### Biomedical Engineering – Program Map: Computational Bioengineering Focus Area

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>Chem I &amp; Lab CHEM:1110</th>
<th>Engr Math I MATH:1550</th>
<th>Intro Engr Prob Solving ENGR:1100</th>
<th>Rhetoric RHET:1030</th>
<th>Engr Success First Year ENGR:1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester 4</td>
<td>Human Physiology HHP:3500 or BME:2260</td>
<td>Systems, Instrum, &amp; Data Acquisition / Lab BME:2200</td>
<td>Bioimaging &amp; Bioinformatics / Lab BME:2210</td>
<td>Comp in Engr ENGR:2730</td>
<td>Biostatistics BIOS:4120 or STAT:3510</td>
</tr>
<tr>
<td>Semester 5</td>
<td>Cell Biology for Engr / Lab BME:2400</td>
<td>Intro to Software Design ECE:3330</td>
<td>Computational Biochemistry BME:4310</td>
<td>Focus Area Elective #1</td>
<td>Diversity &amp; Inclusion</td>
</tr>
<tr>
<td>Semester 6</td>
<td>Computational Bioinformatics BME:5335</td>
<td>Focus Area Elective #2</td>
<td>Focus Area Elective #3</td>
<td>Be Creative</td>
<td>Approved GEC course</td>
</tr>
<tr>
<td>Semester 7</td>
<td>BME Senior Design I BME:4910</td>
<td>Biomaterials &amp; Biomechanics / Lab BME:2500</td>
<td>Focus Area Elective #4</td>
<td>Focus Area Elective #5</td>
<td>Approved GEC course</td>
</tr>
<tr>
<td>Semester 8</td>
<td>BME Senior Design II BME:4920</td>
<td>Focus Area Elective #6</td>
<td>Focus Area Elective #7</td>
<td>Physics II / Lab PHYS:1612</td>
<td>Approved GEC course</td>
</tr>
</tbody>
</table>

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

*If ENGR:2995 is not offered in Fall, it can be taken the following Spring. Students who want to take ENGR:2995 and not ENGR:2130 can take ENGR:2730 Computers in Engr in Semester 3 and ENGR:2995 in Semester 4.*

At least two Focus Area Electives must be from the list of Engineering Topics.
### Biomedical Engineering – Program Map: Computational Bioengineering Focus Area

#### Computational Bioengineering Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Type</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGR:2730</td>
<td>Computers in Engineering</td>
<td>F/S</td>
<td>P: ENGR:1300</td>
</tr>
<tr>
<td>ECE:3330</td>
<td>Intro to Software Design</td>
<td>F/S</td>
<td>P: ENGR:2730</td>
</tr>
<tr>
<td>BME:4310</td>
<td>Computational Biochemistry</td>
<td>S</td>
<td>P: MATH:1560 or MATH:1860, CHEM:1120</td>
</tr>
<tr>
<td>BME:5335</td>
<td>Computational Bioinformatics</td>
<td>S</td>
<td>P: (ENGR:1300 or CS:5110), (BIOS:4120 or STAT:3510)</td>
</tr>
</tbody>
</table>

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

**Engineering Topics (must choose two)**

- **ECE:5450** Machine Learning  
  - F  
  - P: ECE:2400 or BME:2200
- **ECE:5330** Graph Algorithms & Combinatorial Optimization  
  - 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:2995** Intro to AI and Machine Learning  
  - S  
  - P: ENGR:1300 and sophomore standing; C: MATH:2550

**Suggested Electives**

- **ANTH:2320** Origins of Human Infectious Disease  
  - F  
  - P: BIOL:1411, BIOL:1412 or PSY:2701, CHEM:1110; Recommended: CHEM:2210
- **BIOL:2512** Fundamental Genetics  
  - All  
  - P: BIOL:2211 or BIOL:2512 or BIOL:2723
- **BIOL:3314** Genomics  
  - S  
  - P: CHEM:2210 or CHEM:2220
- **BIOL:4213** Bioinformatics  
  - See MyUI  
  - P: BIOL:2512 or BMB:3120 or MICR:3170 or BMB:3110
- **BME:5435** Systems Biology for BME  
  - S  
  - P: BME:2400, BME:2200
- **CHEM:5431** Statistical Thermodynamics I  
  - S §  
  - Recommended: CHEM:4431
- **CHEM:5436** Electronic Structure & Informatics Chem.  
  - See MyUI  
  - Recommended: CHEM:4432
- **CS:3330** Algorithms  
  - All  
  - P: CS:2210 and CS:2230 (min C-), MATH:1850 or MATH:1550 or MATH:1860 or MATH:1560
- **CS:5350** Design and Analysis of Algorithms  
  - See MyUI  
  - P: CS:3330 or CS:5340
- **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
- **BME:5441** Numerical & Statistical Methods for Bioengr  
  - F §  
  - P: MATH:2560 and MATH:2550

#### 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-, BIOL:1412 or PSY:2701 w/min C-, CHEM:1110; Recommended: CHEM:2210

+ Computational Bioengineering students can take ENGR:2130 as an Engineering Topic if they have taken 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 (04/05/23)