2017 - 2018 Major Map
Biomedical Engineering, BSE

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

Term 1 0 - 16 Credit Hours Critical course signified by	Hours	Minimum Grade	Notes
CHM 114: General Chemistry for Engineers (SQ) or CHM 116: General Chemistry II (SQ)	4	C	• An SAT, ACT, Accuplacer, IELTS, or TOEFL score determines placement into first-year composition courses. • ASU Mathematics Placement Test score determines placement in mathematics course. • ASU 101 or College specific equivalent First Year Seminar required of all students. • If ENG 105 taken, a 3 hr applicable elective must also be taken prior to graduation. See Advisor. • Prep for success using the Freshman Guide. • Join a Fulton community. • Explore engineering and technical professions.
MAT 265: Calculus for Engineers I (MA)	3	C	
ASU 101-BME: The ASU Experience	1	C	
BME 100: Introduction to Biomedical Engineering	4	C	
BME 182: Biomedical Engineering Product Design and Development I	1	C	
ENG 101 or ENG 102: First-Year Composition OR ENG 105: Advanced First-Year Composition OR ENG 107 or ENG 108: First-Year Composition	3	C	
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	
BME 111: Engineering Perspectives on Biological Systems	3	C	
CSE 100: Principles of Programming with C++ (CS)	3	C	
ENG 101 or ENG 102: First-Year Composition OR ENG 105: Advanced First-Year Composition OR ENG 107 or ENG 108: First-Year Composition	3	C	
Complete BME 111 AND BME 100 course(s).			
Minimum 2.00 GPA ASU Cumulative.			
Complete ENG 101 OR ENG 105 OR ENG 107 course(s).			
Term hours subtotal:	16		

Term 3 32 - 48 Credit Hours Critical course signified by	Hours	Minimum Grade	Notes
MAT 267: Calculus for Engineers III (MA)	3	C	• 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
	BME 213: Biomedical and Bioengineering Ethics	1	C
	BME 214: FDA Regulatory Processes and Technical Communications	1	C
	BME 235: Physiology for Engineers	4	C
	ECN 211: Macroeconomic Principles (SB) OR ECN 212: Microeconomic Principles (SB)	3	C
	Minimum 2.00 GPA ASU Cumulative.		
	Complete Mathematics (MA) requirement.		
	Term hours subtotal:	16	

- Consult the Resume, Presentation, and Resource Library for tips on how to create a technical resume, job shadow, do informational interviews and mentor with alumni.

Term 4 48 - 63 Credit Hours Critical course signified by	**Hours**	**Minimum Grade**	**Notes**
BME 200: Conservation Principles in Biomedical Engineering	3	C	
MAT 275: Modern Differential Equations (MA)	3	C	
BME 282: Biomedical Engineering Product Design and Development II	1	C	
CHM 231: Elementary Organic Chemistry (SQ) OR CHM 233: General Organic Chemistry I	3	C	
CHM 235: Elementary Organic Chemistry Laboratory (SQ) OR CHM 237: General Organic Chemistry Laboratory I	1	C	
EEE 202: Circuits I	4	C	
Term hours subtotal:	15		

- Pursue an undergraduate research experience.
- Apply for internships.
- Attend career fairs and events.

Term 5 63 - 78 Credit Hours Necessary course signified by	**Hours**	**Minimum Grade**	**Notes**
BME 350: Signals and Systems for Bioengineers	3	C	
BME 300: Bioengineering Product Design	3	C	
BME 318: Biomaterials	4	C	
BME 322: Statistics for Biomedical Engineering	1	C	
Social-Behavioral Sciences (SB) AND Global Awareness (G)	3		
Upper Division Related Elective	1	C	
Term hours subtotal:	15		

- Plan for success using the Junior Guide.
- Network at student organization competitions or professional societies.

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

★	BME 370: Microcomputer Applications in Biomedical Engineering	3	C
	BME 301: Numerical Methods in Biomedical Engineering	2	C
	BME 331: Transport Phenomena for Biomedical Engineering	3	C
	BME 382: Biomedical Engineering Product Design and Development III	1	C
	BME 340: Thermodynamics for Biomedical Engineers	3	C
	Humanities, Arts and Design (HU) AND Cultural Diversity in the U.S. (C)	3	
	Term hours subtotal:	15	

- The general studies requirements for HU or SB and the awareness areas do not have to be taken in exact combinations (as outlined on major map). By the end of term 8, all need to be completed, however the combinations may vary.
- Research and prepare for graduate school.
- Apply for an engineering 4+1 program.
- Develop a professional profile online.

Term 7 93 - 107 Credit Hours Necessary course signified by ★	**Hours**	**Minimum Grade**	**Notes**
★ BME 417: Biomedical Engineering Capstone Design I (L)	4	C	
BME 413: Biomedical Instrumentation (L)	3	C	
BME 416: Biomechanics	3	C	
BME 423: Biomedical Instrumentation Laboratory (L)	1	C	
Upper Division Related Elective	3	C	
Term hours subtotal:	14		

- The general studies requirements for HU or SB and the awareness areas do not have to be taken in exact combinations (as outlined on major map). By the end of term 8, all need to be completed, however the combinations may vary.
- Additional information regarding approved related electives can be found online here.
- Plan for success using the Senior Guide.
- Apply for full-time positions.
- Complete an in-person or practice interview.

