

Biological Engineering Major Degree Plan

Biological Engineering is divided into a preprofessional and a professional program involving either a four-year or a five-year schedule that will satisfy the requirements for a BS degree in Biological Engineering. Students receiving credit from the College Level Examination Program (CLEP) or from Advanced Placement (AP) may complete a BS degree program in less than four years. The academic work, particularly in the junior and senior years, is supplemented by hands-on laboratories which are required as part of the coursework. Modification in the program to meet special needs and priorities of a student may be obtained with the approval of the department head and advisor.

Suggested Semester Schedule (126 credits)

Preengineering: Freshman and Sophomore

Freshman Year (31 credits)

Fall Semester (14 credits)

BIE 1890 ³ Introduction to Undergraduate Research Methods	1
BIOL 1610 (BLS) ^{1,3} Biology I	4
CHEM 1210 ³ Principles of Chemistry I	4
CHEM 1215 ³ Chemical Principles Laboratory I	1
MATH 1210 (QL) ³ Calculus I	4

Spring Semester (17 credits)

BIE 1880 ³ Engineering Quantification of Biological Processes	3
ETE 2270 ³ Computer Engineering Drafting	2
MATH 1220 (QL) ³ Calculus II	4
PHYS 2200 ³ Elements of Mechanics	2
University Studies Breadth courses	6

Sophomore Year (33 credits)

Fall Semester (16 credits)

BIE 2330 ³ Engineering Properties of Biological Materials	3
CHEM 2300 ³ Principles of Organic Chemistry	3
CHEM 2315 ³ Organic Chemistry Laboratory I	1
ENGR 2010 ³ Engineering Mechanics Statics	2
ENGL 2010 (CL2) ³ Intermediate Writing: Research Writing in a Persuasive Mode	3
MATH 2250 (QI) ³ Linear Algebra and Differential Equations	4

Spring Semester (17 credits)

BIE 2400 ³ Biological and Environmental Thermodynamics	3
BIOL 3300 (BLS) ¹ General Microbiology	4
ENGR 2030 ³ Engineering Mechanics Dynamics	3
ENGR 2450 ³ Numerical Methods for Engineers	3
ETE 2210 Electrical Engineering for Nonmajors	4

Professional Engineering: Junior and Senior

Junior Year (32 credits)

Fall Semester (15 credits)

BIE 3200 Introduction to Unit Operations in Biological Engineering	3
CEE 3500 Civil and Environmental Engineering Fluid Mechanics	3
STAT 3000 (QI) Statistics for Scientists	3
Technical Elective course ²	3
University Studies Breadth course	3

Spring Semester (17 credits)

BIE 3000 Instrumentation for Biological Systems	3
BIE 3670 Transport Phenomena in Bio-Environmental Systems	3
BIE 3870 Biological Engineering Design I	1
CHEM 3700 Introductory Biochemistry	3
CHEM 3710 Introductory Biochemistry Laboratory	1
Technical Elective course ²	3
University Studies Breadth course	3

Senior Year (32-34 credits)

Fall Semester (14-15 credits)

BIE 4880 (CI) Biological Engineering Design II	3
BIE 5020 Biological Systems Modeling and Controls	3
University Studies Depth Humanities and Creative Arts (DHA) course	2-3
Technical Elective courses ²	6

Spring Semester (18-19 credits)

BIE 4890 (CI) Biological Engineering Design III	3
Technical Elective courses ²	9
University Studies Breadth Physical Sciences (BPS) course	3-4
University Studies Depth Social Sciences (DSS) course	3

Technical Elective Courses (select 21 or more credits)

Students must select 9-21 credits from the **Biological Engineering Electives** and **Engineering Electives** categories.

Biological Engineering Electives (select 6-21 credits)

BIE 5600 Downstream Processes in Biological Engineering (Sp)	3
BIE 5610 Food and Bioprocess Engineering (F)	3
BIE 5620 Metabolic Engineering I	4
BIE 5630 Synthetic Biological Engineering	3
BIE 5680 Soil-based Waste Management (Sp)	2
BIE 5810 Biochemical Engineering (F)	3
BIE 5830 Management and Utilization of Biological Solids and Wastewater (F)	3
BIE 5840 Introduction to Biophotonics (F)	3
BIE 5850 Biomaterials Engineering (F)	3
BIE 5890 Tissue Engineering (Sp)	3
BIE 5910 Introduction to Biosensors (F)	3
BIE 5930 Special Studies: Biofuels	3
BIE 5930 Special Studies: Biofuels Systems Design	3

Engineering Electives (select 0-15 credits)

CEE 4200 Engineering Economics (F)	2
CEE 5680 Soil-based Waste Management (Sp)	2
MAE 5650 Additive Manufacturing Processes (Sp)	3

Technical Electives (suggested)⁴ (select 0-12 credits)

AV 4200 Composite Manufacturing Processes and Repair (Sp)	3
BIE 4250 Cooperative Practice (F,Sp,Su)	3
BIOL 1620 (BLS) Biology II (Sp)	4
BIOL 2320 Human Anatomy (Sp,Su)	4
BIOL 2420 Human Physiology (F,Sp,Su)	4
BIOL 3060 (QI) Principles of Genetics (F,Sp,Su)	4
BIOL 3100 (CI) Bioethics (Sp)	3
BIOL 5160 Methods in Biotechnology: Cell Culture (Sp)	3
BIOL 5210 Cell Biology (F)	3
BIOL 5230 Developmental Biology (Sp)	3
BIOL 5260 Methods in Biotechnology: Molecular Cloning (F)	3
BIOL 5620 Medical Physiology (F)	3
CHEM 1220 (BPS) Principles of Chemistry II (F,Sp,Su)	4
CHEM 2320 Organic Chemistry II (Sp)	4
CHEM 2325 Organic Chemistry Laboratory II (Sp)	1
CHEM 3070 (QI) Physical Chemistry (Sp)	3
ECE 2250 Electrical Circuits (F,Sp)	4
ECE 2700 Digital Circuits (F,Sp)	4
ENGR 2140 Strength of Materials (F,Sp,Su)	2
ETE 2020 Computer-Integrated Manufacturing Systems (Sp)	3
MAE 2160 Material Science (F,Sp)	3
MAE 2650 Manufacturing Processes (Sp)	3
NFS 4020 Advanced Nutrition (F)	3
NFS 5100 (QI) Sensory Evaluation of Food (Sp)	3
NFS 5110 (CI) Food Microbiology (Sp)	4

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PEP 4200 (QI) Biomechanics (F,Sp,Su).....	4
PHYS 2110 General Physics—Life Sciences I.....	4
PHYS 2120 (BPS) General Physics—Life Sciences II.....	4
PHYS 2210 (QI) General Physics—Science and Engineering I.....	4
PHYS 2220 (BPS/QI) General Physics—Science and Engineering II ..	4
PSC 3000 Fundamentals of Soil Science (F).....	4
PSC 5670 Environmental Soil Physics (F)	4

¹The Breadth Life Sciences (BLS) area in the University Studies Program is satisfied by the combination of BIOL 1610 and 3300.

²To emphasize bioprocesses, premedical, etc., contact department for suggested technical electives.

³This course is required for admission to the Professional Engineering Program (PEP).

⁴Other technical courses (especially science and engineering) may be accepted with prior written approval from the Department of Biological Engineering.