### Required Courses for the ChemBE Undergraduate Degree Fall 2022

#### Required Mathematics and Science Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>020.305</td>
<td>Biochemistry</td>
<td>(3)</td>
</tr>
<tr>
<td>030.205</td>
<td>Organic Chemistry I</td>
<td>(4)</td>
</tr>
<tr>
<td>110.108</td>
<td>Calculus I</td>
<td>(4)</td>
</tr>
<tr>
<td>110.109</td>
<td>Calculus II</td>
<td>(4)</td>
</tr>
<tr>
<td>110.202</td>
<td>Calculus III</td>
<td>(4)</td>
</tr>
<tr>
<td>173.111</td>
<td>General Physics Lab I</td>
<td>(1)</td>
</tr>
</tbody>
</table>

#### Chemistry (8 credits)

**Option 1:** no AP credits, take ALL these courses:
- 030.101 Intro. Chemistry (3)
- 030.102 Intro. Chemistry II (3)
- 030.105 Intro. Chemistry Lab I (1)
- 030.106 Intro. Chemistry Lab II (1)

**Option 2:** 4 AP credits, take
- 030.103 Applied Chemical Equilibrium and Reactivity (4)

**Option 3:** 8 AP credits, requirement is fulfilled (continue to Organic Chemistry) or for those who want a refresher, take
- 030.103 Applied Chemical Equilibrium and Reactivity (4)

#### Physics (8 credits)

**Option 1:** no AP credits, take one of the following course series:
- 171.101 General Physics I (4)
- 171.102 General Physics II (4)
- 171.107 General Physics for Physical Science Majors I (4)
- 171.108 General Physics for Physical Science Majors II (4)

**Option 2:** 4 AP credits, take one of these courses
- 171.102 General Physics II (4)

**Option 3:** 8 AP credits, requirement is fulfilled

#### Take one of the following courses (1 to 3 credits):
- 020.315 Biochemistry Project Laboratory (1)
- 030.225 Introduction to Organic Chemistry Laboratory (3)
- 030.305 Physical Chemistry Instrumentation Laboratory I (3)
- 250.253 Protein Engineering and Biochemistry Laboratory (3)

#### Take one of the following courses (4 credits):
- 110.302 Differential Equations with Applications (4)
- 553.291 Linear Algebra and Differential Equations (4)

#### Required Core ChemBE Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.113</td>
<td>Gateway Computing/Python</td>
</tr>
<tr>
<td>540.101</td>
<td>Chemical Engineering Today</td>
</tr>
<tr>
<td><strong>waived for incoming Class of AY 2022</strong></td>
<td></td>
</tr>
<tr>
<td>540.202</td>
<td>Intro to Chemical and Biological Process Analysis</td>
</tr>
<tr>
<td>540.203</td>
<td>Engineering Thermodynamics</td>
</tr>
<tr>
<td>540.301</td>
<td>Kinetic Processes</td>
</tr>
<tr>
<td>540.303</td>
<td>Transport Phenomena I</td>
</tr>
<tr>
<td>540.304</td>
<td>Transport Phenomena II</td>
</tr>
<tr>
<td>540.306</td>
<td>Chemical and Biological Separations</td>
</tr>
<tr>
<td>540.315</td>
<td>Process Design with ASPEN</td>
</tr>
<tr>
<td>540.409</td>
<td>Modeling Dynamics and Control for Chemical and Biological Systems</td>
</tr>
<tr>
<td>540.490</td>
<td>Chemical and Biomolecular Lab Safety and Ethics</td>
</tr>
</tbody>
</table>

**Take one of the following courses for Senior Lab:**
- 540.311 Projects in Chemical Engineering Unit Operations (4)
- 540.313 Projects in Chemical and Biomolecular Engineering Unit Operations (4)
- Chemical Engineering Lab at DTU (Technical University of Denmark) (4)

**Take one of the following course options for Product Design (3 - 6 Credits)**

**Option 1:** One-semester design (spring)
- 540.314 ChemBE Product Design (3)

**Option 2:** Two-semester design (two consecutive semesters)
- 540.309 Product Design Part 1 (3)
- 540.310 Product Design Part 2 (3)
  - Must take both courses to receive credit. 540.309 counts towards core credits; 540.310 counts toward engineering electives

**Option 3:** WSE two-semester design (two consecutive semesters)
- 660.345 Multidisciplinary Engineering Design 1 (3)
- 660.346 Multidisciplinary Engineering Design 2 (3)
  - Must take both courses to receive credit. 660.345 counts towards core credits; 660.346 counts toward engineering electives

#### Required HS Course

- 661.315 Culture of the Engineering Profession (3)

#### Take Electives to Meet Credit Requirements

- 128 credits total
- 48 credits of Engineering (E designation)
- 16 credits of Mathematics (must be from 110 or 553)
- 13 credits Advanced Chemistry and Biology
- 18 H/S credits (must be six courses that are at least 3 credits each)

#### GPA Requirements

- 2.0 overall GPA
- 2.0 GPA in required core ChemBE courses