Term 8 107 - 120 Credit Hours Necessary course signified by ★	**Hours**	**Minimum Grade**	**Notes**
★ BME 490: Biomedical Engineering Capstone Design II	4	C	
Upper Division Related Elective	3	C	
Upper Division Humanities, Arts and Design (HU) OR Upper Division Social-Behavioral Sciences (SB)	3		
Humanities, Arts and Design (HU) AND Historical Awareness (H)	3		
Term hours subtotal:	13		

- The general studies requirements for HU or SB and the awareness areas do not have to be taken in exact combinations (as outlined on major map). By the end of term 8, all need to be completed, however the combinations may vary.
- Additional information regarding approved related electives can be found online here.

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

Upper Division Related Elective (Imaging)	Upper Division Related Elective (Professional)	Upper Division Related Elective (Biomechanics)
EEE 307: Signal Processing for Digital Culture	BME 394: SBHSE Research Projects or BME 394: Honors Research	ASM 341: Human Osteology
EEE 334: Circuits II		BIO 312: Bioethics (HU) or PHI 320:

EEE 350: Random Signal Analysis

EEE 352: Properties of Electronic Materials

EEE 407: Digital Signal Processing

EEE 480: Feedback Systems

EEE 481: Computer-Controlled Systems

PHY 361: Introductory Modern Physics

BME 484: Industrial

BME 492: Honors Directed Study

BME 493: Honors Thesis (L)

FSE 394: Transfer Success in Engineering

FSE 494: EPICS Gold: EPICS in Action

Bioethics (HU)

BME 416: Biomechanics

FSE 301: Entrepreneurship and Value Creation

IND 464: Collaborative Design Development I (L)

IND 465: Collaborative Design Development II (L)

KIN 334: Functional Anatomy and Kinesiology

KIN 335: Biomechanics

KIN 340: Physiology of Exercise

KIN 348: Psychological Skills for Optimal Performance (SB)

KIN 352: Psychosocial Aspects of Physical Activity (SB & C)

KIN 412: Biomechanics of the Skeletal System

KIN 413: Qualitative Analysis in Sport Biomechanics

KIN 414: Electromyographic Kinesiology (L)

KIN 440: Exercise Biochemistry

MAE 318: System Dynamics and Control I

MEE 322: Structural Mechanics

MAE 341: Mechanism Analysis and Design or FSE 301: Entrepreneurship and Value Creation

Upper Division Related Elective (Math)

IND 464: Collaborative Design Development I (L)

IND 465: Collaborative Design Development II (L)

MAE 384: Advanced Mathematical Methods for Engineers (CS)

MAT 300: Mathematical Structures (L)

MAT 310: Introduction to Geometry

MAT 342: Linear Algebra

MAT 343: Applied Linear Algebra

MAT 355: Introduction to Computational Molecular Biology (CS)

MAT 394: Forensic DNA Analysis

MAT 451: Mathematical Modeling (CS)

MAT 460: Vector Calculus

PAF 301: Applied Statistics (CS)

STP 326: Intermediate Probability (CS)

Upper Division Related Elective (Pre-Medical)

BCH 361: Advanced Principles of Biochemistry

BCH 461: General Biochemistry

BIO 302: Cancer--Mother of All Diseases (L)

BIO 312: Bioethics (HU) or PHI 320: Bioethics (HU)

BIO 340: General Genetics

BIO 353: Cell Biology

BIO 355: Introduction to Computational Molecular Biology (CS)

BIO 360: Animal Physiology

BIO 390: Medical/Dental Field Placement

BIO 440: Functional Genomics

BIO 467: Neurobiology

BMI 465: Introduction to Comparative Genomics

Upper Division Related Elective (Business, Entrepreneurship, Management)

ACC 382: Accounting and Financial Analysis

AGB 302: International Management and Agribusiness (G)

BIO 312: Bioethics (HU) or PHI 320: Bioethics (HU)

BUA 380: Small Business Leadership

BUA 381: Small Business Accounting and Finance

BUA 383: Small Business Working Relationships

BUS 384: Business Operations and Planning

CHE 494: Six Sigma Methodology/Engineering Experimentation

CIS 300: Web Design and Development

STP 420: Introductory Applied Statistics (CS)

STP 421: Probability

STP 429: Experimental Statistics (CS)

CHE 475: Biochemical Engineering

CHM 341: Elementary Physical Chemistry

HCR 350: Introduction to Clinical Research

HCD 320: Applied Medical/Health Care Ethics (HU)

IND 464: Collaborative Design Development I (L)

IND 465: Collaborative Design Development II (L)

KIN 334: Functional Anatomy and Kinesiology

KIN 335: Biomechanics

KIN 412: Biomechanics of the Skeletal System

LES 305: Business Law and Ethics for Managers

MIC 314: HIV/AIDS: Science, Behavior, and Society

MIC 360: Bacterial Physiology

MIC 420: Immunology: Molecular and Cellular Foundations

NTR 457: Sports Nutrition

PAF 410: Building Leadership Skills (SB)

