

## 2024 - 2025 Major Map

### Materials Science and Engineering, BSE

School/College: [Ira A. Fulton Schools of Engineering](#)  
ESMSEBSE

Term 1 0 - 16 Credit Hours <b>Critical course signified by</b> 	Hours	Minimum Grade	Notes
 MAT 265: Calculus for Engineers I (MATH OR MA)	3	C	<ul style="list-style-type: none"> <li>ASU 101 or college-specific equivalent First-Year Seminar required of all first-year students.</li> <li>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.</li> <li>If students take ENG 105, a 3 credit hour applicable elective must also be taken prior to graduation. See advisor.</li> <li>Prep for success using the <a href="#">First-Year Student Guide</a>.</li> <li>Join a <a href="#">Fulton community</a>.</li> <li>Explore <a href="#">engineering and technical professions</a>.</li> </ul>
ASU 101-MSE: The ASU Experience	1		
ENG 101: First-Year Composition or ENG 102: First-Year Composition OR ENG 105: Advanced First-Year Composition OR ENG 107: First-Year Composition or ENG 108: First-Year Composition	3	C	
FSE 100: Introduction to Engineering	2		
CHM 114: General Chemistry for Engineers (SCIT OR SQ) OR CHM 116: General Chemistry II (SCIT OR SQ)	4	C	
Humanities, Arts and Design (HUAD)	3		
 Minimum 2.00 GPA ASU Cumulative.			
Term hours subtotal:	16		

Term 2 16 - 32 Credit Hours <b>Critical course signified by</b> 	Hours	Minimum Grade	Notes
 PHY 121: University Physics I: Mechanics (SCIT OR SQ)	3	C	<ul style="list-style-type: none"> <li>Create a <a href="#">Handshake</a> profile.</li> <li>Get involved with EPICS, the Generator Labs, and the <a href="#">Fulton Start-Up Center</a>.</li> </ul>
 PHY 122: University Physics Laboratory I (SCIT OR SQ)	1	C	
 MAT 266: Calculus for Engineers II (MATH OR MA)	3	C	
ENG 101: First-Year Composition or ENG 102: First-Year Composition OR ENG 105: Advanced First-Year Composition OR ENG 107: First-Year Composition or ENG 108: First-Year Composition	3	C	
MSE 250: Structure and Properties of Materials	3	C	
Humanities, Arts and Design (HUAD)	3		
 Complete CHM 114 OR CHM 116 course(s).			
 Complete ENG 101 OR ENG 105 OR ENG 107 course(s).			
 Minimum 2.00 GPA ASU Cumulative.			
Term hours subtotal:	16		

Term 3 32 - 48 Credit Hours <b>Critical course signified by</b> 	Hours	Minimum Grade	Notes
 MAT 267: Calculus for Engineers III (MATH OR MA)	3	C	<ul style="list-style-type: none"> <li>Prep for success using the <a href="#">Sophomore Guide</a>.</li> </ul>
 MSE 215: Materials Synthesis	3		
 PHY 131: University Physics II: Electricity and Magnetism (SCIT OR SQ)	3	C	
 PHY 132: University Physics Laboratory II (SCIT OR SQ)	1	C	

Math or Science Elective	3-4
Social and Behavioral Sciences (SOBE)	3
❖ Complete MSE 250 course(s).	
❖ Complete First-Year Composition requirement.	
❖ Minimum 2.00 GPA ASU Cumulative.	
Complete Mathematics (MATH) requirement.	
Term hours subtotal:	16-17

Term 4 48 - 64 Credit Hours <b>Critical course signified by</b> ❖	Hours	Minimum Grade	Notes
❖ MAT 343: Applied Linear Algebra	3	C	<ul style="list-style-type: none"> <li>For additional information about Advanced Science Electives options, please go to: <a href="#">Advanced Science Electives</a>.</li> <li>Pursue an <a href="#">undergraduate research experience</a>.</li> <li>Apply for <a href="#">internships</a>.</li> <li>Attend <a href="#">career fairs and events</a>.</li> </ul>
❖ MAT 275: Modern Differential Equations (MATH OR MA)	3	C	
❖ MSE 211: Introduction to Mechanics of Materials	3	C	
❖ MSE 212: Microstructure and Properties Lab	1	C	
IEE 380: Probability and Statistics for Engineering Problem Solving (QTRS OR CS)	3		
Global Communities, Societies and Individuals (GCSI)	3		
❖ Minimum 2.00 GPA ASU Cumulative.			
Term hours subtotal:	16		

Term 5 64 - 80 Credit Hours <b>Necessary course signified by</b> ★	Hours	Minimum Grade	Notes
★ MSE 330: Thermodynamics of Materials	3		<ul style="list-style-type: none"> <li>Plan for success using the <a href="#">Junior Guide</a>.</li> <li>Network at <a href="#">student organization</a> competitions or professional societies.</li> </ul>
★ MSE 355: Structure and Defects	3	C	
★ MSE 356: Thin Film and Microelectronic Devices Lab	1		
MSE 415: Mathematical and Computer Methods in Materials (CS)	3		
MSE 457: Quantum Mechanics for Understanding Properties of Atoms and Solids	3		
American Institutions (AMIT)	3		
Term hours subtotal:	16		

Term 6 80 - 96 Credit Hours <b>Necessary course signified by</b> ★	Hours	Minimum Grade	Notes
★ MSE 450: Introduction to Materials Characterization	3		<ul style="list-style-type: none"> <li>For additional information about Materials Elective options, please go to: <a href="#">Materials Elective</a>.</li> <li>Research and prepare for <a href="#">graduate school</a>.</li> <li>Apply for an <a href="#">engineering 4+1 program</a>.</li> <li>Develop a <a href="#">professional profile online</a>.</li> </ul>
★ MSE 451: Nanomaterials and Electronics Characterization Lab	1		
★ MSE 482: Materials Engineering Design (L)	3		
★ MSE 335: Materials Kinetics	3		
MSE 458: Electronic, Magnetic, and Optical Properties	3		
Sustainability (SUST)	3		
Term hours subtotal:	16		

