Biomedical Engineering – Program Map: Computational Bioengineering Focus Area

Semester	Course 1	Course 2	Course 3	Course 4	Course 5	Seminar
1	Principles Chem I / Lab **CHEM:1110** *(Math & Science)*	Engr Calculus I **MATH:1550** *(Math & Science)*	Intro Engineering Problem Solving **ENGR:1100** *(Engineering Core)*	Rhetoric **RHET:1030** *(Gen Ed)*	—	
2	Principles Chem II / Lab **CHEM:1120** *(Math & Science)*	Engr Calculus II **MATH:1560** *(Math & Science)*	Engr Matrix Algebra **MATH:2550** *(Math & Science)*	Physics I / Lab **PHYS:1611** *(Math & Science)*	Intro Engr Computing **ENGR:1300** *(Engineering Core)*	BME Forum **BME:1010**
3	Foundations of Biology / Lab **BIOL:1411** *(Math & Science)*	Engr Diff Equations **MATH:2560** *(Math & Science)*	Statics **ENGR:2110** *(Required Engineering)*	Electrical Circuits **ENGR:2120** *(Required Engineering)*	Thermo **ENGR:2130** or Intro AI & Machine Learning **ENGR:3110** *(Required Engineering)*	BME Prof Seminar **BME:2010**
4	Fund Human Physiology **HHP:2400** or **BME:3260** Quantitative Physiology *(Math & Science)*	Biostatistics **BIOS:4120** or **STAT:3510** *(Math & Science)*	Bioimaging & Bioinformatics / Lab **BME:2210** *(Biomedical Core)*	Cell Biology for Engr / Lab **BME:2400** *(Biomedical Core)*	Computers in Engineering **ENGR:2730** *(Focus Area Required)*	
5	Systems, Instrum, & Data Acquisition / Lab **BME:2200** *(Biomedical Core)*	Biomaterials & Biomechanics / Lab **BME:2500** *(Biomedical Core)*	Intro to Software Design **ECE:3330** *(Focus Area Required)*	Computational Biochemistry **BME:4310** *(Focus Area Required)*	Cultural Perspectives, Values, & Society *(Gen Ed)*	
6	Focus Area Elective #1	Focus Area Elective #2	Focus Area Elective #3	Computational Bioinformatics **BME:5335** *(Focus Area Required)*	Be Creative *(Gen Ed)*	
7	BME Senior Design I **BME:4910** *(BME Core)*	Focus Area Elective #4	Focus Area Elective #5	Focus Area Elective #6	Approved Gen Ed course	
8	BME Senior Design II **BME:4920** *(BME Core)*	Physics II / Lab **PHYS:1612** *(Math & Science)*	Focus Area Elective #7	Approved Gen Ed course	Approved Gen Ed course	

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:2730; ECE:5480 recommended
ECE:5330	Graph Algorithms & Combinatorial Optimiz.	See MyUI	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	F/S	P: ENGR:1300; 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
BME:3995	Undergraduate Research in BME	F/S	See MyUI for requirements
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:3212	Bioinformatics for Beginners	F	P: BIOL:2512 or BIOL:2211 or MICR:3170 or BMB:3120
BIOL:3314	Genomics	S	P: BIOL:1412; (BIOL:2211 or BIOL:2512 or BIOL:2723)
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:5200	Machine Learning	F	P: ECE:2400 or BME:2200
ECE:5800	Fundamentals of Software Engineering	F/S	P: CS:2820 or ECE:3330
ECE:5210	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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At least two electives must be from the Engineering Topics list. 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.

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