

Biotechnology

Department of Biotechnical and Clinical Laboratory Sciences

Biotechnology
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Overview

The biotechnology program provides intensive, hands-on laboratory-based coursework and training which will allow our graduates to master a diverse array of skills in the field of biotechnology. The biotechnology program incorporates the theoretical concepts taught in lectures with the fundamental practical application of these theories in the intensive laboratory component of our program. The emphasis is on real-life proficiency in the theory as well as practice of biotechnology. Based on this focus, it is expected that the high level of hands-on laboratory training received in our program will enable students to be prepared, upon graduation, to be immediately competitive in the biotechnology job market. Since the coursework is focused on supplying the students with skills in and comprehension of a wide variety of laboratory techniques, it is expected that the training acquired in the program will also enable graduates from our program to qualify for acceptance into a graduate or professional program. Whether the proficiency received here serves as a terminal degree or lays the foundation for entry into a graduate or professional school, students receive a high level of one-on-one training and faculty interaction that is exceptional.

About our Degrees

This program, interdisciplinary in approach, is appropriate for students interested in scientific careers in the expanding biotechnology industry. With a core curriculum of basic science and math courses and required program courses, students choose technical electives from such fields as anthropology, biology, chemistry, medicinal chemistry, biochemical pharmacology, legal studies, medical technology, computer science, and management, according to their career goals. An internship possibility exists for selected students at various times throughout the program.

Acceptance Criteria

Completion of all prerequisite science and math courses (some exceptions allowed).
Minimum GPA of 2.0 overall.
Minimum GPA of 2.5 in prerequisite science and math courses.
Submission of a departmental application and current copy of UB DARS report to the department.

Acceptance Information

Application deadline for fall admission is February 1. These deadlines may be extended based on space availability. Applications are available at the department office, 26 Cary Hall, South Campus, or online at www.smbs.buffalo.edu/cls. Students are advised that program admission is available only in the fall semester. The program admits 18-24 full-time students each year; part-time study is also available.

Colleges that have transfer agreements with the program in biotechnology include Genesee Community College, Erie Community College, Niagara County Community College, Monroe Community College, Jamestown Community College, and many others. Students can obtain required prerequisite courses at many two- and four-year institutions.

Degree Requirements

Please see [Degrees and Policies](#).

About our Courses

The typical size of lecture classes for required program courses is 50-60 students, with a smaller number in each associated laboratory section. Internships usually have an instructor/student ratio of 1/1.

Teaching assistants (TAs) in required program courses assist professors in laboratory teaching and preparation. All teaching assistants are required to have weekly office hours for student assistance.

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Suggested introductory courses:

- [BIO 200](#) Evolutionary Biology
- [BIO 201](#) Cell Biology
- [CHE 101](#) - [CHE 102](#) General Chemistry I - II

About our Faculty

Faculty research interests include measurement of oxidative stress, methods evaluation protocols, environmental pollutants and disease outcomes in humans, vaccine research, cellular and molecular biology of erythropoiesis, breast cancer research, and organ and tissue donation. The faculty excels at teaching and has received several student, university, and state-wide teaching awards. The undergraduate advisor schedules individual advising meetings on the South Campus by appointment only.

Transfer Policy

Transfer students must first be accepted by the university and must complete a SUNY Transfer Admission Application from the Office of Admissions, and submit official transcripts. Upon university admission, the evaluated transcripts are sent to the program for further review. The deadline for fall admission is the previous February 1. Transfer students should submit their application and official transcripts well in advance of these deadlines. The program accepts students past these deadlines only on a space available basis.

The program in biotechnology has articulation agreements with Erie Community College, Genesee Community College, Niagara County Community College, Monroe Community College and more, and prerequisite course equivalencies have been established. Students from other institutions should contact the undergraduate program advisor for prerequisite course equivalencies. Course descriptions and syllabi may be required to establish equivalencies.

Unless articulated, courses from other institutions may not be used to satisfy any upper-division program course requirements.

