

# Biomedical Engineering – Program Map: Computational Bioengineering Focus Area

<b>Semester 1</b>	Chem I / Lab CHEM:1110	Engr Math 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 Math II MATH:1560	Engr Math III 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 Math IV 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>	Human Physiology HHP:3500 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

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

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

### Engineering Topics (must choose two)

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

### Suggested Electives

<b>BME:5441</b>	Numerical & Statistical Methods for Bioengr	F §	P: MATH:2560 and MATH:2550
<b>ANTH:2320</b>	Origins of Human Infectious Disease	F	
<b>BIOL:2512</b>	Fundamental Genetics	All	P: BIOL:1411 w/min C-, CHEM:1110; Recommended: CHEM:2210
<b>BIOL:3314</b>	Genomics	S	P: BIOL:1412; (BIOL:2211 or BIOL:2512 or BIOL:2723)
<b>BIOL:3212</b>	Bioinformatics for Beginners	F	P: BIOL:2512 or BIOL:2211 or MICR:3170 or BMB:3120
<b>CHEM:5431</b>	Statistical Thermodynamics I	S §	Recommended: CHEM:4431
<b>CHEM:5436</b>	Electronic Structure & Informatics Chem.	See MyUI	Recommended: CHEM:4432
<b>CS:3330</b>	Algorithms	All	P: CS:2210 and CS:2230 (min C-)
<b>CS:5350</b>	Design and Analysis of Algorithms	See MyUI	P: CS:3330 or CS:5340
<b>ECE:5450</b>	Machine Learning	F	P: ECE:2400 or BME:2200
<b>ECE:5800</b>	Fundamentals of Software Engineering	F/S	P: CS:2820 or ECE:3330
<b>ECE:5995:0001</b>	Cont. Topics in ECE: Applied Machine Learning	S	P: ECE:2400 or BME:2200

### Pre-Medicine

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

+ Computational Bioengineering students can take ENGR:2130 as an Engineering Topic if they have taken ENGR:3110 (formerly ENGR:2995) as an Engineering Core (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 (10/7/24)