

BIOLOGY

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PROGRAMS AVAILABLE

BACHELOR OF SCIENCE IN ATHLETIC TRAINING

BACHELOR OF SCIENCE IN BIOLOGY

CONCENTRATION IN PRE-PROFESSIONAL

CONCENTRATION IN PRE-PHYSICAL THERAPY

CONCENTRATION IN MEDICAL TECHNOLOGY

CONCENTRATION IN BIOTECHNOLOGY

CONCENTRATION IN ALLIED HEALTH

BIOLOGY MINOR

TEACHING LICENSURE

BIOLOGY MAJOR PROGRAM

The Department of Biology offers a four-year program leading to a Bachelor of Science in biology. The curriculum is built upon four foundational courses which explore the field of biology from the molecular and cellular level to the level of populations and ecosystems. In these courses, students seek to understand the origin, evolution, and physiological mechanisms of all forms of life. Advanced courses build upon information learned in the foundational courses and allow students to pursue their own areas of interest.

Upon completion of their program, graduates will be able to:

- Understand fundamental concepts in the discipline;
- Write a lab report to communicate the findings of a scientific experiment;
- Design an experiment to test a hypothesis;
- Find and analyze primary literature in the field;

- Demonstrate appropriate technical skills in the laboratory;
- Analyze data with appropriate statistical analysis.

BIOLOGY MAJOR

Requirements

BIOL	101	Biology Seminar for Entering Majors	1 cr
BIOL	150	Introduction to Biology	4 cr
BIOL	235	Botany	4 cr
BIOL	240	Genetics	4 cr
BIOL	245	Zoology	4 cr
BIOL	330	Seminar	1 cr
BIOL	460	Ecology	4 cr
BIOL	480	Cell Biology	4 cr
Biology Electives (300 level or above)			9 cr
CHEM	150	Introduction to Chemistry I	4 cr
CHEM	152	Introduction to Chemistry II	4 cr
CHEM	201	Organic Chemistry I	4 cr
CHEM	202	Organic Chemistry II	4 cr
PHYS	131	General Physics I	4 cr
PHYS	132	General Physics II	4 cr
MATH	150	Pre-Calculus	3 cr
Or MATH	220	Calculus I	
Or MATH	232	Introduction to Statistics	

TOTAL BIOLOGY MAJOR REQUIREMENTS

62 cr

CONCENTRATION IN PRE-PROFESSIONAL

The Biology Department's pre-professional concentration provides the solid science background necessary for admission to medical, dental, veterinary

and pharmacy school. In addition to class work, pre-professional students are strongly encouraged to gain experience through undergraduate research, clinical internships and volunteer work in the medical field. The Department's pre-professional concentration facilitates this process.

PRE-PROFESSIONAL CONCENTRATION

Requirements

BIOL	101	Biology Seminar for Entering Majors	1 cr
BIOL	150	Introduction to Biology	4 cr
BIOL	235	Botany	4 cr
BIOL	240	Genetics	4 cr
BIOL	245	Zoology	4 cr
BIOL	310	Animal Physiology	4 cr
BIOL	330	Seminar	1 cr
BIOL	360	Biochemistry	3 cr
BIOL	480	Cell Biology	4 cr
PHYS	131	General Physics I	4 cr
PHYS	132	General Physics II	4 cr
CHEM	150	Introduction to Chemistry I	4 cr
CHEM	152	Introduction to Chemistry II	4 cr
CHEM	201	Organic Chemistry I	4 cr
CHEM	202	Organic Chemistry II	4 cr
Biology Electives (300 level or above)			6 cr
MATH	150	Pre-Calculus	
OR MATH220		Calculus I	
OR MATH232		Introduction to Statistics	

TOTAL PRE-PROFESSIONAL CONCENTRATION REQUIREMENTS

62 cr

MCLA-NEW YORK COLLEGE OF PODIATRIC MEDICINE ARTICULATION PROGRAM

This agreement allows MCLA students with a pre-professional concentration to simultaneously complete their senior year of undergraduate study and their first year of podiatric medicine at the New York College of Podiatric Medicine (NYCPM). MCLA will count credits from NYCPM toward a B.S. in biology. Students must meet admission requirements of NYCPM and fulfill departmental and articulation agreement requirements to be eligible for this program. Please contact the Biology Department for more information.

