

Biotechnology Science

Gainful Employment	Program Name	Program Type	Area of Study
	Bioinformatics Concentration (9376) , AAS (https://catalog.lakelandcc.edu/degree-certificate-programs/bios/9376/)	Degree	BIOS
	Biotechnology Science (9375) , AAS (https://catalog.lakelandcc.edu/degree-certificate-programs/bios/9375/)	Degree	BIOS
	Biotechnology Science Certificate (3751) (https://catalog.lakelandcc.edu/degree-certificate-programs/bios/3751/)	Certificate	BIOS

BIOS 1050 Introduction to Biotechnology Science

3 Credits

This course introduces students to the field of biotechnology. The course addresses applications of biotechnology to the medical, agricultural, environmental and chemical industries. Discussions will include the safety, ethical, regulatory, and proprietary issues of the application of biotechnology to industry and healthcare.
(3 contact hours)

BIOS 1200 Biotechnology Science Lab Skills

4 Credits

Prerequisite: admission to Biotechnology Science Program.

This course introduces students to the fundamental knowledge and techniques associated with the operation of a laboratory engaged in biotechnology. The course includes the instruction and application of laboratory mathematics, good laboratory practice, and laboratory safety. Students will record the procedures, data, and analysis of laboratory activities. Students will learn experimental techniques, including reagent preparation, cell culture, filtration, centrifugation, spectroscopy, and microscopy. Students must supply a scientific calculator.

(8 contact hours: 2 lecture, 6 lab)

BIOS 1500 Introduction to Biochemistry

4 Credits

Prerequisite: BIOL 1510, BIOS 1200, CHEM 1500; or permission of instructor.

This course introduces students to the chemistry of biological systems. It emphasizes the chemical structures, regulation, biological roles and metabolism of proteins, nucleic acids, carbohydrates, and lipids. Laboratory exercises will focus on basic techniques of isolation and characterization of biomolecules, including separation, chemical reactivity, and kinetics. Students will record experimental procedures, data, and interpretations.

(6 contact hours: 3 lecture, 3 lab)

BIOS 1600 Advanced Molecular Separations

4 Credits

Prerequisite: BIOS 1500 or permission of instructor.

This course includes specialized study of the theory and methodology of the separation and some subsequent characterization of biomolecules. Chromatographic techniques discussed and employed will include affinity, thin layer, paper, gas, ion exchange, and High Performance Liquid Chromatography (HPLC). The course emphasizes separation and specific identification of proteins. Students will record experimental procedures, data, and interpretations.

(8 contact hours: 2 lecture, 6 lab)

BIOS 2100 Applied Microbiology

3 Credits

Prerequisite: BIOL 2700, BIOS 1200; or permission of instructor.

This course advances the student's knowledge of microbial metabolism and genetics, with an emphasis on biotechnological applications. Students will manipulate cell growth conditions experimentally for native and genetically altered microbes. The course also covers the genetics of microbial viral pathogens (phage). Students will record experimental procedures, data, and interpretations.

(5 contact hours: 2 lecture, 3 lab)

BIOS 2400 Tissue Culture

3 Credits

Prerequisite: BIOL 2700, BIOS 1200; or permission of instructor.

This course introduces students to the establishment, maintenance, characterization, and storage of eukaryotic cell cultures. In the laboratory, students will prepare media, manipulate cells using aseptic technique, characterize ectopically expressed gene products, and catalog cell cultures. The course also addresses monoclonal antibody production. Students will record experimental procedures, data, and interpretations.

(5 contact hours: 2 lecture, 3 lab)

BIOS 2500 Recombinant DNA Technology**4 Credits***Prerequisite: BIOS 1200, BIOS 1500; or permission of instructor.*

This specialized course includes the basic genetics and technical aspects of introducing foreign and native genes into organisms. The course also addresses molecular diagnostics for healthcare, forensic science, and research purposes. In the laboratory, the students will isolate, characterize, manipulate, and clone nucleic acids. The course emphasizes record-keeping and good laboratory practice. (8 contact hours: 2 lecture, 6 lab)

BIOS 2550 Introduction to Bioinformatics**1 Credit***Prerequisite: BIOS 2500 or permission of instructor.*

This course introduces students to the use of computers in the biotechnology laboratory. The course provides basic instruction related to the terminology and use of computers in communicating in the biotechnology industry. The course also provides introductory instruction in the use of applied software packages including: DNA/protein sequence analysis; scientific literature and molecular sequence database manipulation; multiple sequence alignment software; and utility software such as statistical packages and documentation programs. (1 contact hour)

BIOS 2600 Bioscience Manufacturing Processes**4 Credits***Prerequisite: BIOS 2100 or permission of instructor.*

This course introduces students to the principles and techniques of fermentation and bioprocessing. Laboratory experiments will include food and beverage fermentations; microbial fermentations yielding specific products such as antibiotics or amino acids; and product formation using isolated enzymes. This course also examines the economics and operational factors encountered when producing microbial by-products on an industrial scale. Students will record experimental procedures, data, and interpretations. (6 contact hours: 3 lecture, 3 lab)

BIOS 2700 Internship**3 Credits***Prerequisite: BIOS 2400 (can be taken concurrently); BIOS 2500, BIOS 2600, BIOS 2800 (must be taken concurrently); or permission of instructor.*

This specialized course provides students with supervised practical experience in an academic or industrial laboratory engaged in biotechnology. The internship integrates the student's bioscience knowledge and laboratory skills, acquired within the core coursework of the Biotechnology Science program, with job experience representative of an entry-level biotechnology laboratory technician position. (15 contact hours: 15 lab)

BIOS 2800 Biotechnology Science Seminar**1 Credit***Prerequisite: BIOS 2700 (must be taken concurrently).*

This course is a specialized topical course providing students a venue to discuss internship issues, as well as recent biotechnology innovations. The course discusses such issues as non-proprietary internship experiences relating to laboratory practices, governmental regulations, and ethics. Students will research and report on assigned biotechnology-related topics. (1 contact hour)

BIOS 2901 Clinical Molecular Diagnostics**4 Credits***Prerequisite: BIOL 1200 or BIOS 1500 or permission of the instructor.*

This advanced course expands the student's knowledge of metabolism and genetics. Purpose, principle, and interpretation of molecular-based assays used for diagnostic purposes are emphasized. Laboratory procedures covered include nucleic acid isolation, separation and detection, nucleic acid amplification, sequencing, and other molecular techniques. The course covers theory and operation of instrumentation and quality assurance in the molecular laboratory. (6 contact hours: 3 lecture, 3 lab)