## 2021 - 2022 Major Map
### Mechanical Engineering (Energy and Environment), BSE

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

### Term 1 0 - 16 Credit Hours Critical course signified by ♦

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>♦ MAT 265: Calculus for Engineers I (MA)</td>
<td>3</td>
<td>C</td>
<td>• ASU 101 or college-specific equivalent First-Year Seminar required of all first-year students.</td>
</tr>
<tr>
<td>ASU 101-MEE: The ASU Experience</td>
<td>1</td>
<td></td>
<td>• FSE 100 is required for first-year students and should be completed the first semester. Non-first year students: see advisor for petitioning replacement electives.</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>• If ENG 105 is taken, a 3 hour applicable elective must also be taken prior to graduation. See advisor.</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>• Prep for success using the First-Year Student Guide.</td>
</tr>
<tr>
<td>FSE 100: Introduction to Engineering</td>
<td></td>
<td></td>
<td>• Join a Fulton community.</td>
</tr>
<tr>
<td>Humanities, Arts and Design (HU) AND Cultural Diversity in the U.S. (C)</td>
<td>3</td>
<td></td>
<td>• Explore engineering and technical professions.</td>
</tr>
<tr>
<td>♦ Minimum 2.00 GPA ASU Cumulative.</td>
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</tbody>
</table>

**Term hours subtotal:** 16

### Term 2 16 - 32 Credit Hours Critical course signified by ♦

<table>
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<tr>
<th>Course</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<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>• Create a Handshake profile.</td>
</tr>
<tr>
<td>♦ MAT 242: Elementary Linear Algebra</td>
<td>2</td>
<td>C</td>
<td>• Get involved with EPICS, the Generator Labs, and the Fulton Start-Up Center.</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>MAE 215: Introduction to Programming in MATLAB</td>
<td>1</td>
<td>C</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>♦ Minimum 2.00 GPA ASU Cumulative.</td>
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</tbody>
</table>

**Term hours subtotal:** 16

### Term 3 32 - 46 Credit Hours Critical course signified by ♦

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>♦ MAE 201: Mechanics of Particles and Rigid Bodies I: Statics</td>
<td>3</td>
<td>C</td>
<td>• Prep for success using the Sophomore Guide.</td>
</tr>
<tr>
<td>♦ MAT 267: Calculus for Engineers III (MA)</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>♦ MAT 275: Modern Differential Equations (MA)</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>
PHY 131: University Physics II: Electricity and Magnetism (SQ) 3  C

MAE 214: Computer-Aided Engineering I 1  C

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

Complete CHM 114 OR CHM 116 course(s).

Minimum 2.00 GPA ASU Cumulative.

Complete Mathematics (MA) requirement.

**Term hours subtotal:** 14

**Term 4  46 - 62 Credit Hours** Critical course signified by  

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</table>

| **MAE 202: Mechanics of Particles and Rigid Bodies II: Dynamics** 3  C | *Pursue an undergraduate research experience.* |
| **MAE 213: Mechanics of Materials** 3  C | *Apply for internships.* |
| **MAE 241: Introduction to Thermodynamics** 3  C | *Attend career fairs and events.* |
| **EEE 202: Circuits I** 4  C | |
| **MAE 384: Advanced Mathematical Methods for Engineers (CS)** 3  C | |

**Term hours subtotal:** 16

**Term 5  62 - 78 Credit Hours** Necessary course signified by  

<table>
<thead>
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</table>

| **MEE 322: Structural Mechanics** 3  C | *Plan for success using the Junior Guide.* |
| **MEE 324: Structural Mechanics Laboratory** 1  C | *Network at student organization competitions or professional societies.* |
| **CHM 231: Elementary Organic Chemistry (SQ) OR CHM 233: General Organic Chemistry I** 3  C | |
| **MAE 242: Introduction to Fluid Mechanics** 3  C | |
| **MAE 301: Applied Experimental Statistics** 3  C | |
| **MSE 250: Structure and Properties of Materials** 3  C | |