CONCENTRATION IN PRE-PHYSICAL THERAPY

The Biology Department's pre-physical therapy concentration provides the science background required for most doctoral programs in physical therapy.

PRE-PHYSICAL THERAPY CONCENTRATION

Requirements

BIOL	101	Biology Seminar for Entering Majors	1 cr
BIOL	150	Introduction to Biology	4 cr
BIOL	240	Genetics	4 cr
BIOL	245	Zoology	4 cr
BIOL	330	Seminar	1 cr
BIOL	342	Anatomy & Physiology I	4 cr
BIOL	343	Anatomy & Physiology II	4 cr
BIOL	440	Physiological Aspects of Exercise	4 cr

Upper Level Biology Electives			3 cr
CHEM 150 & 152		General Chemistry I & II	8 cr
CHEM 201 & 202		Organic Chemistry I & II	8 cr
MATH	232	Introduction to Statistics	3 cr
PHYS 131 & 132		General Physics I & II	8 cr

PSYC	100	Introduction to Psychology	3 cr
PSYC	210	Developmental Psychology	3 cr

TOTAL PRE-PHYSICAL THERAPY CONCENTRATION REQUIREMENTS **62 cr**

MCLA-SAGE COLLEGE ARTICULATION PROGRAM IN PRE PHYSICAL THERAPY

Students must acquire an overall GPA of 3.25 and a minimum science GPA of 3.25. Students must also complete 40 hours of clinical observation with a physical therapist. In addition, an articulation agreement with The Sage Colleges in Albany, N.Y., ensures that students who meet admission requirements at Sage and fulfill departmental and articulation requirements at MCLA will receive preferential acceptance into the Doctor of Physical Therapy program at The Sage Colleges. Please contact Dr. Anne Goodwin for more information about this program.

MCLA-SAGE COLLEGE ARTICULATION PROGRAM IN OCCUPATIONAL THERAPY

This agreement allows MCLA students to continue their studies in occupational therapy at The Sage Colleges in Albany, N.Y. Students must meet admission requirements at The Sage Colleges and fulfill departmental and articulation requirements at MCLA. Please contact Dr. Anne Goodwin for more information about this program. Students must acquire a minimum overall GPA of 3.25 in their undergraduate program and in the following specified courses.

BIOL	150	Introduction to Biology	4 cr
BIOL	342	Anatomy & Physiology I	4 cr
BIOL	343	Anatomy & Physiology II	4 cr

PHYS	131	General Physics	4 cr
PSYC	100	Introduction to Psychology	3 cr
PSYC	208	Applied Developmental Psychology	3 cr
OR PSYC	210	Developmental Psychology	
And PSYC	388	Adulthood and Aging	3 cr
PSYC	270	Abnormal Psychology	3 cr
PSYC	290	Statistical Methods in Psychology	4 cr
SOCI	100	Introduction to Sociology	3 cr

**TOTAL MCLA-SAGE COLLEGE ARTICULATION PROGRAM IN
OCCUPATIONAL THERAPY REQUIREMENTS 35 cr**

CONCENTRATION IN MEDICAL TECHNOLOGY

The Department of Biology offers a four-year program in medical technology. Students spend their first three years on the MCLA campus obtaining a liberal arts education with a broad background in science, thereby providing the education necessary for professional responsibilities. The fourth year of the program consists of coursework in an accredited hospital with a school of medical technology. During the hospital coursework, students receive clinical laboratory training. Hospitals and adjunct faculty affiliated with MCLA are as follows:

BERKSHIRE MEDICAL CENTER, PITTSFIELD

Lori Moore, B.S., MT (ASCP) Educational Coordinator;
Jessica Krochmal, MD, Medical Director