Extracurricular Activities

Every fall semester the department hosts an orientation pizza party for all faculty, staff, graduate and undergraduate students. An awards banquet is held in the spring semester to recognize graduating seniors.

See the [UB Student Association](#).

Practical Experience and Special Academic Opportunities

Notable Program Features

Internships

A technical elective chosen during the program may be [MT 496](#), Internship in Biotechnology. This variable, 1-12 credit course may be taken more than once. Student selection for the internship is based on cumulative GPA and an interview with the prospective internship site. Internships are not a guaranteed part of the program.

Undergraduate Research and Practical Experience

Opportunities to work with faculty on research projects are available to students in the department through [MT 499](#) Independent Study.

Honors, Awards, and Scholarships

Traditionally, the Wyeth Lederle Vaccines/Pfizer Award and Fisher Scientific Achievement Award have been presented to graduating seniors for outstanding academic achievement.

Career Information and Further Study

Opportunities for biotechnologists are extremely varied, including research and development, quality assurance and quality control, regulatory

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affairs, patent law, marketing and sales, and employment is available in both the public and private sectors.

Career choices include:

- Graduate school: Scientific specialty, forensics, computer science, business
- Instrument Manufacturers
- Laboratory Manager
- Management or regulatory affairs
- Professional school: Medical, dental, law, chiropractic, optometry, veterinary, physician's assistant
- Research or Industrial Laboratory
- Sales or Technical Representative
- Scientific writing or editing

Degree Options

Students who successfully complete program and university requirements for graduation are granted a bachelor of science degree.

Degrees Offered

Undergraduate: BS

Graduate: MS

Links to Further Information About this Program

- [Undergraduate Catalog](#)
- [Undergraduate Admissions](#)
- [Graduate Admissions](#)
- [Department of Biotechnical and Clinical Laboratory Sciences](#)
- [School of Medicine and Biomedical Sciences](#)

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Acceptance Criteria

Completion of all prerequisite science and math courses (some exceptions allowed).

Minimum GPA of 2.0 overall.

Minimum GPA of 2.5 in the prerequisite courses.

Advising Notes

Submission of a departmental application is required and current copy of UB DARS report must be submitted to the department.

Application deadline for fall admission is February 1. These deadlines may be extended based on space availability. Applications are available at the department office, 26 Cary Hall, South Campus, or online at <http://www.smbs.buffalo.edu/cls>. Students are advised that program admissions is available only in fall semesters. The program admits 25-30 full-time students each year; part-time study is also available.

Prerequisite Courses

[BIO 200](#) Evolutionary Biology

[BIO 201](#) Cell Biology

[CHE 101](#) General Chemistry

[CHE 102](#) General Chemistry

[CHE 201](#) Organic Chemistry

[CHE 202](#) Organic Chemistry

[CSE 101](#) Computers: A General Introduction

[MIC 301](#) Biomedical Microbiology

[PGY 300](#) Human Physiology

[PSY 207](#) Psychological Statistics or [STA 119](#) Statistical Methods

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Required Courses

MTH 121 Survey of Calculus and Its Applications I or MTH 141 College Calculus I
 MT 302 Instrumental Analysis
 MT 401 Clinical Biochemistry
 MT 402 Fundamentals of Immunology
 MT 422 Biomolecular Technology and Diagnostics
 MT 426 Technical Communications for the Scientific Professional
 MT 430 Bioseparation Techniques
 MT 432 Introduction to Medical Genetics
 MT 434 Cell and Tissue Culture Techniques
 MT 445 Biotechnology Career Preparation
 PHI 337 Social and Ethical Values in Medicine OR PHI 107 Ethics OR PHI 217 Professional Ethics
 PHY 101/PHY 151 College Physics I/Lab
 Technical electives (12-18 credits)

Summary

Required prerequisite science and math credit hours.....45
 Required program credit hours.....38
 Technical elective credit hours.....12-18

See [Baccalaureate Degree Requirements](#) for general education and remaining university requirements

