2021 - 2022 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).			
!	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	
IEE 380: Probability and Statistics for Engineering Problem Solving (CS)	3		
MSE 212: Microstructure and Properties Lab	1	C	
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 355: Structure and Defects	3	C	• Plan for success using the Junior Guide. • Network at student organization competitions or professional societies.
MSE 330: Thermodynamics of Materials	3		
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 420: Advanced Metallurgical Alloys and Processes	3		
MSE 450: Introduction to Materials Characterization	3		
MSE 451: Nanomaterials and Electronics Characterization Lab	1		
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 489: Capstone Design Project I (L)	1		• 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 440: Mechanical Behavior of Materials	3		
MSE 482: Materials Engineering Design (L)	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	Materials Elective
Advanced Science Elective	ABS 225: Soils (SQ)	Please choose two courses from the following options:
	ABS 350: Applied Statistics (CS)	

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)

BIO 201: Human Anatomy and Physiology I (SG)

CHM 113: General Chemistry I (SQ)

CHM 231: Elementary Organic Chemistry (SQ)

CHM 233: General Organic Chemistry I

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

MAT 243: Discrete Mathematical Structures

PHY 201: Mathematical Methods in Physics I (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

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

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 2021 - 2022 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.