2022 - 2023 Major Map
Materials Science and Engineering, BSE

School/College: Ira A. Fulton Schools of Engineering
ESMSEBSE

Term 1 0 - 16 Credit Hours Critical course signified by	Hours	Minimum Grade	Notes
MAT 265: Calculus for Engineers I (MA)	3	C	• 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.
ASU 101-MSE: The ASU Experience	1		
CHM 114: General Chemistry for Engineers (SQ) OR CHM 116: General Chemistry II (SQ)	4	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	
FSE 100: Introduction to Engineering	2		
Social-Behavioral Sciences (SB) AND Global Awareness (G)	3		
Minimum 2.00 GPA ASU Cumulative.			
Term hours subtotal:	16		

Term 2 16 - 32 Credit Hours Critical course signified by	Hours	Minimum Grade	Notes
MAT 266: Calculus for Engineers II (MA)	3	C	• Create a Handshake profile. • Get involved with EPICS, the Generator Labs, and the Fulton Start-Up Center.
PHY 121: University Physics I: Mechanics (SQ)	3	C	
PHY 122: University Physics Laboratory I (SQ)	1	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 (HU) AND Cultural Diversity in the U.S. (C)	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 Critical course signified by	Hours	Minimum	Notes

		Grade	
MAT 267: Calculus for Engineers III (MA)	3	C	• For additional information about Math or Science Electives, please go to: Math or Science Electives. • Prep for success using the Sophomore Guide.
PHY 131: University Physics II: Electricity and Magnetism (SQ)	3	C	
PHY 132: University Physics Laboratory II (SQ)	1	C	
MSE 215: Materials Synthesis	3		
Math or Science Elective	3-4		
Social-Behavioral Sciences (SB) AND Historical Awareness (H)	3		
Complete MSE 250 course(s).			
Complete First-Year Composition requirement.			
Minimum 2.00 GPA ASU Cumulative.			
Complete Mathematics (MA) requirement.			
Term hours subtotal:	16-17		

Term 4 48 - 64 Credit Hours Critical course signified by	**Hours**	**Minimum Grade**	**Notes**
MAT 275: Modern Differential Equations (MA)	3	C	• 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.
MAT 343: Applied Linear Algebra	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 (CS)	3		
Advanced Science Elective	3		
Minimum 2.00 GPA ASU Cumulative.			
Term hours subtotal:	16		

Term 5 64 - 80 Credit Hours Necessary course signified by	**Hours**	**Minimum Grade**	**Notes**
MSE 330: Thermodynamics of Materials	3		• Plan for success using the Junior Guide. • Network at student organization competitions or professional societies.
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		
Humanities, Arts and Design (HU)	3		

Term hours subtotal:	16	

Term 6 80 - 93 Credit Hours Necessary course signified by ★	Hours	Minimum Grade	Notes
★ MSE 335: Materials Kinetics	3		• For additional information about Materials Elective options, please go to: Materials Elective. • Research and prepare for graduate school. • Apply for an engineering 4+1 program. • Develop a professional profile online.
★ MSE 450: Introduction to Materials Characterization	3		
★ MSE 451: Nanomaterials and Electronics Characterization Lab	1		
MSE 420: Advanced Metallurgical Alloys and Processes	3		
MSE 458: Electronic, Magnetic, and Optical Properties	3		
★ Complete Cultural Diversity in the U.S. (C) AND Global Awareness (G) AND Historical Awareness (H) course(s).			
Term hours subtotal:	13		

Term 7 93 - 106 Credit Hours Necessary course signified by ★	Hours	Minimum Grade	Notes
★ MSE 482: Materials Engineering Design (L)	3		• For additional information about Materials Elective options, please go to: Materials Elective. • Plan for success using the Senior Guide. • Use Handshake to apply for full-time positions. • Complete an in person or virtual practice interview.
★ MSE 489: Capstone Design Project I (L)	1		
MSE 440: Mechanical Behavior of Materials	3		
Complete 2 courses: Upper Division Materials Elective	6		
Term hours subtotal:	13		

Term 8 106 - 120 Credit Hours Necessary course signified by ★	Hours	Minimum Grade	Notes
★ MSE 490: Capstone Design Project II (L)	2		• For additional information about Advanced Science Electives and Technical Electives, please go to: Advanced Science Electives and Technical Electives.
Advanced Science Elective	3		
Complete 2 courses: Technical Elective	6		
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	Upper Division Materials Elective

Advanced Science Elective

AST 111: Introduction to Solar Systems Astronomy (SQ)

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

BIO 130: Introduction to Environmental Science (SQ)

BIO 181: General Biology I (SQ)

BIO 182: General Biology II (SG)

CHM 113: General Chemistry I (SQ)

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

MAT 243: Discrete Mathematical Structures

ABS 225: Soils (SQ)

ABS 350: Applied Statistics (CS)

AST 321: Introduction to Planetary and Stellar Astrophysics

AST 322: Introduction to Galactic and Extragalactic Astrophysics

AST 421: Astrophysics I

BCH 341: Physical Chemistry with a Biological Focus

BCH 361: Advanced Principles of Biochemistry

BIO 201: Human Anatomy and Physiology I (SG)

BIO 320: Fundamentals of Ecology

CHM 231: Elementary Organic Chemistry (SQ)

CHM 233: General Organic Chemistry I

CHM 234: General Organic Chemistry II

CHM 302: Environmental Chemistry

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

ENV 410: Soil Science

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

Please choose two courses from the following options:

BME 318: Biomaterials

CHE 468: Polymer Principles and Processing

MSE 470: Polymers and Composites

MSE 471: Introduction to Ceramics

MSE 494: Polymer Synthesis, Characterization, & Processing

Technical Electives

Advanced Science Elective

CEE 294: AutoCAD Civil 3-D

CEE 353: Civil Engineering Materials

CHE 211: Introduction to Chemical Processing

CHE 494: Fundamentals of Scaleup

CHE 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
- 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
- MAT 300: Mathematical Structures (L)
- MEE 322: Structural Mechanics
- MEE 342: Principles of Mechanical Design
- PUP 442: Environmental Planning
- SES 311: Essentials of Astrobiology: Exploration for Life in the Universe
- By approval only:
- MSE 484: Internship
- MSE 492: Honors Directed Study
- MSE 493: Honors Thesis (L)
- MSE 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.

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 next to courses on the major map were valid for the 2022 - 2023 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.