

MOLECULAR BIOSCIENCE & BIOTECHNOLOGY

<http://www.rit.edu/cos/biology>

PROGRAM OVERVIEW FOR EMPLOYERS

The Molecular Bioscience & Biotechnology degree is a laboratory-intensive program that prepares students to immediately assume challenging positions as research assistants/associates in a wide range of biotechnology-based research and bio-processing/manufacturing applications. These include human genetics, genomic research, gene therapy, vaccine development, plant biotechnology, cancer biology, agriculture, pharmaceuticals, scale-up fermentations and bioremediation.

Focus on communication skills permeates the entire curriculum. Investigative, open-ended laboratories characterize the advanced courses. Included in the curriculum are specialized elective courses providing, in-depth, topics such as: genomics and bioinformatics, biological-separations, immunology, microbial & viral genetics, virology, genetic engineering, plant biotechnology, plant biochemistry, plant molecular biology, mammalian cell tissue culture, and monoclonal antibody production, scale-up fermentation of bacteria, characterization, separation and purification of proteins, small molecules and nucleic acids, including DNA sequencing and analysis.

Students are provided the opportunity to pursue original and undergraduate research projects mentored by sponsoring faculty throughout all four years. Students can participate in an undergraduate research program offered by the college of Science and by working with faculty to obtain extramural funding for undergraduate research. Students can also perform laboratory-based research and become a co-author of peer-reviewed research papers. Approximately twenty percent of the graduates successfully pursue the M.D. or Ph.D. degree.

Degree(s) Awarded

Bachelor of Science

Enrollment

Approximately 245 students

Cooperative Education Component

Optional; 2 or 3 quarters recommended; all students eligible any quarter after completion of second year courses.

Salary Information (Avg/Range)

Co-op:	\$13.94	\$9.38 - \$19.00
BS:	\$30,562.50	\$23,000 - \$36,000

Equipment & Facilities

- 9 teaching laboratories
- 13 student/faculty research laboratories
- NYS-DOH certified animal facility
- Human cadaver lab
- Greenhouse and plant tissue culture facility
- The Center for Biosciences, Education & Technology

Accreditation

RIT is chartered by the Legislature of the State of New York and accredited by the Commission of Higher Education of the Middle States Association for Colleges and Schools.

Student Skills & Capabilities

Students' skill sets will vary depending on the elective courses each student has taken. The following is a comprehensive list of skills and techniques taught in the molecular bioscience & biotechnology curriculum.

Preparation of media, reagents, buffers; keeping a laboratory notebook and preparing research reports, establishing and maintaining primary tissue/organ cultures and cell lines; isolation and characterization of microorganisms; viral plaque assays; cloning in soft agar and by limiting dilution; mycoplasma assays; cryopreservation; plasmid isolation; DNA restriction digests and ligation; CsCl density gradients; PAGE and agarose gel electrophoresis; thin-layer chromatography; HPLC; western and southern blots; RT-PCR and ELISA assays; cDNA synthesis; DNA sequencing, microsatellite analysis, electroporation, pulse-field electrophoresis, plant cell transformation, plant gene cloning, gene mapping, monoclonal antibody production; spectrophotometry; genomics using the Wisconsin data analysis package and NCBI for nucleotide and protein sequences; routine lab animal handling and injection; and computer-controlled fermentations.

Molecular Bioscience & Biotechnology

First & Second Years:

Freshmen Symposium
Intro to Biology I (cell biology; with lab)
Intro to Biology II (molecular biology, development & evolution; with lab)
Intro to Biology III (physiology & ecology; with lab)
Cell Biology (with lab)
Bioinformatic analysis of Macromolecules
Tissue Culture (with lab)
Molecular Biology (with lab)
General & Analytical Chemistry I-III Lecture
Chemical Principles I, II Laboratory
General & Analytical Chemistry Laboratory
Organic Chemistry I-III (with labs)
Elementary Calculus I & II
Data Analysis I (applied statistics)
Liberal Arts Courses (28 cr hr)
COOPERATIVE EDUCATION (optional)*

Course Sequence BS degree

Third and Fourth or Fifth Years*:

Introductory Microbiology (with lab)
Genetics (with lab)
Biotechnology *electives* (min. of 24 cr hr; all with labs):
Biological-Separations
Cell Physiology
Microbial & Viral Genetics
Plant Biotechnology
Industrial Microbiology
Plant Biochemistry
Plant Molecular Biotechnology
Environmental Microbiology
Food Microbiology
Bioremediation
Hybridoma Techniques
Genetic Engineering
Virology
Developmental Biology
Microbial Pathogenesis
Advanced Microbial Fermentation
Genomics
Bioinformatics
Advanced Immunology
Managing the Industrial Laboratory
Biology Research
Analytical Chemistry: Separations (with lab)
Biochemistry (2 quarters)
Liberal Arts (26 cr hr, including a concentration)
Institute-wide Electives (9 cr hr)
COOPERATIVE EDUCATION (optional)*

Employers of Molecular Bioscience & Biotechnology Co-op and Graduating Students:

Sanofi Pasteur, Ortho-Clinical Diagnostics (Johnson & Johnson), Albany Medical College, Masonic Medical Research Lab, Glaxo Smithkline, University of Rochester Medical Ctr., iCardiac Technologies, Vaccinex, Roswell Park Cancer Institute, Genencor, Brigham & Women's Hospital, Bio Sidus Argentina SA, Boston Scientific, VWR International, University of California at Berkeley, Idexx Labs, Test America, University of Virginia, Mount Sinai Hospital, Life Science Inc, Siemens Medical Solutions, Pfizer, Cambrex Biosciences, Genzyme, Osiris Therapeutics, Progenic Pharmaceutical, Briston-Meyers Squibb, The Broad Institute, Charles River Labs, Amgen, Genome Sciences, Wyeth Pharmaceuticals, Glaxo Smithkline, The Jackson Lab, Vaccinex, Centocor (Johnson & Johnson), Johns Hopkins University School of Medicine, Cornell University-Nanobiotechnology, Diffinity Genomics, University of Illinois at Urbana-Champaign. University of Pennsylvania

Contact Us:

We appreciate your interest in hiring RIT co-op, graduating students or alumni. We will make every effort to make your recruiting endeavor a success. Call our office and ask to speak with Charles Dispenza, the program coordinator who works with the Biotechnology program. For your convenience, you can access information and services through our web site at <http://www.rit.edu/recruit>.

Charles W. Dispenza

Program Coordinator

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