**Term hours subtotal:** 16

**Term 6  78 - 93 Credit Hours** Necessary course signified by  

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| **MAE 318: System Dynamics and Control I** 4  C | *Research and prepare for graduate school.* |
| **MEE 340: Heat Transfer** 3  C | *Apply for an engineering 4+1 program.* |
| **MAE 400: Engineering Profession (L)** 2  C | *Develop a professional profile online.* |
| **MEE 323: Computer-Aided Engineering II** 3  C | |
| **MEE 342: Principles of Mechanical Design** 3  C | |
| **Complete Cultural Diversity in the U.S. (C) AND Global Awareness (G) AND Historical Awareness (H) course(s).** | |

**Term hours subtotal:** 15

**Term 7  93 - 106 Credit Hours** Necessary course signified by  

<table>
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</table>

| **MEE 482: Intermediate Thermodynamics** 3  C | *Plan for success using the Senior Guide.* |
| **MAE 417: System Dynamics and Control II OR MEE 491: Experimental Mechanical Engineering (L)** 3  C | *Apply for full-time positions.* |
| **PUP 190: Sustainable Cities ((HU or SB) & G) OR GPH 314: Global Change (HU & G)** 3  C | *Complete an in person or virtual practice interview.* |
| **Upper Division Energy and Environment Technical Elective** 3  C | |

**Term hours subtotal:** 13

**Term 8  106 - 120 Credit Hours** Necessary course signified by  

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<th>Notes</th>
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**Term hours subtotal:**
## Upper Division Energy and Environment Technical Electives

- **ATE 521**: Building Environmental Science
- **ATE 556**: Architectural Technology V
- **ATE 560**: Building Energy Analysis
- **ATE 582**: Environmental Control Systems
- **BIO 320**: Fundamentals of Ecology
- **CEE 361**: Introduction to Environmental Engineering
- **CEE 440**: Hydrology
- **CHE 473**: Fuel Cells and Biofuel Cells
- **CHE 478**: Biomass Energy Conversion Technology
- **CHM 302**: Environmental Chemistry
- **EEE 360**: Energy Systems and Power Electronics
- **EEE 460**: Nuclear Power Engineering
- **EEE 463**: Electrical Power Plants
- **EVE 302**: Environmental Engineering Fundamentals: Physical and Chemical Processes
- **MAE 494**: Energy Efficiency
- **MAE 494**: Solar Thermal Engineering
- **MEE 434**: Internal Combustion Engines
- **AST 321**: Introduction to Planetary and Stellar Astrophysics (SQ)
- **AST 322**: Introduction to Galactic and Extragalactic Astrophysics (SQ)
- **BIO 320**: Fundamentals of Ecology
- **BME 300**: Bioengineering Product Design
- **BME 316**: Biomechanics for Biomedical Engineers
- **BME 318**: Biomaterials
- **BME 350**: Signals and Systems for Bioengineers
- **BME 494**: Bioenergy and Microbial Biotechnology, Neural Bases of Motor Control
- **CEE 361**: Introduction to Environmental Engineering
- **CEE 372**: Transportation Engineering
- **CEE 400**: Earth Systems Engineering and Management (L or HU & H)
- **CEE 440**: Hydrology
- **CEE 449**: Energy Efficient Buildings and Systems
- **CEE 494**: Sustainable Energy and Material Use
- **CEE 494**: Sustainable Energy Technologies
- **CHE 468**: Polymer Principles and Processing
- **CHE 473**: Fuel Cells and Biofuel Cells
- **CHE 478**: Biomass Energy Conversion Technology
- **CHM 302**: Environmental Chemistry
- **EEE 360**: Energy Systems and Power Electronics
- **EEE 460**: Nuclear Power Engineering
- **EEE 463**: Electrical Power Plants
- **EVE 302**: Environmental Engineering Fundamentals: Physical and Chemical Processes
- **MAE 494**: Energy Efficiency
- **MAE 494**: Solar Thermal Engineering
- **MEE 434**: Internal Combustion Engines

