# 2018 - 2019 Major Map

## Chemical Engineering, BSE

**School/College:** Ira A. Fulton Schools of Engineering  
**Location:** Tempe campus

### Term 1 - 0 - 16 Credit Hours

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHM 113</td>
<td>General Chemistry I (SQ)</td>
<td>4</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>FSE 100</td>
<td>Introduction to Engineering</td>
<td>2</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>MAT 265</td>
<td>Calculus for Engineers I (MA)</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>ASU 101-CHE</td>
<td>The ASU Experience</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENG 101 or ENG 102: First-Year Composition OR ENG 105: Advanced First-Year Composition OR ENG 107 or ENG 108: First-Year Composition</td>
<td>3</td>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humanities, Arts and Design (HU) AND Cultural Diversity in the U.S. (C)</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum 2.00 GPA ASU Cumulative.</td>
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</tbody>
</table>

**Term hours subtotal:** 16

### Notes
- An SAT, ACT, Accuplacer, IELTS, or TOEFL score determines placement into first-year composition courses.
- Mathematics Placement Assessment score determines placement in mathematics course.
- ASU 101 or College specific equivalent First Year Seminar required of all freshman students.
- ASU 101-CHE and FSE 100 required for freshmen and should be completed first semester. Non-freshmen: see advisor for petitioning replacement electives.
- If ENG 105 is taken, a 3 hr applicable elective must also be taken prior to graduation. See Advisor.
- Prep for success using the [Freshman Guide](#).
- Join a Fulton community.
- Explore engineering and technical professions.

### Term 2 - 16 - 30 Credit Hours

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHM 116</td>
<td>General Chemistry II (SQ)</td>
<td>4</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>MAT 266</td>
<td>Calculus for Engineers II (MA)</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>PHY 121</td>
<td>University Physics I: Mechanics (SQ)</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>PHY 122</td>
<td>University Physics Laboratory I (SQ)</td>
<td>1</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>ENG 101 or ENG 102: First-Year Composition OR ENG 105: Advanced First-Year Composition OR ENG 107 or ENG 108: First-Year Composition</td>
<td>3</td>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete ENG 101 OR ENG 105 OR ENG 107 course(s).</td>
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<tr>
<td>Minimum 2.00 GPA ASU Cumulative.</td>
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</tbody>
</table>

**Term hours subtotal:** 14

### Notes
- Create a Handshake profile.
- Get involved with EPICS, the Generator Labs, and the Fulton Start-Up Center.

### Term 3 - 30 - 45 Credit Hours

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHE 211</td>
<td>Introduction to Chemical Processing</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>MAT 242</td>
<td>Elementary Linear Algebra</td>
<td>2</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>MAT 275</td>
<td>Modern Differential Equations (MA)</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>CHM 233</td>
<td>General Organic Chemistry I</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>CHM 237</td>
<td>General Organic Chemistry Laboratory I</td>
<td>1</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Bioscience Elective</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum 2.00 GPA ASU Cumulative.</td>
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</tbody>
</table>

### Notes
- For more information about Bioscience Elective course options, please visit [here](#).
- Prep for success using the [Sophomore Guide](#).
- Consult the Resume, Presentation, and Resource Library for tips on how to create a technical resume, job shadow, do informational interviews and mentor with alumni.
- Create a technical resume.
Complete Mathematics (MA) requirement.

<table>
<thead>
<tr>
<th>Term 4 45 - 60 Credit Hours</th>
<th>Critical course signified by</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>✷ CHE 231: Introduction to Transport Phenomena I: Fluids</td>
<td>3</td>
<td>C</td>
<td>• Pursue an undergraduate research experience.</td>
<td></td>
</tr>
<tr>
<td>✷ MAT 267: Calculus for Engineers III (MA)</td>
<td>3</td>
<td>C</td>
<td>• Apply for internships.</td>
<td></td>
</tr>
<tr>
<td>✷ PHY 131: University Physics II: Electricity and Magnetism (SQ)</td>
<td>3</td>
<td>C</td>
<td>• Attend career fairs and events.</td>
<td></td>
</tr>
<tr>
<td>✷ CHE 384: Numerical Methods for Chemical Engineers (CS)</td>
<td>3</td>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHM 234: General Organic Chemistry II</td>
<td>3</td>
<td>C</td>
<td></td>
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</table>

