# 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></td>
<td></td>
</tr>
<tr>
<td>ENG 101: First-Year Composition or ENG 102: First-Year Composition</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>ENG 107: First-Year Composition or ENG 108: First-Year Composition</td>
<td></td>
<td></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>Minimum 2.00 GPA ASU Cumulative.</td>
<td></td>
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<td></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.  
- 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 - 16 - 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</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>ENG 107: First-Year Composition OR ENG 108: First-Year Composition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humanities, Arts and Design (HU) AND Cultural Diversity in the U.S.</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keep CHM 114 OR CHM 116 course(s).</td>
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<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: 16

**Notes:**  
- Create a [Handshake profile](#).  
- Get involved with EPICS, the Generator Labs, and the Fulton Start-Up Center.

## Term 3 - 32 - 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>
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</tbody>
</table>

**Notes:**  
- **Term 4:**  
  - Complete remaining courses and electives.  
  - Complete senior design and capstone projects.  
  - Minimum 2.00 GPA ASU Cumulative.
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

<table>
<thead>
<tr>
<th>Term 4 48 - 63 Credit Hours</th>
<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>
<td></td>
</tr>
<tr>
<td>MAT 343: Applied Linear Algebra</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>MSE 211: Introduction to Mechanics of Materials</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IEE 380: Probability and Statistics for Engineering Problem Solving (CS)</td>
<td>3</td>
<td></td>
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</tr>
<tr>
<td>Advanced Science Elective</td>
<td>3</td>
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</tbody>
</table>

Minimum 2.00 GPA ASU Cumulative.

Term hours subtotal: 15

<table>
<thead>
<tr>
<th>Term 5 63 - 79 Credit Hours</th>
<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>
<td></td>
</tr>
<tr>
<td>MSE 330: Thermodynamics of Materials</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSE 356: Structures, Properties, and Defects Lab</td>
<td>1</td>
<td></td>
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</tr>
<tr>
<td>MSE 415: Mathematical and Computer Methods in Materials (CS)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSE 457: Quantum Mechanics for Understanding Properties of Atoms and Solids</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humanities, Arts and Design (HU)</td>
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</tbody>
</table>

Term hours subtotal: 16

<table>
<thead>
<tr>
<th>Term 6 79 - 93 Credit Hours</th>
<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>
<td></td>
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<tr>
<td>MSE 335: Materials Kinetics and Processing</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSE 421: Physical Metallurgy Laboratory</td>
<td>1</td>
<td></td>
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<tr>
<td>MSE 450: Introduction to Materials Characterization</td>
<td>3</td>
<td></td>
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</tr>
<tr>
<td>MSE 451: Introduction to Materials Characterization Lab</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSE 458: Introduction to Electronic, Magnetic, and Optical Properties</td>
<td>3</td>
<td></td>
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</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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</tbody>
</table>

Term hours subtotal: 14

<table>
<thead>
<tr>
<th>Term 7 93 - 106 Credit Hours</th>
<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>
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<tr>
<td>MSE 440: Mechanical Behavior of Materials</td>
<td>3</td>
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<tr>
<td>MSE 482: Materials Engineering Design (L)</td>
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</tr>
<tr>
<td>Materials Elective</td>
<td>6</td>
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</tbody>
</table>

For additional information about Materials Elective options, please go to: Materials Elective
Plan for success using the Senior Guide.

• For additional information about Math or Science Electives, please go to: Math or Science Electives
• 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.

• For additional information about Advanced Science Electives options, please go to: Advanced Science Electives
• Pursue an undergraduate research experience
• Apply for internships.
• Attend career fairs and events.

• Plan for success using the Junior Guide.
• Network at student organization competitions or professional societies.

• Research and prepare for graduate school
• Apply for an engineering 4+1 program.
• Develop a professional profile online.
## Math or Science Elective

- **AST 111**: Introduction to Solar Systems
- **AST 112**: Introduction to Stars, Galaxies, and Cosmology
- **BIO 130**: Introduction to Environmental Science
- **BIO 201**: Human Anatomy and Physiology I
- **CHM 113**: General Chemistry I
- **CHM 231**: Elementary Organic Chemistry
- **GLG 101**: Introduction to Geology I (Physical)
- **MAT 211**: Mathematics for Business Analysis
- **MAT 243**: Discrete Mathematical Structures
- **PHY 201**: Mathematical Methods in Physics I
- **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
- **CHM 302**: Environmental Chemistry
- **CHM 325**: 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
- **FSE 494**: EPICS Gold: EPICS in Action
- **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

Term hours subtotal: 14

For additional information about Advanced Science Electives and Technical Electives, please go to: Advanced Science Electives and Technical Electives.

- Use Handshake to apply for full-time positions.
- Complete an in-person or practice interview.

**Terms and Credits:**

Term 8: 106 - 120 Credit Hours

<table>
<thead>
<tr>
<th>Math or Science Elective</th>
<th>Hours</th>
<th>Minimum Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Advanced Science Elective</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Technical Electives</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.
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.

**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

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

**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.