

## BIOLOGY

### PROGRAMS OFFERED

- Bachelor of Science in Biology
- Bachelor of Science in Biology with an Emphasis in Cell and Molecular Biology
- Bachelor of Science in Biology with an Emphasis in Medical Imaging
- Minor in Biology
- Certificate in Biotechnology

Biology is the study of life, its origins, diversity and intricacies. It emphasizes the relationship between structure and function in living systems and the processes by which organisms grow, reproduce and interact with each other and their environment. The discipline is dynamic and rapidly advancing, particularly in the areas of biotechnology and information technology. The Biology Program provides its students with a strong theoretical foundation in biology combined with extensive hands-on laboratory experiences using state-of-the-art technology. Students take a series of core courses augmented by upper-division electives selected from areas of special interest.

**CAREERS:** The Bachelor of Science in Biology and the Bachelor of Science in Biology with an Emphasis in Cell and Molecular Biology are designed for students who wish to enter medical, dental or other health professional or graduate schools, the teacher credential program, or to seek careers in science education, business, industry or government. The Bachelor of Science in Biology with an Emphasis in Cell and Molecular Biology also offers students an opportunity to study the exciting developments in genetics, molecular biology, cloning, biotechnology and bioinformatics. Such programs lead to careers in biotechnology, pharmaceuticals, research and development, intellectual property and patent law.

The Bachelor of Science in Biology with an Emphasis in Medical Imaging prepares students for graduate or professional study in the medical sciences (medical imaging, medical physics, health physics, dosimetry, nuclear medicine, radiotherapy, oncology, biomedical engineering), or for entry into professional positions in the clinical environment and in medical imaging research and development.

The Certificate in Biotechnology will provide students with advanced knowledge and skills in modern biotechnology that will lead to careers in biotech as well as pharmaceutical industries.

### CONTACT INFORMATION

Biology@csuci.edu

### FACULTY

Ching-Hua Wang, M.D., Ph.D., Professor of Biology  
Academic Coordinator  
Academic Advisor  
Professional Building, Room 215  
(805) 437-8870  
ching-hua.wang@csuci.edu

Simone Aloisio, Ph.D., Assistant Professor of Chemistry  
Professional Building, Room 241  
(805) 437-8999  
simone.aloisio@csuci.edu

Nikolaos Diamantis, Ph.D.,  
Assistant Professor of Mathematics  
Professional Building, Room 246  
(805) 437-8991  
nikolaos.diamantis@csuci.edu

Geoffrey Dougherty, Ph.D., Professor of Physics  
Professional Building, Room 220  
(805) 437-8990  
geoff.dougherty@csuci.edu

Ivona Grzegorzcyk, Ph.D., Professor of Mathematics  
Professional Building, Room 208  
(805) 437-8868  
ivona.grze@csuci.edu

Philip Hampton, Ph.D., Professor of Chemistry  
Professional Building, Room 210  
(805) 437-8869  
philip.hampton@csuci.edu

Louise Lutze-Mann, Ph.D.,  
Associate Professor of Biology  
Professional Building, Room 213  
(805) 437-8873  
louise.lutze-mann@csuci.edu

Nancy Mozingo, Ph.D., Assistant Professor of Biology  
Professional Building, Room 224  
(805) 437-8989  
nancy.mozingo@csuci.edu

### REQUIREMENTS FOR THE BACHELOR OF SCIENCE DEGREE IN BIOLOGY (120 units)

(For pre-professional and general biology students)

#### Lower Division Requirements (31 units):

1. Biology
  - BIOL 200 Principles of Organismal and Population Biology (4)
  - BIOL 201 Principles of Cell and Molecular Biology (4)
  - BIOL 202 Biostatistics (3)
2. Mathematics
  - MATH 150 Calculus I (4)
3. Chemistry
  - CHEM 121 General Chemistry I (4)
  - CHEM 122 General Chemistry II (4)
4. Physics
  - Select either**
  - PHYS 100 Introduction to Physics I (4)
  - PHYS 101 Introduction to Physics II (4)
  - Or**
  - PHYS 200 General Physics I (4)
  - PHYS 201 General Physics II (4)

(12 units of the above courses will be counted toward lower-division GE credits, 4 units in each of three different disciplines)

**Upper Division Requirements (33 units):**

- Biology
  - BIOL 300 Cell Physiology (4)
  - BIOL 302 Genetics and Evolution (4)
  - BIOL 400 Molecular Biology and Molecular Genetics (4)
  - BIOL 433\* Ecology and the Environment (4)
- Organic Chemistry
  - CHEM 311 and 312 Organic Chemistry I (4)
  - CHEM 314 and 315 Organic Chemistry II (4)

(A year-long organic chemistry sequence with laboratory taken at a community college may be accepted for the Biology major in lieu of CHEM 311, 312, 314, 315.)

- Ethics
  - Select one of the following:**
  - BIOL 346\* Scientific and Professional Ethics (3)
  - PHYS/ENGL 338\* Science and Conscience (3)
- Computing in Biology
  - Select one of the following courses:**
  - BIOL 410 Computer Applications in Biomedical Fields (3)
  - BIOL 430\* Research Design and Data Analysis (3)
  - BIOL 431\* Bioinformatics (4)
- Service Learning
  - A minimum of 2 units taken from the following:**
  - BIOL 494 Independent Research (1-3)
  - BIOL 497 Directed Study (1-3)
- Capstone
  - BIOL 499 Senior Capstone Colloquium (1)

\* Courses with an \* are double-counted toward upper-division GE credits.