Term hours subtotal: 15

<table>
<thead>
<tr>
<th>Term 5 60 - 75 Credit Hours</th>
<th>Necessary course signified by</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>💫 CHE 334: Introduction to Transport Phenomena II: Heat and Mass Transfer</td>
<td>3</td>
<td>C</td>
<td>• For more information about the Engineering Elective or Upper Division Advanced Chemistry/Biochemistry Technical Elective, please visit here.</td>
<td></td>
</tr>
<tr>
<td>✷ CHE 342: Introduction to Applied Chemical Thermodynamics</td>
<td>3</td>
<td>C</td>
<td>• Plan for success using the Junior Guide.</td>
<td></td>
</tr>
<tr>
<td>Upper Division Advanced Chemistry/Biochemistry Technical Elective</td>
<td>3</td>
<td></td>
<td>• Network at student organization competitions or professional societies.</td>
<td></td>
</tr>
<tr>
<td>Engineering Elective</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social-Behavioral Sciences (SB) AND Historical Awareness (H)</td>
<td>3</td>
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</tbody>
</table>

Term hours subtotal: 15

<table>
<thead>
<tr>
<th>Term 6 75 - 90 Credit Hours</th>
<th>Necessary course signified by</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>💫 CHE 433: Modern Separations</td>
<td>3</td>
<td>C</td>
<td>• Research and prepare for graduate school.</td>
<td></td>
</tr>
<tr>
<td>✷ CHE 442: Introduction to Chemical Reactor Design</td>
<td>3</td>
<td>C</td>
<td>• Apply for an engineering 4+1 program.</td>
<td></td>
</tr>
<tr>
<td>CHE 352: Chemical Engineering Lab I (L)</td>
<td>3</td>
<td>C</td>
<td>• Develop a professional profile online.</td>
<td></td>
</tr>
<tr>
<td>IEE 220: Business and Industrial Engineering</td>
<td>3</td>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social-Behavioral Sciences (SB) AND Global Awareness (G)</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete Cultural Diversity in the U.S. (C) AND Global Awareness (G) AND Historical Awareness (H) course(s).</td>
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</table>

Term hours subtotal: 15

<table>
<thead>
<tr>
<th>Term 7 90 - 105 Credit Hours</th>
<th>Necessary course signified by</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>✷ CHE 432: Principles of Chemical Engineering Design</td>
<td>3</td>
<td>C</td>
<td>• For more information about Upper Division CHE Technical Electives, please visit here.</td>
<td></td>
</tr>
<tr>
<td>CHE 451: Chemical Engineering Laboratory II</td>
<td>3</td>
<td></td>
<td>• Plan for success using the Senior Guide.</td>
<td></td>
</tr>
<tr>
<td>CHE 461: Process Dynamic Control (CS)</td>
<td>3</td>
<td></td>
<td>• Use Handshake to apply for full-time positions.</td>
<td></td>
</tr>
<tr>
<td>Upper Division CHE Technical Elective</td>
<td>3</td>
<td></td>
<td>• Complete an in-person or virtual practice interview.</td>
<td></td>
</tr>
<tr>
<td>Humanities, Arts and Design (HU)</td>
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</table>

Term hours subtotal: 15

<table>
<thead>
<tr>
<th>Term 8 105 - 120 Credit Hours</th>
<th>Necessary course signified by</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>✷ CHE 462: Process Design (L)</td>
<td>3</td>
<td></td>
<td>• For more information about Upper Division Advanced Chemistry/Biochemistry Technical Electives, Upper Division CHE Technical Electives, please visit here.</td>
<td></td>
</tr>
<tr>
<td>Upper Division Advanced Chemistry/Biochemistry Technical Elective</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Division CHE Technical Elective</td>
<td>3</td>
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</tbody>
</table>

Term hours subtotal: 15

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Page 2
<table>
<thead>
<tr>
<th>Upper Division Natural Science or Materials Science Technical Elective</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Division Humanities, Arts Design (HU) OR Upper Division Social-Behavioral Sciences (SB)</td>
<td>3</td>
</tr>
</tbody>
</table>

For a list of Engineering Electives, Upper Division Advanced Chemistry/Biochemistry Technical Electives, CHE Upper Division Technical Electives, and Upper Division Natural Science or MSE Technical Elective course options please visit: CHE Elective Course Options