COM 312: Communication, Conflict, and Negotiation

ECN 306: Survey of International Economics (SB & G)

ENT 360: Entrepreneurship and Value Creation

FIN 300: Fundamentals of Finance

FIN 380: Personal Financial Management

FSE 301: Entrepreneurship and Value Creation

HON 394: Deductive Logic, Leadership/Management Techniques

HON 494: Genetics and the Law or HON 494: Information Measurement Theory I

IEE 300: Economic Analysis for Engineers

IEE 369: Work Analysis and Design (L)

IEE 320: Extreme Excel

IEE 431: Engineering Administration (L)

IND 464: Collaborative Design Development I (L)

IND 465: Collaborative Design Development II (L)

LES 305: Business Law and Ethics for Managers

LES 380: Consumer Perspective of Business Law

MGT 300: Organization and Management Leadership

MGT 302: Principles of International Business (G)

MGT 380: Management and Strategy for Nonmajors

MGT 447: Lean Launch

MKT 300: Marketing and Business Performance

MKT 370: Professional Sales and Relationship Management

MKT 390: Essentials of Marketing

MKT 391: Essentials of Selling

PAF 410: Building Leadership Skills (SB)

PHI 306: Applied Ethics (HU)

SCM 300: Global Supply Operations

SOC 334: Technology and Society (L or SB)

STS 304: Science, Technology, and Society (SB)

STS 332: Global Issues in Science and Technology (SB)

TWC 451: Copyright and Intellectual Property in the Electronic Age

Upper Division Related Elective (Neural)

BIO 312: Bioethics (HU) or PHI 320: Bioethics (HU)

BIO 360: Animal Physiology

BIO 467: Neurobiology

CSE 310: Data Structures and Algorithms

CSE 340: Principles of Programming Languages

CSE 412: Database Management

EDP 310: Emotional Intelligence (SB)

EDP 310: Gender Development (SB)

EDP 310: Learning and Memory (SB)

EDP 310: Motivation (SB)

EDP 310: Understanding the Brain (SB)

EEE 350: Random Signal Analysis

EEE 480: Feedback Systems

EEE 481: Computer-Controlled Systems

FSE 301: Entrepreneurship and Value Creation

IND 464: Collaborative Design Development I (L)

IND 465: Collaborative Design Development II (L)

MAE 318: System Dynamics and Control I

MAE 417: System Dynamics and Control II

PSY 325: Physiological Psychology

PSY 470: Psychopharmacology

Upper Division Related Elective (Molecular, Cellular, Materials)

BCH 361: Advanced Principles of Biochemistry

BCH 392: Introduction to Research Techniques

BCH 461: General Biochemistry

BCH 462: General Biochemistry

BCH 467: Analytical Biochemistry Laboratory (L)

BIO 302: Cancer--Mother of All Diseases (L)

BIO 312: Bioethics (HU) or PHI 320: Bioethics (HU)

BIO 331: Animal Behavior

BIO 340: General Genetics

BIO 345: Organic Evolution

BIO 353: Cell Biology

BIO 355: Introduction to Computational Molecular Biology (CS)

BIO 360: Animal Physiology

BIO 440: Functional Genomics

BIO 467: Neurobiology

BIO 494: Advanced Study Practicum: Anatomy & Physiology

BMI 465: Introduction to Comparative Genomics

CHE 475: Biochemical Engineering

CHM 302: Environmental Chemistry

CHM 341: Elementary Physical Chemistry

EEE 352: Properties of Electronic Materials

HON 494: Physical Science & Cancer

IND 464: Collaborative Design Development I (L)

IND 465: Collaborative Design Development II (L)

LSC 347: Fundamentals of Genetics

MEE 340: Heat Transfer

MBB 343: Genetic Engineering and Society (L)

MBB 347: Molecular Genetics: From Genes to Proteins

MBB 440: Functional Genomics

MIC 314: HIV/AIDS: Science, Behavior, and Society

MIC 360: Bacterial Physiology

MIC 420: Immunology: Molecular and Cellular Foundations

MSE 301: Materials and Civilization

MSE 330: Thermodynamics of Materials

MSE 335: Materials Kinetics and Processing

MSE 355: Structure and Defects

MSE 356: Structures, Properties, and Defects Lab

MSE 415: Mathematical and Computer Methods in Materials (CS)

MSE 420: Physical Metallurgy

MSE 421: Physical Metallurgy Laboratory

MSE 440: Mechanical Behavior of Materials

MSE 442: Fatigue, Fracture, and Creep of Materials

MSE 450: Introduction to Materials Characterization

MSE 451: Introduction to Materials Characterization Lab

MSE 458: Introduction to Electronic, Magnetic, and Optical Properties

MSE 460: Nanomaterials in Energy Production and Storage

MSE 470: Polymers and Composites

MSE 471: Introduction to Ceramics

MSE 482: Materials Engineering Design (L)

MSE 494: Bioinspired Materials and Biomaterials

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 2017 - 2018 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.