2022 - 2023 Major Map
Mechanical Engineering (Energy and Environment), BSE
School/College: Ira A. Fulton Schools of Engineering
Location: Tempe campus
ESMAEEBSE

<table>
<thead>
<tr>
<th>Term 1 0 - 16 Credit Hours Critical course signified by ✅</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></td>
</tr>
<tr>
<td>ASU 101-MEE: 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>
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<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>
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<tr>
<td>Humanities, Arts and Design (HU) AND Cultural Diversity in the U.S. (C)</td>
<td>3</td>
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<tr>
<td>Minimum 2.00 GPA ASU Cumulative.</td>
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<tr>
<td>Term hours subtotal:</td>
<td>16</td>
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<table>
<thead>
<tr>
<th>Term 2 16 - 32 Credit Hours Critical course signified by ✅</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 242: Elementary Linear Algebra</td>
<td>2</td>
<td>C</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>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>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>Complete ENG 101 OR ENG 105 OR ENG 107 course(s).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum 2.00 GPA ASU Cumulative.</td>
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<td></td>
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</tr>
<tr>
<td>Term hours subtotal:</td>
<td>16</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Term 3 32 - 46 Credit Hours Critical course signified by ✅</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></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>
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</tr>
<tr>
<td>* Prep for success using the Sophomore Guide.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Hours</td>
<td>Minimum Grade</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------------------------------------------------</td>
<td>-------</td>
<td>---------------</td>
</tr>
<tr>
<td>MAE 202</td>
<td>Mechanics of Particles and Rigid Bodies II: Dynamics</td>
<td>3</td>
<td>C</td>
</tr>
<tr>
<td>MAE 213</td>
<td>Mechanics of Materials</td>
<td>3</td>
<td>C</td>
</tr>
<tr>
<td>MAE 241</td>
<td>Introduction to Thermodynamics</td>
<td>3</td>
<td>C</td>
</tr>
<tr>
<td>EEE 202</td>
<td>Circuits I</td>
<td>4</td>
<td>C</td>
</tr>
<tr>
<td>MAE 384</td>
<td>Advanced Mathematical Methods for Engineers (CS)</td>
<td>3</td>
<td>C</td>
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</tbody>
</table>

Term hours subtotal: 14

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

Term hours subtotal: 16

<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>MAE 318</td>
<td>System Dynamics and Control I</td>
<td>4</td>
<td>C</td>
<td>• Research and prepare for graduate school.</td>
</tr>
<tr>
<td>MEE 340</td>
<td>Heat Transfer</td>
<td>3</td>
<td>C</td>
<td>• Apply for an engineering 4+1 program</td>
</tr>
<tr>
<td>MAE 400</td>
<td>Engineering Profession (L)</td>
<td>3</td>
<td>C</td>
<td>• Develop a professional profile online.</td>
</tr>
<tr>
<td>MEE 323</td>
<td>Computer-Aided Engineering II</td>
<td>2</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>MAE 342</td>
<td>Principles of Mechanical Design</td>
<td>3</td>
<td>C</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: 15

<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>MEE 445</td>
<td>Energy Systems Design I</td>
<td>1</td>
<td>C</td>
<td>• For additional information about Upper Division Energy and Environment Technical Electives, please see: Upper Division Energy and Environment Technical Electives.</td>
</tr>
<tr>
<td>MEE 482</td>
<td>Intermediate Thermodynamics</td>
<td>3</td>
<td>C</td>
<td>• Plan for success using the Senior Guide.</td>
</tr>
<tr>
<td>MAE 417</td>
<td>System Dynamics and Control II OR MEE 491:</td>
<td>3</td>
<td>C</td>
<td>• Apply for full-time positions.</td>
</tr>
<tr>
<td>PUP 190</td>
<td>Sustainable Cities ((HU or SB) &amp; G) OR GPH 314:</td>
<td>3</td>
<td>C</td>
<td>• Complete an in person or virtual practice interview.</td>
</tr>
</tbody>
</table>

Upper Division Energy and Environment Technical Elective

Term hours subtotal: 13
### Upper Division Technical Electives

- AEE OR MAE OR MEE Upper Division Elective
- AST 321: Introduction to Planetary and Stellar Astrophysics
- AST 322: Introduction to Galactic and Extragalactic Astrophysics
- 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
- CEE 449: Energy Efficient Buildings and Systems
- CEE 494: Sustainable Energy and Material Use
- CEE 494: Sustainable Energy Technologies
- 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

### Upper Division Energy and Environment Technical Electives

- MEE 446: Energy Systems Design II
- MAE 417: System Dynamics and Control II OR MEE 491: Experimental Mechanical Engineering (L)
- SOS 171: The Thread of Energy (SB & G) OR GCU 364: Energy in the Global Arena (SB & G)

### Upper Division Technical Elective

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

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**Term 8 106 - 120 Credit Hours**

**Necessary course signified by 🌟**

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
<th>Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEE 446: Energy Systems Design II</td>
<td>2</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>MAE 417: System Dynamics and Control II OR MEE 491: Experimental Mechanical Engineering (L)</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>SOS 171: The Thread of Energy (SB &amp; G) OR GCU 364: Energy in the Global Arena (SB &amp; G)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Upper Division Technical Elective**

- Upper Division Technical Elective

**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 466: Electrochemical Energy Storage and Conversion
- MSE 476: Growth and Processing of Semiconductors

**Term hours subtotal:** 14

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For additional information about Upper Division Energy and Environment Technical Electives, & Upper Division Technical Electives, please go to: [Upper Division Energy and Environment Technical Electives & Upper Division Technical Electives](#).

Hide Course List(s)/Track Group(s)
MEE 434: Internal Combustion Engines
MEE 440: Renewable Energy: Mechanical Systems
MEE 441: Wind Energy
MSE 460: Nanomaterials in Energy Production and Storage
MSE 466: Electrochemical Energy Storage and Conversion

By approval only:
MAE 484: Internship
MAE 492: Honors Directed Study
MAE 493: Honors Thesis (L)
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 484/499 can be applied toward the TE requirements.

CEE 494: 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
CHE 494: Nanobiotechnology
CHE 494: Quantum Mechanical Simulations of Chemical Process
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

MSE 494: Bioinspired Materials and Biomaterials
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 307: SW3-Structural Modeling: Model, Test, Build
SES 407: Space Works II
SES 494: Modeling and Analysis of Space Thermal Systems

By approval only:
MAE 484: Internship
MAE 492: Honors Directed Study
MAE 493: Honors Thesis (L)
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 484/499 can be applied toward the TE requirements.
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 2022 - 2023 academic year.