

BIOTECHNOLOGY

Biotechnology is the application of biological systems and living organisms to address today's societal challenges. Biotechnology utilizes living cells to produce medicine, food, and alternative fuels, as well as remove environmental toxins. Courses in biotechnology lead to a Certificate of Achievement in Biomanufacturing, as well as an associate's degree in Biotechnology. Laboratory-intensive biotech courses empower students with practical skills to immediately obtain entry-level positions as technicians in the local bioscience industry. Lecture-based courses provide students with an appreciation of the ethical and regulatory issues surrounding biotechnology, and prepare students to obtain an industry-recognized credential from the American Society for Quality. Workforce skills, such as resume writing and job interviewing, are emphasized throughout the program.

Faculty

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Division

Mathematics, Sciences and Business

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Discipline Website

<https://www.citruscollege.edu/academics/programs/biot> (<https://www.citruscollege.edu/academics/programs/biot/>)

Learning Outcomes

This discipline prepares students to do the following:

- Calibrate and safely operate standard equipment and instrumentation utilized in biotechnology.
- Document laboratory activities, experimental data, and procedures following Good Documentation Practice (GDP).
- Describe the principles of Good Laboratory Practice (GLP) and Good Manufacturing Practice (cGMP), and perform tasks in accordance with these standards and established safety procedures.
- Explain how biotechnology tools may be applied to address societal challenges.
- Describe key concepts in quality and how regulatory oversight shapes the biotechnology industry.

- Prepare for a job interview and generate a resume appropriate for entry-level positions in biotechnology.

Courses

BIOT 107

Biotechnology: Transforming Society Through Biology

3 Units (AA/AS; Citrus B1; CSU; UC; CSUGE B2)

54 lecture hours

Grade Mode: Standard Letter

Strongly recommended: ENGL 101.

This lecture course serves as an introduction to biology concepts and their application in the field of biotechnology. Lecture content will emphasize the biology, business, and legal/ethical issues surrounding biotechnology. The course is appropriate for a wide range of students, including non-majors, who would like to explore how biological solutions may be employed to address today's societal issues. Topics include molecular and cellular biology, genetic engineering, drug development, GMOs, and biofuels.

BIOT 108

Intro to Biotechnology: Real World Biology Applications

4 Units (AA/AS; Citrus B1; Citrus B3; CSU; UC; IGETC 5B; IGETC 5C; CSUGE B2; CSUGE B3)

54 lecture hours, 54 lab hours

Grade Mode: Standard Letter

Strongly recommended: Intermediate algebra or higher; ENGL 101.

This course will serve as a general introduction to biology with a focus on biotechnology appropriate for a wide range of students, including non-majors. Topics will encompass the biology, business, and legal/ethical issues surrounding biotechnology. Lecture content will emphasize cell structure and function, molecular biology, genetic engineering, drug development, biofuels, and discussion of utilizing living systems to address current societal challenges. The laboratory provides students with expanded hands-on experience of biotechnology techniques and applications.

BIOT 110

Biotechnology I: Basic Lab Skills and Documentation

5 Units (AA/AS; CSU; UC)

36 lecture hours, 162 lab hours

Grade Mode: Standard Letter

Strongly recommended: BIOT 107 or BIOT 108 or BIOL 105 or BIOL 124; Intermediate algebra or higher; ENGL 101.

This course introduces students to scientific instrumentation and techniques employed in the biotechnology industry. The course includes a significant laboratory component focused on laboratory safety, operation of standard equipment, industry documentation practices, laboratory math, preparation of chemical solutions, aseptic technique, and DNA isolation and manipulation. Students will gain an appreciation for the diversity of biotechnology companies in our region and local workforce trends. Good communication, teamwork, and work-readiness skills are emphasized.

BIOT 125

Quality and Regulatory Practices in Biotechnology

3 Units (AA/AS; CSU)

54 lecture hours

Grade Mode: Standard Letter

Strongly recommended: Intermediate algebra or higher; ENGL 101.

This course serves as an introduction to basic quality principles and tools with an emphasis on their application in biotechnology. Students will explore concepts related to quality control, quality assurance, validation, documentation, and regulatory compliance within this industry. The course prepares students for examination through the American Society for Quality to become a Certified Quality Improvement Associate (CQIA).

BIOT 150

Biotechnology II: Biomanufacturing and Quality Principles

4 Units (AA/AS; CSU)

36 lecture hours, 108 lab hours

Grade Mode: Standard Letter

Prerequisite(s): BIOT 110.

Strongly recommended: Intermediate algebra or higher; ENGL 101.

This course builds upon the concepts and laboratory techniques introduced in Biotechnology I: Basic Lab Skills and Documentation. Students will closely examine the biomanufacturing sector, including facility design, the production process, quality control, and quality assurance. Governmental regulation of the biomanufacturing industry will be highlighted as students explore Good Manufacturing Practice and Good Documentation Practice. This course includes a significant laboratory component focusing on large-scale protein production and purification, environmental monitoring, equipment validation, and clean room operations. Resume writing and job interview skills for biomanufacturing employment opportunities will be emphasized.

Programs

Associate Degree

- Biotechnology (<http://catalog.citruscollege.edu/disciplines/biotechnology/biotechnology-as/>)

Certificate of Achievement

- Biomanufacturing (<http://catalog.citruscollege.edu/disciplines/biotechnology/biomanufacturing-certificate-achievement/>)
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