MEDICAL TECHNOLOGY CONCENTRATION

Requirements

BIOL	101	Biology Seminar for Entering Majors	1 cr
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BIOL	150	Introduction to Biology	4 cr
BIOL	235	Botany	4 cr
BIOL	240	Genetics	4 cr
BIOL	245	Zoology	4 cr
BIOL	305	Immunology	3 cr
BIOL	320	Microbiology	4 cr
BIOL	342	Anatomy & Physiology I	4 cr
BIOL	343	Anatomy & Physiology II	4 cr
BIOL	491	BMC: Clinical Chemistry	8 cr
BIOL	492	BMC: Clinical Molecular Biology	1 cr
BIOL	493	BMC: Clinical Immunology	1 cr
BIOL	494	BMC: Clinical Hematology	8 cr
BIOL	495	BMC: Clinical Urinalysis & Body Fluid	1 cr
BIOL	496	BMC: Clinical Microbiology	8 cr
BIOL	497	BMC: Clinical Immunohematology	5 cr
CHEM	150	Introduction to Chemistry I	4 cr
CHEM	152	Introduction to Chemistry II	4 cr
CHEM	201	Organic Chemistry I	4 cr
CHEM	202	Organic Chemistry II	4 cr
OR BIOL	360	Biochemistry	3 cr
MATH	232	Introduction to Statistics	3 cr

**TOTAL MEDICAL TECHNOLOGY CONCENTRATION
REQUIREMENTS**

82 - 83 cr

CONCENTRATION IN BIOTECHNOLOGY

The Department of Biology offers a four-year program in biotechnology. The Biology Department's biotechnology concentration provides students with a strong background in both biology and chemistry. This concentration has a strong emphasis on laboratory coursework, which prepares students for a

wide range of careers in the field of biotechnology. Students are strongly encouraged to gain experience through undergraduate research and/or internships.

BIOL	101	Biology Seminar	1 cr
BIOL	150	Introduction to Biology	4 cr
BIOL	235	Botany	4 cr
BIOL	240	Genetics	4 cr
BIOL	245	Zoology	4 cr
BIOL	320	Microbiology	4 cr
BIOL	330	Biology Seminar	1 cr
BIOL	360	Biochemistry	3 cr
BIOL	390	Biometry	3 cr
BIOL	410	Biotechniques	4 cr
BIOL	480	Cell Biology	4 cr
CHEM	150	Introduction to Chemistry I	4 cr
CHEM	152	Introduction to Chemistry II	4 cr
CHEM	201	Organic Chemistry I	4 cr
CHEM	202	Organic Chemistry II	4 cr
PHYS	131	General Physics I	4 cr
PHYS	132	General Physics II	4 cr
MATH	150	Pre-Calculus	3 cr
OR MATH	232	Intro to Statistics	
OR MATH	220	Calculus	
CSCI	243	Database development	3 cr
BIOL	420	Bioinformatics	3 cr

**TOTAL BIOTECHNOLOGY CONCENTRATION
REQUIREMENTS**

69 cr

MCLA – BERKSHIRE COMMUNITY COLLEGE BIOTECHNOLOGY ARTICULATION AGREEMENT

This program is a 2 + 2 program with Berkshire Community College, which allows students who complete BCC's liberal arts biotechnology concentration to transfer seamlessly into MCLA's Biology Major with a concentration in biotechnology.

BCC Program-Specific Courses	26 cr
BCC General Education Courses	36 cr
*MCLA Program-Specific Courses	42 cr
*MCLA Graduation Req	17 cr
Tier III	3 cr
Additional Upper Level Reqs	12 cr
Physical Education Req	2 cr
BIOL 101 Seminar	1 cr
BIOL 240 Genetics	4 cr
BIOL 245 Zoology	4 cr
BIOL 320 Microbiology	4 cr
BIOL 330 Seminar	1 cr
BIOL 360 Biochemistry	3 cr
BIOL 390 Biometry	3 cr
BIOL 410 Biotechniques	4 cr
BIOL 420 Bioinformatics	3 cr
BIOL 480 Cell Biology	4 cr
CSCI 243 Database Development	3 cr
PHYS 131 General Physics I	4 cr
PHYS 132 General Physics II	4 cr

TOTAL MCLA – BERKSHIRE COMMUNITY COLLEGE BIOTECHNOLOGY ARTICULATION AGREEMENT REQUIREMENTS

121 cr

CONCENTRATION IN ALLIED HEALTH

The Biology Department's Allied Health Concentration provides the science background required for the most post-baccalaureate programs in allied health professions such as physician assistant, nurse practitioner, registered nurse, and nutritionist.

