

September 2014
B.S. in Chemical and Biological Engineering
Technical Elective List

Notes:

1. **ALL courses on the bioscience elective list and the engineering elective list are also eligible as technical electives.**
2. ***This list is not exhaustive***; other science and engineering courses may be eligible. However, they should be at the 200 level or higher and have appropriate technical content. If you are interested in a course not on this list, ask your advisor or the Director of Undergraduate Studies before taking the course.
3. ***Plan ahead!*** if you are interested in a particular elective course, check the catalog to find out what prerequisites are required.
4. Courses marked with the symbol @ are not offered every year.

Course number (credits)	Title
Astronomy	
AA 301 [@] (5)	Astrophysics I
AA 302 [@] (5)	Astrophysics II
AA 303 [@] (5)	Astrophysics III
Bioagricultural Sciences and Pest Management	
BSPM 450 [@] (3)	Molecular Plant-Microbe Interactions
Biochemistry	
BC 463 (3)	Molecular Genetics
BC 465 (3)	Molecular Regulation of Cell Function
Biomedical Engineering	
BIOM 531 (3)	Materials Engineering
BIOM 532 (3)	Material Issues in Mechanical Design
BIOM 570 (3)	Bioengineering
BIOM 571 (3)	Biomechanics
BIOM 573 (3)	Structure and Function of Biomaterials
Biomedical Sciences	
BMS 410 (3)	Physiological Responses to the Environment
BMS 420 (3)	Cardiopulmonary Physiology
BMS 430 (3)	Endocrinology
BMS 450 (3)	Pharmacology
BMS 500 (4)	Mammalian Physiology I
BMS 501 (4)	Mammalian Physiology II
BMS 550 (3)	Electron Microscopy – TEM, SEM, and X-Ray
BMS 560 [@] (3)	Theory and Practice of Animal Biotechnology
Biotechnology	
BTEC 450 [@] (2)	Topics in Biotechnology
Botany/Zoology	
BZ 311 (4)	Developmental Biology
BZ 348 (4)	Theory of Population and Evolutionary Ecology

Course number (credits)	Title
BZ 440 (3)	Plant Physiology
BZ 441 (2)	Plant Physiology Laboratory
BZ 450 (4)	Plant Ecology
BZ 476 [®] (3)	Topics in Advanced Genetics
BZ 572 [®] (3)	Phytoremediation
<i>Cell and Molecular Biology</i>	
CM 501 (4)	Advanced Cell Biology
CM 502 (2)	Techniques in Molecular & Cellular Biology
<i>Chemistry</i>	
CHEM 261 (3)	Fundamentals of Inorganic Chemistry
CHEM 331 (3)	Quantitative Analysis – Biological Sciences
CHEM 334 (1)	Quantitative Analysis Laboratory – Biological
CHEM 335 (3)	Introduction to Analytical Chemistry
CHEM 332 (2)	Quantitative Analysis Laboratory
CHEM 431 (4)	Instrumental Analysis
CHEM 433 [®] (3)	Clinical Chemistry
CHEM 440 (2)	Advanced Organic Laboratory
CHEM 461 (3)	Inorganic Chemistry
CHEM 462 (2)	Inorganic Chemistry Laboratory
CHEM 511 (3)	Solid State Chemistry
CHEM 515 [®] (3)	Polymer Chemistry
CHEM 517 [®] (3)	Chemistry of Electronic Materials
CHEM 530 (1)	Advanced Topics in Chemical Analysis
CHEM 537 [®] (3)	Electrochemical Methods
CHEM 539 (1)	Principles of NMR and MRI
CHEM 543 (3)	Structure/Mechanisms in Organic Chemistry
CHEM 547 (3)	Physical Organic Chemistry
CHEM 551 (3)	Organometallic Chemistry
CHEM 565 (3)	Inorganic Mechanisms
CHEM 569 (3)	Chemical Crystallography
CHEM 570 (3)	Chemical Bonding
CHEM 571 (3)	Quantum Chemistry
CHEM 575 (3)	Chemical Thermodynamics
CHEM 576 (3)	Statistical Mechanics
CHEM 577 (3)	Surface Chemistry
CHEM 579 (3)	Chemical Kinetics
<i>Computer Science</i>	
CS 160 (4)	Foundations in Programming
CS 161 (4)	Object-Oriented Problem Solving
CS 200 (4)	Algorithms and Data Structures
CS 270 (4)	Computer Organization
CS 301 (4)	Foundations of Computer Science
CS 420 (4)	Introduction to Analysis of Algorithms
<i>Environmental Engineering</i>	
ENVE 441 (1)	Water and Wastewater Characterization
<i>Environmental and Radiological Health Science</i>	
ERHS 446 (3)	Environmental Toxicology

