2210	Organic Chemistry I	All	P: CHEM:1120 w/min C-
CHEM:2220	Organic Chemistry II	All	P: CHEM:2210 w/min C-
CHEM:2410	Organic Chemistry Lab	All	P: CHEM:1120 w/min C-, CHEM:2210 w/min C-; C: CHEM:2220
BMB:3110	Biochemistry	All	See MyUI for requirements
BIOL:2512	Fundamental Genetics	All	P: BIOL:1411 w/min C-, CHEM:1110; Recom:CHEM:2210

+ Computational Bioengineering students can take ENGR:2130 as an Engineering Topic if they take ENGR:3110 as a required engineering course (and vice versa)

\*\* Pre-medicine students should check with their Pre-medicine advisor regarding the need for this course.

§ Offered in academic years with odd fall and even spring semesters

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Note: At least two electives must be from the list of Engineering Topics. Electives not listed above may be approved via the Plan of Study form.

Please check MyUI for the most current course offerings and pre/corequisites.

See the BME [Computational Bioengineering Focus Area web page](#) for a link to a guide for courses with machine learning content.

Last updated (1/27/25)