

BACHELOR OF SCIENCE IN BIOTECHNOLOGY

What is Biotechnology?

Biotechnology is the application of biological organisms, cells, or molecules to produce a product or service for the betterment of humankind. This area of study includes aspects of molecular biology, microbiology, cell biology, biochemistry, and genetic engineering, among other related disciplines.

The Biotechnology Curriculum

The curriculum builds on introductory courses in the sciences including biology, chemistry, calculus, and physics, creating a strong foundation for more advanced upper-level courses. This degree program prepares students to use molecular and biochemical approaches to tackle environmental, natural resource, agricultural, or medical questions, and provides sufficient breadth for students interested in careers veterinary and human medicine. Students who complete this major will be qualified to enter the growing biotechnology job market or continue their studies in graduate or professional school.

The Biotechnology curriculum requires a minimum of 126 total credits. The core requirements are listed in the typical schedule. There are also 12 credits of directed electives that can be chosen from a list of approved courses. Twenty open elective credits can be selected depending on a student's individual interests. There are also many courses offered at Syracuse University or the SUNY Upstate Medical University that could be used to fill these electives and open electives.

Required Courses

APM 105

APM 106

APM 210

BTC 132

BTC 401

BTC 420

OR

BTC 498

BTC 250

BTC 499

EFB 101

EFB 102

EFB 103

EFB 104

EFB 303

EFB 307

EFB 308

EFB 311

EFB 320

EFB 325

EWP 190

EWP 290

FCH 150

FCH 151

FCH 152

FCH 153

FCH 221

FCH 222

FCH 223

FCH 224

FCH 430

FCH 432

EPH 101

AND

EPH 102

EPH 103

AND

EPH 104

NOTE: BTC 420 (Internship in Biotechnology) is often done in the summer but can be done any semester.

NOTE: 3 credits of BTC 498 or BTC 420 or a combination of both are required.

Electives

Course Name	Code*	Credit
General Education Course in two of the following categories: US History & Civic Engagement, The Arts, Social Sciences, World History and Global Awareness, World Languages	G	6
General Education Course in Diversity, Equity, Inclusion and Social Justice	G	3
Directed Electives		12
Open Electives		23

Directed Electives - Biotechnology

A minimum of 12 credits of directed elective courses required. Other courses may be applicable with petition but cannot include courses numbered 420, 495, and 498. A maximum of 2 microscopy (MCR) courses, or six credits, can count toward directed electives.

Although any combination of courses below may satisfy the minimum 12 credits required, the following list has been categorized into the most common subject areas of interest to BTC students, as well as those courses that would be suitable for multiple subject areas of interest. These groupings of elective courses are guidelines and it is best to consult your advisor when selecting courses since students have unique career goals and interests.

Courses that fit multiple areas of interest

- FCH 380 Analytical Chemistry I (2 cr.) F
- FCH 381 Analytical Chemistry II (3 cr.) S
- FCH 510 Environmental Chemistry (3 cr.) S
- FCH 431 Biotechnology lab (3 cr.) F
- FCH 531 Biochemistry lab (3 cr.) F
- FCH 584 Spectro ID/Organic Compounds (3 cr.)
- MCR 480 Fundamentals of Microscopy (3 cr.) F
- MCR 484 Scanning Electron Microscopy (3 cr.) F
- MCR 485 Transmission Electron Microscopy (3 cr.) S
- BIO 422 Bioinformatics for Life Scientists (3 cr.) – SU course
- BIO 440 Applied Genomics (3 cr.) – SU course
- BIO 442 Seminar in Model Organism Genetics (3 cr.) – SU course
- BIO 443 Seminar in Epigenetics (3 cr.) – SU course
- BIO 450 Seminar in Evolutionary Genetics (3 cr.) – SU course
- BIO 463 Molecular Genetics (4 cr.) – SU course
- BIO 463 Molecular Biotechnology (4 cr.) – SU course

- BIO 464 Applied Biotechnology (4 cr.) – SU course
- BCM 477 Proteins and Nucleic Acids Lab (3 cr.) – SU course
- BCM 484 Biomolecular Modeling (3 cr.) – SU course
- BEN 541 Principles of Tissue Engineering (3 cr.) – SU course

Pre-health (Pre-Veterinary, Pre-Medical, etc.)