BIOL	101	Biology Seminar for Majors	1 cr
BIOL	150	Introduction to Biology	4 cr
BIOL	235	Botany	
OR BIOL	245	Zoology	4 cr
BIOL	240	Genetics	4 cr
BIOL	250	Nutrition	3 cr
BIOL	320	Microbiology	4 cr
BIOL	330	Biology Seminar	1 cr
BIOL	342	Anatomy & Physiology I	4 cr
BIOL	343	Anatomy & Physiology II	4 cr
BIOL	480	Cell Biology	4 cr
BIOL upper level elective			3 cr
CHEM 150 & 152 General Chemistry I & II			8 cr
CHEM 201 & 202 Organic Chemistry I & II			8 cr
PHYS 131 & 132 General Physics I & II			8 cr
MATH	232	Introduction to Statistics	3 cr

TOTAL ALLIED HEALTH CONCENTRATION REQUIREMENTS

63 cr

In addition, an articulation agreement with the The Sage Colleges in Albany, NY ensures that the students who meet admission requirements at Sage and fulfill department and articulation requirements at MCLA will be accepted into the Master's of Science in Applied Nutrition program at The Sage Colleges.

BIOLOGY MINOR PROGRAM

Requirements

BIOL	100	Concepts in Biology	
Or BIOL	150	Introduction to Biology	4 cr
Choose one of the following:			4 cr
BIOL	235	Botany	
BIOL	240	Genetics	
BIOL	245	Zoology	
Biology electives			12 cr
(One elective must be at 300 level or above, remaining electives at the 200 level or above)			

TOTAL BIOLOGY MINOR REQUIREMENTS **20 cr**

TEACHING LICENSURE

Students majoring in biology may opt to pursue initial teacher licensure as an early childhood teacher or elementary teacher. Also, biology majors may pursue initial licensure as a teacher of biology for the middle school or secondary levels. Students seeking any of these licensures must complete a biology major, education major and a licensure program in education.

BIOLOGY AWARDS

Awards will be given annually to graduating seniors who have demonstrated outstanding performance in course work as well as in independent research. Students recommended for this award must meet the following criteria:

- A minimum overall GPA of 3.20
- A minimum GPA of 3.50 in courses counting towards the biology major
- Above average achievement at least one semester of independent research. Result of the research project must be presented at the College's Undergraduate Research Conference.

BIOL 150 Introduction to Biology 4 cr

Introduces the student to cell biology, mitosis, meiosis, genetics, photosynthesis, respiration and cellular organisms. This course is designed for, but not limited to, students pursuing a major/minor in science. Required laboratory. Course attributes: CSTL, ENVI.

Prerequisite: None

BIOL 195 Topics in Biology 1 to 4 cr

Provides students with an opportunity to explore different topics and current issues in biology or related fields within the Department. This course is designed to focus on special biological topics or issues at an introductory level.

Prerequisite: None

BIOL 235 Botany 4 cr

Overview of the fundamental principles of plant biology with emphasis on anatomy, taxonomy, physiology and evolution of algae, non-vascular and vascular plants, including major divisions of gymnosperms and angiosperms. The focus will be on plants of economic, cultural or ecological significance. Required laboratory. Course attributes: ENVI.

Prerequisite: BIOL 100 or BIOL 150

BIOL 240 Genetics 4 cr

Examines the major aspects of heredity, with emphasis on Mendelian principles as well as multiple genes, linkage, sex chromosomes, chromosome numbers, and biochemical and population genetics. Required laboratory.

Prerequisite: BIOL150

BIOL 245 Zoology 4 cr

Introduces the student to the biology of the invertebrate and vertebrate animals of the world through evolutionary and phylogenetic relationships. The course

serves as an introduction to the major phyla. Required laboratory. Course attributes: ENVI.

Prerequisite: BIOL150 or equivalent

BIOL 250 Nutrition 3 cr

Investigates the importance of diet for present and future good health. Examines the importance of carbohydrates, fats, proteins, vitamins and minerals, and their interactions. In addition, the course explores topics such as label-reading, diets, dietary analysis and other issues of current interest.

Prerequisite: BIOL100 or BIOL150

BIOL 255 Biodiversity 4 cr

Focuses on global, regional and local patterns of biological diversity and the processes that influence these patterns. Central to discussions of biodiversity pattern and process will be the relevant scientific principles from ecology, evolution and conservation biology. The impact of humans on natural systems and biodiversity loss will also be discussed. Specific case studies will be used to illustrate biodiversity loss and proposals to protect and restore biodiversity. Required laboratory. Course attributes: CSTL.