Recommended Sequence of Program Requirements

FIRST YEAR

Fall BIO 200, CHE 101
 Spring BIO 201, CHE 102
 Fall or Spring CSE 101

SECOND YEAR

Fall CHE 201
 Spring CHE 202, MIC 301
 Fall or Spring PGY 300, PSY 207

THIRD YEAR

Fall MT 302, MT 401, MT 402
 Spring MT 426, MT 430, MT 445, PHI 337 or PHI 107, MTH 121 or MTH 141, and technical electives

FOURTH YEAR

Fall MT 422, MT 432, MT 434, PHY 101, PHY 151, and technical electives
 Spring Technical electives or optional internship

Electives and Course Groupings

Note: Minors in anthropology, pharmacology and toxicology, biology, chemistry, computer science, environmental studies, foreign language, medicinal chemistry and pharmaceuticals may be used to fulfill all or part of the technical electives required for the BS degree in biotechnology. Although no minor in Management is available, students may use management courses toward the technical electives with permission of the program director. Students must meet with a representative of the department/program offering the minor prior to the fall semester of the junior year, as many departments have strict rules regarding prerequisites, course sequence and minimum GPA for acceptance to and completion of the minor. Students should consult the relevant listings in the Undergraduate Catalog for specifics concerning each minor.

ANA 113 Human Anatomy
 APY 107 Intro to Physical Anthropology
 APY 248 Human Genetics
 APY 275 Medical Anthropology
 APY 345/APY 356:Comparative Primate Anatomy lecture with lab
 APY 348 Anthropological Osteology
 APY 448 Human Genetics/Legal & Ethical Issues
 BCH 408 Gene Expression
 BIO 215 Fundamentals of Biochemistry Lab and Lecture
 BIO 302 Molecular Biology
 BIO 400 Bioinformatics/Genome Anal.
 BIO 401 Advanced Molecular Biology
 BIO 402 Advanced Cell Biology
 BIO 416 Intermediate Cell Biology
 BIO 465 Radiation Biology
 BIO 466 Microbial Radiation Laboratory
 CHE 214 Analytical Chemistry Lecture

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[CHE 215](#) Analytical Chemistry Lab
[CHE 413](#) Instrumental Analysis
[CL 151](#) Medical Terminology
[JLS 130](#) American Jury Trials
[JLS 201](#) Intro to Law and Legal Process
[MCH 311](#) The Chemistry of Drug Action
[MCH 403](#) Mechanisms of Drug Action
[MCH 427](#) Combinatorial Chemistry
[MFC 250](#) Intro to Health Care in US, I
[MFC 350](#) Intro to Health Care in US, II
[MGE 302](#) Applied Economics
[MGF 301](#) Corporation Finance
[MGF 405](#) Advanced Corporation Finance
[MGT 401](#) Public Policy, Law and Management
[MGQ 301](#) Statistical Decisions in Management
[MGM 301](#) Principles of Marketing
[MGM 402](#) Sales Force Management
[MGM 403](#) Marketing Research
[MGM 406](#) Product and Brand Management
[MGM 409](#) Advertising and Promotion
[MGM 483](#) International Marketing
[MT 101](#) Introduction to Medical Technology
[MT 201](#) Medical Terminology
[MT 428](#) Forensic Science
[MTH 122](#) Calculus II
[NTR 108](#) Human Nutrition
[NTR 401](#) Nutrition and Health
[PHC 331](#) Case Studies in Pharmaceutical Sciences
[PHC 425/PHC 426](#) Pharmaceutical Biotechnology/ Pharm Biotec Virtual Lab
[PHY 102/PHY 152](#) Physics and lab
[PMY 302](#) Introduction to Pharmacology and Toxicology
[SOC 307](#) Criminology
[SOC 317](#) Criminal Justice Systems
[SOC 322](#) Introduction to Medical Sociology

Additional courses may be considered. Graduate courses may be taken if the material is beneficial to the student's goals. A formal petition must be filed and prior approval must be granted for the student to use a graduate course for undergraduate credit. Consult the Undergraduate Advisor for the Program in biotechnology program for details.