Course number (credits)	Title
ERHS 502 (3)	Fundamentals of Toxicology
ERHS 510 (3)	Cancer Biology
ERHS 547 [®] (3)	Equipment and Instrumentation
<i>Forest Sciences</i>	
F 311 (3)	Forest Ecology
<i>Food Technology</i>	
FTEC 447 (2)	Food Chemistry
FTEC 572 (2)	Food Biotechnology
<i>Geoscience</i>	
GEOL 150 (4)	Physical Geology for Scientists and Engineers
GEOL 454 (4)	Geomorphology
<i>Health and Exercise Science</i>	
HES 307 (3)	Biomechanical Principles of Human Movement
HES 319 (3)	Neuromuscular Aspects of Human Movement
HES 403 (4)	Physiology of Exercise
<i>Mathematics</i>	
MATH 317 (4)	Advanced Calculus of One Variable
MATH 332 (3)	Partial Differential Equations
MATH 348 (4)	Theory of Population and Evolutionary Ecology
MATH 366 (3)	Introduction to Abstract Algebra
MATH 369 (3)	Linear Algebra
MATH 405 (3)	Introduction to Number Theory
MATH 417 (3)	Advanced Calculus I
MATH 418 (3)	Advanced Calculus II
MATH 419 (3)	Introduction to Complex Variables
MATH 455 [®] (3)	Mathematics in Biology and Medicine
MATH 469 (3)	Linear Algebra II
MATH 501 (3)	Combinatorics I
MATH 502 (3)	Combinatorics II
MATH 510 (3)	Linear Programming and Network Flows
MATH 520 (3)	Nonlinear Programming
MATH 525 [®] (3)	Optimal Control
MATH 530 (4)	Mathematics for Scientists and Engineers
MATH 531 (3)	Discrete Models of Physical Systems
MATH 532 (3)	Mathematical Modeling of Large Data Sets
MATH 545 (3)	Partial Differential Equations I
MATH 546 (3)	Partial Differential Equations II
<i>Mechanical Engineering</i>	
MECH 307 (4)	Mechatronics and Measurement Systems
MECH 431 (3)	Metals and Alloys
MECH 468 (3)	Space Propulsion and Power Engineering
MECH 530 (3)	Advanced Composite Materials
MECH 531 (3)	Materials Engineering
MECH 532 (3)	Material Issues in Mechanical Design

Microbiology	
MIP 334 (3)	Food Microbiology
MIP 335 [®] (2)	Food Microbiology Laboratory
MIP 342 (3)	Immunology
MIP 343 (2)	Immunology Laboratory
MIP 350 (3)	Microbial Diversity
MIP 351 (3)	Medical Bacteriology
MIP 352 (2)	Medical Bacteriology Laboratory
MIP 420 (4)	Medical and Molecular Virology
MIP 432 [®] (3)	Microbial Ecology
MIP 433 [®] (1)	Microbial Ecology Laboratory
MIP 436 [®] (4)	Industrial Microbiology
MIP 443 (4)	Microbial Physiology
MIP 450 (3)	Microbial Genetics
MIP 576 (3)	Bioinformatics
MIP 578 (4)	Genetics of Natural Populations
Natural Resources	
NR 300 (3)	Biological Diversity
NR 322 (4)	Introduction to Geographic Information Systems
NR 323 (3)	Remote Sensing of Natural Resources
Natural Sciences	
NSCI 380A2 [®] (3)	Introduction to Nanoscale Science
Physics	
PH 314 (4)	Introduction to Modern Physics
PH 315 (2)	Modern Physics Laboratory
PH 341 (4)	Mechanics
PH 351 (4)	Electricity and Magnetism
PH 353 (4)	Optics and Waves
PH 361 (3)	Physical Thermodynamics
PH 451 (3)	Introductory Quantum Mechanics I
PH 452 (3)	Introductory Quantum Mechanics II
PH 521 (3)	Introduction to Lasers
PH 522 (1)	Introductory Laser Laboratory
PH 531 (3)	Introductory Solid State Physics
PH 541 (3)	Classical Physics
PH 551 (3)	Modern Physics
PH 561 (3)	Elementary Particle Physics
PH 571 (3)	Mathematical Methods for Physicists I
PH 572 (3)	Mathematical Methods for Physicists II
Soil and Crop Sciences	
SOCR 240 (4)	Introductory Soil Science
SOCR 330 (3)	Principles of Genetics
SOCR 455 (3)	Soil Microbiology
SOCR 456 (1)	Soil Microbiology Laboratory
SOCR 467 (3)	Soil and Environmental Chemistry
SOCR 470 (3)	Soil Physics
SOCR 471 (1)	Soil Physics Laboratory

SOCR 478 (3)	Environmental Soil Sciences
SOCR 479 (1)	Environmental Soil Science Laboratory
SOCR 560 (3)	Chemical Equilibria in Soils
Statistics	
STAT 305 (3)	Sampling Techniques
STAT 315 (3)	Statistics for Engineers and Scientists
STAT 340 (3)	Multiple Regression Analysis
STAT 350 (3)	Design of Experiments
STAT 372 (3)	Data Analysis Tools
STAT 420 (3)	Probability and Mathematical Statistics I
STAT 430 (3)	Probability and Mathematical Statistics II
STAT 511 (3)	Design and Data Analysis for Researchers I
STAT 512 (3)	Design and Data Analysis for Researchers II