# 2018 - 2019 Major Map

**Materials Science and Engineering, BSE**

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

## Term 1 - 16 Credit Hours

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSE 100: Introduction to Engineering</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAT 265: Calculus for Engineers I (MA)</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>ASU 101-MSE: The ASU Experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHM 114: General Chemistry for Engineers (SQ) OR CHM 116: General Chemistry II (SQ)</td>
<td>4</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>ENG 101: First-Year Composition or ENG 102: First-Year Composition OR ENG 105: Advanced First-Year Composition OR ENG 107: First-Year Composition</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Social-Behavioral Sciences (SB) AND Global Awareness (G)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Minimum 2.00 GPA ASU Cumulative.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Term hours subtotal:** 16

- An SAT, ACT, Accuplacer, IELTS, or TOEFL score determines placement into first-year composition courses.
- ASU 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-MSE and FSE 100 required for freshmen and should be completed first semester. Non-freshmen: see advisor for petitioning replacement electives.
- If student takes ENG 105 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 - 32 Credit Hours

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 266: Calculus for Engineers II (MA)</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>MSE 250: Structure and Properties of Materials</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>PHY 121: University Physics I: Mechanics (SQ)</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>PHY 122: University Physics Laboratory I (SQ)</td>
<td>1</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>ENG 101: First-Year Composition or ENG 102: First-Year Composition OR ENG 105: Advanced First-Year Composition OR ENG 107: First-Year Composition</td>
<td>3</td>
<td>C</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>
</tr>
<tr>
<td><strong>Complete CHM 114 OR CHM 116 course(s).</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Complete ENG 101 OR ENG 105 OR ENG 107 course(s).</strong></td>
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</tr>
<tr>
<td><strong>Minimum 2.00 GPA ASU Cumulative.</strong></td>
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</tr>
</tbody>
</table>

**Term hours subtotal:** 16

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

## Term 3 - 48 Credit Hours

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 267: Calculus for Engineers III (MA)</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>MSE 215: Materials Synthesis</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Create a Handshake profile.**  
- **Get involved with EPICS, the Generator Labs, and the Fulton Start-Up Center.**
### PHY 131: University Physics II: Electricity and Magnetism (SQ)
3
- C

### PHY 132: University Physics Laboratory II (SQ)
1
- C

Math or Science Elective
3–4

Social-Behavioral Sciences (SB) AND Historical Awareness (H)
3

**Minimum 2.00 GPA ASU Cumulative.**

**Complete Mathematics (MA) requirement.**

**Term hours subtotal: 16-17**

### Term 4 48 - 63 Credit Hours

<table>
<thead>
<tr>
<th>Critical course signified by ⚫</th>
<th>Hours</th>
<th>Minimum Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 275: Modern Differential Equations (MA)</td>
<td>3</td>
<td>C</td>
</tr>
<tr>
<td>MAT 343: Applied Linear Algebra</td>
<td>3</td>
<td>C</td>
</tr>
<tr>
<td>MSE 211: Introduction to Mechanics of Materials</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>IEE 380: Probability and Statistics for Engineering Problem Solving (CS)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Advanced Science Elective</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Minimum 2.00 GPA ASU Cumulative.**

**Term hours subtotal: 15**

### Term 5 63 - 79 Credit Hours

<table>
<thead>
<tr>
<th>Necessary course signified by ⭐</th>
<th>Hours</th>
<th>Minimum Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSE 355: Structure and Defects</td>
<td>3</td>
<td>C</td>
</tr>
<tr>
<td>MSE 330: Thermodynamics of Materials</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MSE 356: Structures, Properties, and Defects Lab</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>MSE 415: Mathematical and Computer Methods in Materials (CS)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MSE 457: Quantum Mechanics for Understanding Properties of Atoms and Solids</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Humanities, Arts and Design (HU)</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Term hours subtotal: 16**

### Term 6 79 - 93 Credit Hours

<table>
<thead>
<tr>
<th>Necessary course signified by ⭐</th>
<th>Hours</th>
<th>Minimum Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSE 420: Physical Metallurgy</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MSE 335: Materials Kinetics and Processing</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MSE 421: Physical Metallurgy Laboratory</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>MSE 450: Introduction to Materials Characterization</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MSE 451: Introduction to Materials Characterization Lab</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>MSE 458: Introduction to Electronic, Magnetic, and Optical Properties</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Complete Cultural Diversity in the U.S. (C) AND Global Awareness (G) AND Historical Awareness (H) course(s).**

**Term hours subtotal: 14**

### Term 7 93 - 106 Credit Hours

<table>
<thead>
<tr>
<th>Necessary course signified by ⭐</th>
<th>Hours</th>
<th>Minimum Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSE 489: Capstone Design Project I (L)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>MSE 440: Mechanical Behavior of Materials</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MSE 482: Materials Engineering Design (L)</td>
<td>3</td>
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<tr>
<td>Materials Elective</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

**For additional information about Materials Elective options, please go to: Materials Elective**

**Plan for success using the Senior Guide.**
**Math or Science Elective**

- AST 111: Introduction to Solar Systems Astronomy (SQ)
- AST 112: Introduction to Stars, Galaxies, and Cosmology (SQ)
- BIO 130: Introduction to Environmental Science (SQ)
- BIO 201: Human Anatomy and Physiology I (SG)
- CHM 113: General Chemistry I (SQ)
- CHM 231: Elementary Organic Chemistry (SQ)
- GLG 101: Introduction to Geology I (Physical) (SQ)
- MAT 211: Mathematics for Business Analysis
- MAT 243: Discrete Mathematical Structures
- PHY 201: Mathematical Methods in Physics I (CS)
- Advanced Science Elective
- Contact your advisor for additional course options to be reviewed through department petition.