### Hide Course List(s)/Track Group(s)

#### Bioscience Electives
- BIO 181: General Biology I (SQ)
- BIO 182: General Biology II (SG)
- BIO 201: Human Anatomy and Physiology I (SG)
- BME 111: Engineering Perspectives on Biological Systems
- MIC 205: Microbiology (SG)
- MIC 220: Biology of Microorganisms
- Contact your advisor for additional course options

#### Engineering Elective
- BME 2** Elective
- CEE 210: Engineering Mechanics I: Statics OR CEE 300: Engineering Business Practice (L) OR CEE 2** Elective
- CSE 2** Elective
- EEE 202: Circuits I OR EEE 2** Elective
- IEE 2** Elective
- MAE 2** Elective
- MSE 250: Structure and Properties of Materials OR MSE 2** Elective
- Note: MSE 208, 301, or 308 cannot be used
- FSE 301: Entrepreneurship and Value Creation
- IEE 300: Economic Analysis for Engineers
- IEE 380: Probability and Statistics for Engineering Problem Solving (CS)
- Contact your advisor for additional course options
- If interested in a course from a "2** " range, please work with your advisor for prior approval. Not all courses will be accepted.

#### Upper Division CHE Technical Electives
- CHE 400 to CHE 489
- CHE 469: Air Quality Engineering
- CHE 475: Biochemical Engineering
- CHE 484 by approval
- CHE 492/493 max of 6 credits towards CHE TE requirements
- CHE 494 by approval
- CHE 498/499 by approval
- Note: Students may be allowed by instructor consent to take these courses without having the prerequisites fulfilled. Courses not listed here require a department petition form.

#### Upper Division Advanced Chemistry/Biochemistry Technical Elective
- BCH 361: Advanced Principles of Biochemistry
- BCH 461: General Biochemistry
- CHM 302: Environmental Chemistry
- CHM 325: Analytical Chemistry
- CHM 341: Elementary Physical Chemistry

#### Upper Division Natural Science or Materials Engineering Technical Electives
- BIO 302: Cancer--Mother of All Diseases (L)
- BIO 320: Fundamentals of Ecology
- BIO 325: Oceanography
- BIO 340: General Genetics
- BIO 353: Cell Biology
- MSE 355: Structure and Defects
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHM 453</td>
<td>Inorganic Chemistry</td>
</tr>
<tr>
<td>CHM 481</td>
<td>Geochemistry</td>
</tr>
<tr>
<td>MSE 460</td>
<td>Nanomaterials in Energy</td>
</tr>
<tr>
<td></td>
<td>Production and Storage</td>
</tr>
<tr>
<td>GLG 321</td>
<td>Mineralogy</td>
</tr>
<tr>
<td>GLG 418</td>
<td>Geophysics</td>
</tr>
<tr>
<td>GLG 419</td>
<td>Geodynamics</td>
</tr>
<tr>
<td>MBB 347</td>
<td>Molecular Genetics: From Genes to Proteins</td>
</tr>
<tr>
<td>MIC 360</td>
<td>Bacterial Physiology</td>
</tr>
<tr>
<td>MIC 461</td>
<td>Geomicrobiology</td>
</tr>
<tr>
<td>STP 420</td>
<td>Introductory Applied Statistics (CS)</td>
</tr>
<tr>
<td>or STP 421</td>
<td>Probability</td>
</tr>
<tr>
<td>STP 420</td>
<td>Introductory Applied Statistics (CS)</td>
</tr>
<tr>
<td>or STP 421</td>
<td>Probability</td>
</tr>
<tr>
<td></td>
<td>Note: Students taking STP 420 or STP 421 cannot</td>
</tr>
<tr>
<td></td>
<td>take IEE 380 for Engineering Elective</td>
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<td></td>
<td>Contact your advisor for additional course</td>
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<tr>
<td></td>
<td>options</td>
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</tbody>
</table>

**General University Requirements Legend**

**General Studies Core Requirements:**
- Literacy and Critical Inquiry (L)
- Mathematical Studies (MA)
- Computer/Statistics/Quantitative Applications (CS)
- Humanities, Arts and Design (HU)
- Social-Behavioral Sciences (SB)
- Natural Science - Quantitative (SQ)
- Natural Science - General (SG)

**General Studies Awareness Requirements:**
- Cultural Diversity in the U.S. (C)
- Global Awareness (G)
- Historical Awareness (H)

**First-Year Composition**

General Studies designations listed on the major map are current for the 2018 - 2019 academic year.