

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	Survey Of Calc & Appl I	4
APM 106	Survey Of Calc & Appl II	4
APM 391	Intro/Probability&Stats	3
BTC 132	Orientation Seminar:BTC	1
BTC 401	Molecular Biol Techniques	3
BTC 420	Internship in Biotechnology	1 - 5
OR BTC 498	Resrch Prob/Biotechnology	1 - 9
BTC 497	Research Dsgn&Prof Develop	1
BTC 499	Senior Project Synthesis	1
EFB 101	Gen Bio I:Organismal Bio&Ecol	3
EFB 102	General Biology I Laboratory	1
EFB 103	Gen Bio II:Cell Bio & Genetics	3

EFB 104	General Biology II Laboratory	1
EFB 303	Intro Envrn Microbiology	4
EFB 307	Principles Of Genetics	3
EFB 308	Prin Of Genetics Lab	1
EFB 311	Principles of Evolution	3
EFB 320	General Ecology	4
EFB 325	Cell Biology	3
EWP 190	Writing And The Envrnment	3
FCH 150	General Chemistry I	3
FCH 151	General Chemistry I Lab	1
FCH 152	General Chemistry II	3
FCH 153	General Chemistry II Lab	1
FCH 221	Organic Chemistry 1	3
FCH 222	Organic Chemistry Lab 1	1
FCH 223	Organic Chemistry II	3
FCH 224	Organic Chemistry Lab II	1
FCH 430	Biochemistry I	3
FCH 432	Biochemistry II	3
PHY 101	Major Concepts of Physics I	0 - 8
PHY 100	Major Concepts of Physics II	4

NOTE: BTC 420 (Internship in Biotechnology) is typically done in the summer.

NOTE: 5 credits of BTC 498 or BTC 420 are required.

Electives

Course Name	Code*	Credit
General Education Course in two of the following categories: US History	G	6

& Civic Engagement, The Arts, Social Sciences, World History and Global Awareness, World Languages		
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. New biotechnology related courses not currently on the list may also fulfill this requirement with permission of your advisor.

Although any combination of courses below may satisfy the minimum 12 credits required, the following list has been categorized into 4 of 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. Probably no two students in the biotechnology program have exactly the same career goals or interests. Consult your advisor if your subject interests vary.

Courses that fit multiple areas of interest

- FCH 380 Analytical Chemistry I (2 cr.) F
- FCH 381 Analytical Chemistry II (3 cr.) S
- FCH 382 Analytical Chemistry I Laboratory (1 cr.) F
- FCH 510 Environmental Chemistry (3 cr.) S
- FCH 531 Biochemistry lab (3 cr.) F
- 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 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 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
- 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 447 Basic Immunology (3 cr.) – SU course
- BIO 448 Evolutionary Medicine (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 427 Plant Anatomy and Development (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 505 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 310 Colloid and Interface Science (3 cr.)*
- BPE 420/620 Bioseparations (3 cr.)**
- BPE 438/638 Introduction to Biorefinery Processes (3 cr.)**
- BPE 510 Introduction to Polymer Coatings (3 cr.)
- BPE 536 Radiation Curing of Polymer Technologies (3 cr.)
- BPE 658 Advanced Biocatalysis (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