Prerequisite: None

BIOL 295 Topics in Biology 1 to 4 cr

Provides students with an opportunity to explore different topics and current issues in biology or related fields within the Department. This course is designed to focus on special biological topics or issues at a sophomore level.

Prerequisite: BIOL 150 or department approval

BIOL 305 Immunology 3 cr

Examines the structure and function of antigens, antibodies and the cellular system of immunity. Additional topics include a study of the complement

BIOL 351 Ornithology 4 cr

Provides an overview of the fundamental principles of avian biology with emphasis on ecological and behavioral aspects of ornithology. Students will learn to identify about 100 regional species by sight and/or sound. A semester long project will encourage students to investigate and read the ornithological peer-reviewed scientific literature. Lab activities will include field trips to practice identifying birds and collecting avian field data. Required laboratory. Course attributes: ENVI.

Prerequisite: BIOL 100 or BIOL 150 or ENVI 150 or ENVI 150H or instructor permission

BIOL 360 Biochemistry 3 cr

Surveys the structure and properties of biologically important compounds: carbohydrates, proteins, amino acids, lipids, nucleic acids, and vitamins. Other topics to be covered include enzyme activity, cellular metabolism and protein synthesis.

Prerequisite: CHEM 201

BIOL 361 Advanced Biochemistry 3 cr

Studies the chemical dynamics in living systems. Topics include enzymes mechanisms, metabolism and its regulation, and energy production and utilization.

Prerequisite: BIOL 360

BIOL 371 Forest Environment 4 cr

Provides the student a background and introduction to the forest ecosystem. The temperate forest of the Northeast will exemplify the principles discussed. Required laboratory. Course attributes: ENVI.

Prerequisite: Junior status

BIOL 375 Aquatic Ecology 4 cr

Focuses on the physical, chemical, and biological environment of freshwater systems, as well as on common methods used in the study of these systems. Concepts will be applied to addressing current challenges in conserving freshwater resources. Required laboratory.

Prerequisite: BIOL 100 or BIOL 150 or ENVI 150H or instructor approval

BIOL 380 Evolution 3 cr

Examines the history of evolutionary thought and the processes of organic evolution. Students will present selected topics to the class. Guest speakers will present the effects of Darwinian thinking in such disciplines as philosophy, anthropology, psychology, sociology and religion.

Prerequisite: Junior status and/or department approval

BIOL 390 Biometry 3 cr

Application-oriented introduction to data analysis in the context of biology. Students will learn to statistically analyze and interpret data collected from a variety of biological experiments.

Prerequisite: Junior status and MATH 150, or MATH 220, or MATH 232

BIOL 395 Special Topics in Biology 1 to 4 cr

A course or seminar for students who have taken a substantial number of biology courses. This course may explore any of a variety of topics.

Prerequisite: Junior/senior status, department approval

BIOL 410 Biotechniques 4 cr

Explores major techniques in the fields of biochemistry, cellular biology and molecular biology. This course is designed to be completely laboratory based.

Prerequisite: BIOL 240, BIOL 245

BIOL 480 Cell Biology 4 cr

Explores the eukaryotic and prokaryotic cell. Examines the cellular processes of transport phenomena, membrane metabolism, growth, and reproduction, with detailed coverage of the ultrastructure and function of cellular organelles. Laboratory emphasizes development of investigative techniques and genetic engineering. Required laboratory.

Prerequisite: Junior/senior status

BIOL 484 Biomechanical Analysis of Human Movement 3 cr

Provides instruction in those competencies essential to the study of the human body as a machine for the performance of work. Enables effective understanding and/or evaluation of motor skills and their effect on the human structure.

Prerequisite: BIOL 316

BIOL 491 BMC: Clinical Chemistry 8 cr

Introduces the student to the physiology of the organ system of the body and the various analytes that interact with them. Discusses abnormal physiology and relates to various disease states. Discusses the principles of test methodology. The student applies this theory to the clinical lab using current diagnostic techniques and instrumentation to correlate lab results to disease processes.

Prerequisite: Department approval, requires acceptance and enrollment in MCLA-BMC Med Tech Clinical Lab Experience

BIOL 492 BMC: Clinical Molecular Biology 1 cr

Introduces the student to the basic structure and function of DNA. Discusses the impact of molecular genetics in medicine and specific methods for analysis. The student applies this theory in the molecular biology laboratory using

