## 2020 - 2021 Major Map

**Materials Science and Engineering, BSE**

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

### Term 1: 0 - 16 Credit Hours

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Critical course signified by 🟢</strong></td>
<td></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>1</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>FSE 100: Introduction to Engineering</td>
<td>2</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>
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</tbody>
</table>

**Term hours subtotal:** 16

- 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 first-year students.
- FSE 100 is required for first-year students and should be completed in the first semester. Non-first year students: see advisor for petitioning replacement electives.
- If students take ENG 105, a 3 credit hour applicable elective must also be taken prior to graduation. See advisor.
- Prep for success using the First-Year Student 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><strong>Critical course signified by 🟢</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAT 266: Calculus for Engineers II (MA)</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>MSE 250: Structure and Properties of Materials</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>
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</tr>
<tr>
<td>Complete CHM 114 OR CHM 116 course(s).</td>
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<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

- 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>Critical course signified by</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>• For additional information about Math or Science Electives, please go to: Math or Science Electives.</td>
</tr>
<tr>
<td>PHY 131: University Physics II: Electricity and Magnetism (SQ)</td>
<td>3</td>
<td>C</td>
<td>• Prep for success using the Sophomore Guide.</td>
</tr>
<tr>
<td>PHY 132: University Physics Laboratory II (SQ)</td>
<td>1</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>MSE 215: Materials Synthesis</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math or Science Elective</td>
<td>3-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social-Behavioral Sciences (SB) AND Historical Awareness (H)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete MSE 250 course(s).</td>
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<td></td>
</tr>
<tr>
<td>Minimum 2.00 GPA ASU Cumulative.</td>
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</tbody>
</table>

**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>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 275: Modern Differential Equations (MA)</td>
<td>3</td>
<td>C</td>
<td>For additional information about Advanced Science Electives options, please go to: Advanced Science Electives.</td>
</tr>
<tr>
<td>MAT 343: Applied Linear Algebra</td>
<td>3</td>
<td>C</td>
<td>• Pursue an undergraduate research experience.</td>
</tr>
<tr>
<td>MSE 211: Introduction to Mechanics of Materials</td>
<td>3</td>
<td>C</td>
<td>• Apply for internships.</td>
</tr>
<tr>
<td>IEE 380: Probability and Statistics for Engineering Problem Solving (CS)</td>
<td>3</td>
<td></td>
<td>• Attend career fairs and events.</td>
</tr>
<tr>
<td>Advanced Science Elective</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum 2.00 GPA ASU Cumulative.</td>
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</tbody>
</table>

**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>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>☆ MSE 355: Structure and Defects</td>
<td>3</td>
<td>C</td>
<td>• Plan for success using the Junior Guide.</td>
</tr>
<tr>
<td>MSE 356: Structures, Properties, and Defects Lab</td>
<td>1</td>
<td></td>
<td>• Network at student organization competitions or professional societies.</td>
</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>
<td>3</td>
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</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>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>☆ MSE 335: Materials Kinetics</td>
<td>3</td>
<td></td>
<td>• For additional information about Materials Elective options, please go to: Materials Elective.</td>
</tr>
<tr>
<td>MSE 421: Physical Metallurgy Laboratory</td>
<td>1</td>
<td></td>
<td>• Research and prepare for graduate school.</td>
</tr>
<tr>
<td>MSE 450: Introduction to Materials Characterization</td>
<td>3</td>
<td></td>
<td>• Apply for an engineering 4+1 program.</td>
</tr>
<tr>
<td>MSE 451: Introduction to Materials Characterization Lab</td>
<td>1</td>
<td></td>
<td>• Develop a professional profile online.</td>
</tr>
<tr>
<td>MSE 458: Electronic, Magnetic, and Optical Properties</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Division Materials Elective</td>
<td>3</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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</tr>
</tbody>
</table>

**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>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>☆ MSE 489: Capstone Design Project I (L)</td>
<td>1</td>
<td></td>
<td>• For additional information about Materials Elective options, please go to: Materials Elective.</td>
</tr>
<tr>
<td>MSE 440: Mechanical Behavior of Materials</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSE 482: Materials Engineering Design (L)</td>
<td>3</td>
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</tr>
</tbody>
</table>
Complete 2 courses:

Upper Division Materials Elective

Term hours subtotal: 6

Term 8 106 - 120 Credit Hours Necessary course signified by ★  Hours Minimum Grade  Notes

★ MSE 490: Capstone Design Project II (L)  2

Advanced Science Elective  3

Complete 2 courses:

Technical Elective

Upper Division Humanities, Arts and Design (HU) OR Upper Division Social-Behavioral Sciences (SB)  3

Term hours subtotal: 14

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

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

Math or Science Elective

Advanced Science Elective

Materials Elective

AST 111: Introduction to Solar Systems Astronomy (SQ)

ABS 225: Soils (SQ)

Please choose three courses from the following options:

AST 112: Introduction to Stars, Galaxies, and Cosmology (SQ)

ABS 350: Applied Statistics (CS)

AST 321: Introduction to Planetary and Stellar Astrophysics (SQ)

BCH 341: Physical Chemistry with a Biological Focus

BCH 361: Advanced Principles of Biochemistry

CHM 113: General Chemistry I (SQ)

AST 421: Astrophysics I

BCH 345: Physical Chemistry I

CHM 231: Elementary Organic Chemistry (SQ)

AST 422: Introduction to Galactic and Extragalactic Astrophysics (SQ)

BCH 346: Physical Chemistry II

CHM 233: General Organic Chemistry I

CHM 302: Environmental Chemistry

GLG 101: Introduction to Geology I (Physical) (SQ)

CHM 325: Analytical Chemistry

MAT 211: Mathematics for Business Analysis

CHM 341: Elementary Physical Chemistry

MAT 243: Discrete Mathematical Structures

CHM 345: Physical Chemistry I

PHY 201: Mathematical Methods in Physics I (CS)

CHM 346: Physical Chemistry II

Advanced Science Elective

CHM 433: Advanced Organic Chemistry I

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

CHM 435: Physical Chemistry I

ENV 410: Soil Science

MSE 318: Biomatertials

MSE 420: Physical Metallurgy

MSE 470: Polymers and Composites

MSE 471: Introduction to Ceramics

MSE 494: Polymer Synthesis, Characterization, & Processing

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

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

For success using the Senior Guide.

Use Handshake to apply for full-time positions.

Complete an in person or virtual practice interview.
GLG 404: Fundamentals of Planetary Geology

GLG 418: Geophysics

PHY 201: Mathematical Methods in Physics I (CS)

PHY 334: Advanced Laboratory I (L)

PHY 361: Introductory Modern Physics

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

Technical Electives

CEE 353: Civil Engineering Materials

CHE 211: Introduction to Chemical Processing

CHE 494: Special Topics

CIS 310: Business Data Visualization

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

EEE 460: Nuclear Power Engineering

EEE 465: Photovoltaic Energy Conversion

EGR 219: Computational Modeling of Engineering Systems

FSE 301: Entrepreneurship and Value Creation

FSE 404: 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

MAT 300: Mathematical Structures (L)

MEE 322: Structural Mechanics

MEE 342: Principles of Mechanical Design

MSE 484: Internship

MSE 494: Special Topics

PUP 442: Environmental Planning
SES 311: Essentials of Astrobiology: Exploration for Life in the Universe

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.

**SES 311: Essentials of Astrobiology: Exploration for Life in the Universe**

**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.

**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)

**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 2020 - 2021 academic year.