**Advanced Science Elective**

- ABS 225: Soils (SQ)
- ABS 350: Applied Statistics (CS)
- AST 321: Introduction to Planetary and Stellar Astrophysics (SQ)
- AST 322: Introduction to Galactic and Extragalactic Astrophysics (SQ)
- AST 421: Astrophysics I
- BIO 201: Human Anatomy and Physiology I (SG)
- BIO 320: Fundamentals of Ecology
- CHM 231: Elementary Organic Chemistry (SQ)
- CHM 302: Environmental Chemistry
- CHM 305: Analytical Chemistry
- CHM 333: Organic Chemistry for Majors I
- CHM 334: Organic Chemistry for Majors II
- CHM 341: Elementary Physical Chemistry
- CHM 345: Physical Chemistry I
- CHM 346: Physical Chemistry II
- GLG 404: Fundamentals of Planetary Geology
- GLG 418: Geophysics
- GLG 404: Fundamentals of Planetary Geology
- GLG 418: Geophysics

**Technical Electives**

- CEE 353: Civil Engineering Materials
- CHE 494: Special Topics
- EEE 202: Circuits I
- EEE 241: Fundamentals of Electromagnetics
- EEE 352: Properties of Electronic Materials
- EEE 435: Fundamentals of CMOS and MEMS
- EEE 436: Fundamentals of Solid-State Devices
- FSE 301: Entrepreneurship and Value Creation
- FSE 394: EPICS Gold II AND FSE 494: EPICS Gold: EPICS in Action
- FSE 394: EPICS Gold II AND FSE 494: EPICS Gold: EPICS in Action
- IEE 300: Economic Analysis for Engineers
- IEE 369: Work Analysis and Design (L)
- IEE 385: Engineering Statistics: Probability
- IEE 437: Human Factors Engineering
- IEE 474: Quality Control
- MAE 494: Special Topics
- MEE 322: Structural Mechanics
- MEE 342: Principles of Mechanical Design

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**Term 8 106 - 120 Credit Hours**

<table>
<thead>
<tr>
<th>Necessary course signified by</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSE 490: Capstone Design Project II (L)</td>
<td>2</td>
<td></td>
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</tr>
<tr>
<td>Advanced Science Elective</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete 2 courses:</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical Elective</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Division Humanities, Arts and Design (HU) OR Upper Division Social-Behavioral Sciences (SB)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Term hours subtotal:** 14

For more information about Math or Science Elective course options, Materials Elective course options, Advanced Science Elective course options, or Technical Elective course options, please go to: **MSE Elective Course Options**

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

**MSE 490: Capstone Design Project II (L)**

**Advanced Science Elective**

- ABS 225: Soils (SQ)
- ABS 350: Applied Statistics (CS)
- AST 321: Introduction to Planetary and Stellar Astrophysics (SQ)
- AST 322: Introduction to Galactic and Extragalactic Astrophysics (SQ)
- AST 421: Astrophysics I
- BIO 201: Human Anatomy and Physiology I (SG)
- BIO 320: Fundamentals of Ecology
- CHM 231: Elementary Organic Chemistry (SQ)
- CHM 302: Environmental Chemistry
- CHM 305: Analytical Chemistry
- CHM 333: Organic Chemistry for Majors I
- CHM 334: Organic Chemistry for Majors II
- CHM 341: Elementary Physical Chemistry
- CHM 345: Physical Chemistry I
- CHM 346: Physical Chemistry II
- GLG 404: Fundamentals of Planetary Geology
- GLG 418: Geophysics

**Technical Electives**

- CEE 353: Civil Engineering Materials
- CHE 494: Special Topics
- EEE 202: Circuits I
- EEE 241: Fundamentals of Electromagnetics
- EEE 352: Properties of Electronic Materials
- EEE 435: Fundamentals of CMOS and MEMS
- EEE 436: Fundamentals of Solid-State Devices
- FSE 301: Entrepreneurship and Value Creation
- FSE 394: EPICS Gold II AND FSE 494: EPICS Gold: EPICS in Action
- FSE 394: EPICS Gold II AND FSE 494: EPICS Gold: EPICS in Action
- IEE 300: Economic Analysis for Engineers
- IEE 369: Work Analysis and Design (L)
- IEE 385: Engineering Statistics: Probability
- IEE 437: Human Factors Engineering
- IEE 474: Quality Control
- MAE 494: Special Topics
- MEE 322: Structural Mechanics
- MEE 342: Principles of Mechanical Design
General Studies designations listed on the major map are current for the 2018 - 2019 academic year.

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.

PHY 201: Mathematical Methods in Physics I (CS)

PHY 334: Advanced Laboratory I (L)

Contact your advisor for additional course options to be reviewed through department petition.

MSE 475: Fundamentals of Microelectronics Packaging

MSE 484: Internship

MSE 494: Special Topics

Advanced Science Elective

For MSE 492/493/498/499 courses, please work with your advisor for prior approval.

Contact your advisor for additional course options to be reviewed through department petition.

Materials Elective

Please choose two courses from the following options:

- MSE 470: Polymers and Composites
- MSE 471: Introduction to Ceramics
- MSE 494: Polymer Syn & Prop
- BME 318: Biomaterials

**Total Hours:** 120

**Upper Division Hours:** 45 minimum

**Major GPA:** 2.00 minimum

**Cumulative GPA:** 2.00 minimum

**Total hrs at ASU:** 30 minimum

**Hrs Resident Credit for Academic Recognition:** 56 minimum

**Total Community College Hrs:** 64 maximum

**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)