### Upper Division Technical Electives continued

- **MAT 300**: Mathematical Structures (L)
- **MAT 310**: Introduction to Geometry
- **MAT 371**: Advanced Calculus I
- **MAT 420**: Scientific Computing
- **MAT 421**: Applied Computational Methods (CS)
- **MAT 423**: Numerical Analysis I (CS)
- **MAT 425**: Numerical Analysis II (CS)
- **MAT 451**: Mathematical Modeling (CS)
- **MAT 461**: Applied Complex Analysis
- **MAT 462**: Applied Partial Differential Equations
- **MSE 330**: Thermodynamics of Materials
- **MSE 355**: Structure and Defects
- **MSE 440**: Mechanical Behavior of Materials
- **MSE 450**: Introduction to Materials Characterization
- **MSE 457**: Quantum Mechanics for Understanding Properties of Atoms and Solids
- **MSE 460**: Nanomaterials in Energy Production and Storage
- **MSE 476**: Growth and Processing of Semiconductors
- **MSE 494**: Bioinspired Materials and Biomaterials
- **MSE 494**: Electrochemical Energy Storage and Conversion

For additional information about Upper Division Energy and Environment Technical Electives, please go to: [Upper Division Energy and Environment Technical Electives & Upper Division Technical Electives](#)
MEE 440: Renewable Energy: Mechanical Systems
MEE 441: Wind Energy
MSE 460: Nanomaterials in Energy Production and Storage
MSE 494: Electrochemical Energy Storage and Conversion

By approval only:
MAE 484: Internship
MAE 492: Honors Directed Study
MAE 493: Honors Thesis (L)
MAE 498: Pro-Seminar or MAE 499: Individualized Instruction

*Students who do not meet the enrollment requirements for these courses may be allowed to enroll with instructor consent. Courses not listed here require a program petition prior to enrollment. Please check with your advisor. A max of 3 credits from MAE 484/498/499 can be applied toward the TE requirements.

CHE 478: Biomass Energy Conversion Technology
CHE 494: Nanobiotechnology
CHE 494: Six Sigma Methodology/Engineering Experimentation
CHM 302: Environmental Chemistry
CHM 325: Analytical Chemistry
EEE 304: Signals and Systems II
EEE 333: Hardware Design Languages and Programmable Logic
EEE 334: Circuits II
EEE 350: Random Signal Analysis
EEE 360: Energy Systems and Power Electronics
EEE 407: Digital Signal Processing
EEE 434: Quantum Mechanics for Engineers
EEE 460: Nuclear Power Engineering
EEE 463: Electrical Power Plants
EEE 480: Feedback Systems
EEE 481: Computer-Controlled Systems
EEE 498: Foundations Machine Learning: From Theory to Pract
EEE 498: Science and Technology of Solar Cell Fabrication
EGR 317: Humanitarian Engineering Project II
EGR 433: Transforms and Systems Modeling
EGR 455: Robotic Systems I
EGR 456: Robotic Systems II
EGR 494: Engineering in Semiconductors and Microelectronics
EVE 302: Environmental Engineering Fundamentals: Physical and Chemical Processes
FSE 301: Entrepreneurship and Value Creation
GLG 418: Geophysics
FSE 394: Engineering in Global Context
IEE 300: Economic Analysis for Engineers
IEE 305: Information Systems Engineering (CS)
IEE 376: Operations Research Deterministic Techniques/Applications
MSE 494: Failure Analysis of Metallic Materials
MSE 494: Intro to FEA for Matl Design and Characterization
MSE 494: Manufacturing Processes for Structural Materials
PHY 310: Classical Particles, Fields, and Matter I
PHY 361: Introductory Modern Physics
SES 311: Essentials of Astrobiology: Exploration for Life in the Universe
SES 350: Engineering Systems and Experimental Problem Solving
SES 407: Space Works II: Model, Fabricate and Test
SES 494: Modeling and Analysis of Space Thermal Systems
SES 494: ASU SpaceWorks Project Level 3-Model, Test, Build

By approval only:
MAE 484: Internship
MAE 492: Honors Directed Study
MAE 493: Honors Thesis (L)
MAE 498: Pro-Seminar or MAE 499: Individualized Instruction

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Notes:

- First-Year Composition: All students are placed in ENG 101 unless submission of SAT, ACT, Accuplacer, IELTS, or TOEFL score, or college-level transfer credit or test credit equivalent to ASU's first-year composition course(s), determine otherwise. Students on Polytechnic, Downtown Phoenix and West Campuses are encouraged to complete the Directed Self-Placement survey to choose the first-year composition option they believe best suits their needs. Visit: https://cisa.asu.edu/DSP

- Mathematics Placement Assessment score determines placement in first mathematics course.

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 2021 - 2022 academic year.