Major Course Requirements

A minimum of 108 hours (55 upper-division hours)

> **Required Core Courses (78 hours):**
  - BIOL 111+12+13 Biological Foundations I,II,III 5+5+5
  - BIOL 221+222 Intro to Research Methods I,II 2+2
  - BIOL 320 Cellular and Molecular Biology 4
  - BIOT 345+L Biotechnology I+Lab 2+1
  - BIOT 445+L Biotechnology II+Lab 1+2
  - BIOT 490 Biotechnology Capstone 1
  - BIOT 494 Biotechnology Internship 4
  - CHEM 111+L General Chemistry I+Lab 4+1
  - CHEM 112+L General Chemistry II+Lab 4+1
  - CHEM 113+L General Chemistry III+Lab 4+1
  - CHEM 324+L Analytical Chemistry I+Lab 2+1
  - CHEM 371+L Organic Chemistry I+Lab 3+1
  - CHEM 372+L Organic Chemistry II+Lab 3+1
  - CHEM 373+L Organic Chemistry III+Lab 3+1
  - CHEM 481+482 Biochemistry I,II 4+4
  - BIOT 396 Science Seminar 0.5
  - BIOT 397 Biotechnology Seminar 0.5

One of the following courses:
- MICR 134 General Microbiology (5)
- MICR 366 Medical Microbiology (5)

> **Required Core Electives (16 hours):**
At least 16 hours from the following: 16
(Include at least one BIOL course and one CHEM course)
  - BIOL 348 Systems Physiology (5)
  - BIOL 354 Genetics (4)
  - BIOL 430 Neuroscience (4)
  - BIOL 419 Developmental Biology (3)
  - BIOL 426 Histology (5)
  - BIOL 469 Immunology (4)
  - CHEM 225 Chemical Modeling (2)
  - CHEM 326 Analytical Chemistry I (2)
  - CHEM 326L Analytical Chemistry III Lab (1)
  - CHEM 482L Biochemistry II Lab
  - CHEM 483 Biochemistry III (3)
  - CHEM 483L Biochemistry III Lab (2)
  - CHEM 485 Topics: Biophysical Chemistry (3)

> **Required Cognate Courses (15 hours):**
  - RELT 390 Christian Bioethics 3
  - PHYS 111+112+113 General Physics I,II,III (4+4+4) 12

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This major fulfills the general education requirements in Science (section V).

Student Learning Outcomes

**Students will:**
- Identify and explain general biological and chemical principles.
- Describe and employ the scientific process and techniques, especially as these apply to biotechnology.
- Successfully communicate in both oral and written scientific format and be information literate.
- Develop a personal ethic that considers the ramifications of biotechnology-related decisions (right-making and wrong-making) and to take action rooted in society’s best interest.

Occupational Information

**What can I do with this major?**

The PUC Biotechnology Program provides students with opportunities to be trained in basic and advanced biochemical techniques to analyze proteins, DNA and RNA, which will help prepare them to work professionally in biomedical, pharmaceutical, criminal investigative, agricultural and other related industries. Experience will be gained in material analysis (high pressure liquid chromatography, gas chromatography, mass spectrometry), protein analysis (enzyme-linked immunosorbent assay, immunocytochemistry, western blotting), and nucleic acid analysis (polymerase chain reaction, gene sequencing, Southern and northern blotting). Students will learn how to design and implement scientific experiments, interpret data, and communicate their conclusions with colleagues orally and in writing. Additionally, ethical and philosophical issues related to research and applications in biotechnology will be thoroughly examined.

**Additional Education Required?**

The goal of this program is to train students to work as lab technicians in biotechnology research and development and academic settings by emphasizing hands-on experience and expertise. However, the program is also intended to fully prepare students to pursue more advanced MS and PhD degrees in biotechnology, thus enabling them to obtain more prestigious positions as administrators, primary investigators and medical professionals.

**Job Outlook**

Employment of biological technicians is projected to grow 5 percent from 2014 to 2024. Greater demand for biotechnology research is expected to increase the need for these workers. Employment of forensic science technicians is projected to grow 27 percent from 2014 to 2024. Biotechnology cuts a wide swath across a number of industries; agriculture, pharmaceuticals and medicine, manufacturing, and more. Specific occupations may experience greater demand and higher salaries than others. Visit www.bls.gov for more details. For a thorough examination of the biotechnology sector in California, visit www.labormarketinfo.edd.ca.gov/Biotechnology_in_California.html
General Education Requirements

To view general education requirements for this major, please refer to page A-01, Summary of General Education Requirements: B.S. Degree.

How to Construct Your Own Program

1. Consult with your academic advisor.
2. Consider your aptitudes, interests, and available courses.
3. Schedule major courses and cognates first.
4. Fill the rest of your schedule with G.E. requirements.
5. For the freshman year include English I and II and Religion courses. Also include Basic Algebra I+II unless waived by previous work.

What the Degree Includes

A total of 192 quarter hours including:
1. A minimum of 60 upper division hours.
2. General Education requirements.
3. Major requirements.
4. Minimum 2.0 GPA, overall and major.

For More Information

Visit our website: www.puc.edu/academics/departments/biology

email: biology@puc.edu

Sample Four-Year Program

This sample curriculum shows you how a program may be constructed, emphasizing the science components. Your program may differ, but be sure to consult your advisor.

First Year

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* Depending on your schedule, you may take Biotechnology I in the second or third year.
** See the front of this sheet for a list of Biotechnology elective options.