

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

\*If ENGR:3110 is not 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 Engineering 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. | 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  | 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                                  |
| <b>BME:3995</b> | 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;<br>Recommended: CHEM:2210 |
| BIOL:3212       | Bioinformatics for Beginners                  | F        | P: BIOL:2512 or BIOL:2211 or MICR:3170 or<br>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: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);<br>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-;<br>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 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 (10/29/25)