- EFB 360 Epidemiology (3 cr.) F
- EFB 385 Comparative Vertebrate Anatomy (4 cr.) S
- EFB 400 Toxic Health Hazards (3 cr.) F
- EFB 453 Parasitology (3 cr.) F
- EFB 462 Animal Physiology: Environmental & Ecological (4 cr.) F
- EFB 463 Ecotoxicology (3 cr.) S
- EHS 320 Disease Prevention (3 cr.) S
- FCH 390 Drugs from the Wild (3 cr.) F
- BIO 211 Introduction to Neuroscience (3 cr.) S – SU course
- BIO 216 Anatomy and Physiology I (4 cr.) F – SU course
- BIO 217 Anatomy and Physiology II (4 cr.) S – SU course
- BIO 316 Anatomy & Physiology I for Biology Majors (4 cr.) – SU course
- BIO 317 Anatomy & Physiology II for Biology Majors (4 cr.) – SU course
- BIO 355 General Physiology (3 cr.) S – SU course
- BIO 396 Stem Cells and Society (3 cr.) – SU course
- BIO 441 Seminar in Infectious Diseases (3 cr.) S – SU course
- BIO 446 Epigenetics of Human Health and Diseases (3 cr.) – SU course
- BIO 447 Basic Immunology (3 cr.) – SU course
- BIO 448 Evolutionary Medicine (3 cr.) – SU course
- BIO 468 Microbiomes Biotech & Medicine (3 cr.) – SU course
- BIO 473 Pharmaceuticals & Cells (3 cr.) – SU course
- BIO 501 Biology of Cancer (3 cr.) – SU course
- BIO 503 Developmental Biology (3 cr.) – SU course

Plant Biotechnology

- BTC 425 Plant Biotechnology (3 cr.) S
- BTC 426 Intro. Plant Tissue Culture (3 cr.) F
- EFB 530 Plant Physiology (3 cr.) S
- EFB 531 Plant Physiology Lab (2 cr.) S
- FCH 630 Plant Biochemistry (3 cr.) S

Microbial Biotechnology

- EFB 340 Forest & Shade tree Pathology (3 cr.) S
- EFB 440 Mycology (3 cr.) F
- EFB 402 Microbial Ecology (2 cr.) S

Bioprocess Engineering

- PSE 200 Introduction to Papermaking (3 cr.)*
- PSE 202 Pulp and Paper Laboratory Skills (1 cr.)*
- PSE 223 Introduction to Lignocellulosics (4 cr.)*
- PSE 361 Engineering Thermodynamics (3 cr.)*
- PSE 370/570 Principles of Mass and Energy Balance (3 cr.)**
- PSE 371 Fluid Mechanics (3 cr.)*
- BPE 300 Introduction to Industrial Bioprocessing (3 cr.)*
- PSE 350/550 Fiber Processing (3 cr.)**
- PSE 450/650 Pulping and Bleaching Processes (3 cr.)**

- PSE 465/665 Fiber and Paper Properties (3 cr.)**
- PSE 438/638 Biorenewable Fibrous and Nonfibrous products (3 cr.)**
- BPE 420/620 Bioseparations (3 cr.)**
- BPE 438/638 Introduction to Biorefinery Processes (3 cr.)**
- BEN 364/664 Quantitative Physiology (4 cr.) – SU course**
- BEN 421/621 Biochemical Engineering (3 cr.) – SU course**
- BEN 433/633 Drug Delivery (3 cr.) – SU course**
- BEN 462/662 Biofuels, Bioproducts, and Biorefining (3 cr.) – SU course**
- BEN 468/668 Biomaterials & Medical Devices (3 cr.) – SU course**
- BEN 473/673 Biomanufacturing (3 cr.) – SU course**
- BEN 481 Bioinstrumentation (3 cr.) – SU course
- BEN 561 Polymer Science & Engineering (3 cr.) – SU course

*Useful background and prerequisite courses if you are planning on entering the MPS program in Paper and Bioprocess Engineering.

**The graduate level course may be applicable to the MPS program in Paper and Bioprocess Engineering.

Total Minimum Credits For Degree: 126