Term 7 96 - 109 Credit Hours <b>Necessary course signified by</b> ★	Hours	Minimum Grade	Notes
★ MSE 489: Capstone Design Project I (L)	1		<ul style="list-style-type: none"> <li>For additional information about Materials Elective options, please go to: <a href="#">Materials Elective</a>.</li> <li>Plan for success using the <a href="#">Senior Guide</a>.</li> <li>Use <a href="#">Handshake</a> to apply for full-time positions.</li> </ul>
MSE 440: Mechanical Behavior of Materials	3		
Complete 2 courses: Upper Division Materials Elective	6		
Governance and Civic Engagement (CIVI)	3		
Term hours subtotal:	13		

Term 8 109 - 120 Credit Hours <b>Necessary course signified by</b> ★	Hours	Minimum Grade	Notes
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★ MSE 490: Capstone Design Project II (L)	2
MSE 420: Advanced Metallurgical Alloys and Processes	3
Advanced Science Elective	3
Upper Division Technical Elective	3
Term hours subtotal:	11

- 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](#).

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

Advanced Science Elective	Math or Science Elective	Upper Division Materials Elective
ABS 225: Soils (SQ)	AST 111: Introduction to Solar Systems Astronomy (SCIT OR SQ)	Please choose two courses from the following options:
ABS 350: Applied Statistics (QTRS OR CS)	AST 112: Introduction to Stars, Galaxies, and Cosmology (SCIT OR SQ)	BME 318: Biomaterials
AST 321: Stellar and Planetary Astrophysics	BIO 130: Introduction to Environmental Science (SCIT OR SQ)	CHE 468: Polymer Principles and Processing
AST 322: Introduction to Galactic and Extragalactic Astrophysics	BIO 181: General Biology I (SCIT OR SQ)	MSE 470: Polymers and Composites
AST 421: Astrophysics I	BIO 182: General Biology II (SCIT OR SG)	MSE 471: Introduction to Ceramics
BCH 341: Physical Chemistry with a Biological Focus	BIO 201: Human Anatomy and Physiology I (SCIT OR SG)	MSE 494: Polymer Synthesis, Characterization, & Processing
BCH 361: Advanced Principles of Biochemistry	CHM 113: General Chemistry I (SCIT OR SQ)	MSE 494: Electrochemical Materials Science
BIO 201: Human Anatomy and Physiology I (SCIT OR SG)	CHM 231: Elementary Organic Chemistry (SCIT OR SQ)	MSE 494: Semiconductor materials, devices, and fabrication
BIO 320: Fundamentals of Ecology	CHM 233: General Organic Chemistry I	
CHM 231: Elementary Organic Chemistry (SCIT OR SQ)	GLG 101: Introduction to Geology I (Physical) (SCIT OR SQ)	
CHM 233: General Organic Chemistry I	MAT 211: Mathematics for Business Analysis	
CHM 234: General Organic Chemistry II	MAT 243: Discrete Mathematical Structures	
CHM 302: Environmental Chemistry	PHY 201: Mathematical Methods in Physics I (MATH OR CS)	
CHM 325: Analytical Chemistry		
CHM 341: Elementary Physical Chemistry		
CHM 345: Physical Chemistry I		
CHM 346: Physical Chemistry II		
CHM 433: Advanced Organic Chemistry I		
CHM 481: Geochemistry or GLG 481: Geochemistry		
ENV 410: Soil Science		
GLG 321: Mineralogy		
GLG 404: Fundamentals of Planetary Geology		
GLG 418: Geophysics		

PHY 201: Mathematical Methods in Physics  
I (MATH OR CS)

PHY 241: University Physics III

PHY 334: Advanced Laboratory I (L)

PHY 361: Introductory Modern Physics

PHY 494: Adv. Scanning Electron  
Microscopy/Microanalysis

#### Technical Electives

Advanced Science Elective

ART 494: Foundry Research Methods for  
Non-Majors

CEE 353: Civil Engineering Materials

CHE 211: Introduction to Chemical  
Processing

CHE 494: Fundamentals of Scaleup

CHE 494: Innovation in Engineering

CHE 494: Quantum Mechanical Simulations  
of Chemical Process or MSE 494: Quantum  
Mechanical Simulations of Chemical Process

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

EGR 494: Engineering in Semiconductors  
and Microelectronics

FSE 301: Entrepreneurship and Value  
Creation

FSE 404: EPICS Gold: EPICS in Action

FSE 494: History and Technology of  
Microelectronics

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

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MAT 300: Mathematical Structures (L)  
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MEE 322: Structural Mechanics  
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MEE 342: Principles of Mechanical Design  
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MFG 472: Additive Manufacturing  
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MSE 4\*\* Elective  
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PUP 442: Environmental Planning  
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SES 311: Essentials of Astrobiology:  
Exploration for Life in the Universe  
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By approval only:  
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MSE 484: Internship  
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MSE 492: Honors Directed Study  
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MSE 493: Honors Thesis (L)  
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MSE 499: Individualized Instruction  
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\*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.  
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- **Total Hours:** 120
- **Upper Division Hours:** 45 minimum
- **University Undergraduate Graduation Requirements**

**Notes:**

Mathematics Placement Assessment score determines placement in first mathematics course.

General Studies designations listed next to courses on the major map were valid for the 2024 - 2025 academic year. Please refer to the course catalog for current General Studies designations at time of class registration. General Studies credit is applied according to the designation the course carries at the time the class is taken.