**Electives in Biology (14 units):**

A minimum of 14 units chosen from 300 to 400 level upper division biology courses, with at least one lab-based course and no more than two courses that could be taken at 300 level (no courses from BIOL 331 to 343 would be counted toward the major). CHEM 318 or CHEM 400 could also be taken to satisfy the electives.

**Electives in Any Discipline (6 units)****Required Supporting and Other GE Courses (36 units):**

- ENGL 330 Writing in the Disciplines (3)
- American Institutions Requirement (6)
- Other GE Courses in Categories A-E (27)

**REQUIREMENTS FOR THE BACHELOR OF SCIENCE DEGREE IN BIOLOGY WITH AN EMPHASIS IN CELL and MOLECULAR BIOLOGY (120 units)****Lower Division Requirements (31 units):**

- Biology
  - BIOL 200 Principles of Organismal and Population Biology (4)
  - BIOL 201 Principles of Cell and Molecular Biology (4)
  - BIOL 202 Biostatistics (3)
- Mathematics
  - MATH 150 Calculus I (4)
- Chemistry
  - CHEM 121 General Chemistry I (4)
  - CHEM 122 General Chemistry II (4)
- Physics
  - Select either**
  - PHYS 100 Introduction to Physics I (4)
  - PHYS 101 Introduction to Physics II (4)
  - Or**
  - PHYS 200 General Physics I (4)
  - PHYS 201 General Physics II (4)

(12 units of the above courses will be counted toward lower-division GE credits, 4 units in each of three different disciplines)

**Upper Division Requirements (41-42 units):**

- Biology
  - BIOL 300 Cell Physiology (4)
  - BIOL 301 Microbiology (4)
  - BIOL 302 Genetics and Evolution (4)
  - BIOL 400 Molecular Biology and Molecular Genetics (4)
  - BIOL 401 Biotechnology and Recombinant DNA Techniques (5)
  - BIOL 433\* Ecology and the Environment (4)
- Organic Chemistry and Biochemistry
  - Select either Group A or Group B courses:**
  - Group A**
  - CHEM 311 Organic Chemistry I (3)
  - CHEM 312 Organic Chemistry I Laboratory (1)
  - CHEM 318 Biological Chemistry (3)
  - Group B**
  - (Note: Students completing the following courses to satisfy this category will obtain a Minor in Chemistry in addition to a Major in Biology:
  - CHEM 311 Organic Chemistry I (3)
  - CHEM 312 Organic Chemistry I Laboratory (1)
  - CHEM 314 Organic Chemistry II (3)
  - CHEM 315 Organic Chemistry II Laboratory (1)
  - CHEM 400 Biochemistry (4)

(A year-long organic chemistry sequence with laboratory taken at a community college may be accepted for the Biology major in lieu of CHEM 311, 312, 314, 315.)

3. Ethics

**Select one of the following:**

- BIOL 346\* Scientific and Professional Ethics (3)  
PHYS/ENGL 338\* Science and Conscience (3)

4. Computing in Biology

**Select one of the following:**

- BIOL 430\* Research Design and Data Analysis (3)  
BIOL 431\* Bioinformatics (4)

5. Service Learning

**A minimum of 2 units taken from the following:**

- BIOL 492 Internship (2-3)  
BIOL 494 Independent Research (1-3)  
BIOL 497 Directed Study (1-3)

6. Capstone

- BIOL 499 Senior Capstone Colloquium (1)

\* Courses with an \* are double-counted toward upper-division GE credits.

**Electives in Biology (8-9 units):**

A minimum of 8-9 units chosen from 400 level courses, excluding BIOL 410.

**Electives in Any Discipline (6 units)**

**Required Supporting and Other GE Courses (33 units):**

- ENGL 330 Writing in the Disciplines (3)  
American Institutions Requirement (6)  
Other GE Courses in Categories A-E (24)



**REQUIREMENTS FOR THE BACHELOR OF SCIENCE DEGREE IN BIOLOGY WITH AN EMPHASIS IN MEDICAL IMAGING (120 units)**

**Lower Division Requirements (36 units):**

1. Biology

- BIOL 200 Principles of Organismal and Population Biology (4)  
BIOL 201 Principles of Cell and Molecular Biology (4)  
BIOL 210 Human Anatomy and Physiology I (4)  
BIOL 211 Human Anatomy and Physiology II (4)

2. Mathematics

- MATH 150 Calculus I (4)

3. Chemistry

- CHEM 121 General Chemistry I (4)  
CHEM 122 General Chemistry II (4)

4. Physics

**Select either**

- PHYS 100 Introduction to Physics I (4)  
PHYS 101 Introduction to Physics II (4)

**Or**

- PHYS 200 General Physics I (4)  
PHYS 201 General Physics II (4)

(12 units of the above courses will be counted toward lower-division GE credits, 4 units in each of three different science disciplines.)

**Upper Division Requirements (41 units):**

1. Biology

- BIOL 300 Cell Physiology (4)  
BIOL 301 Microbiology (4)  
BIOL 400 Molecular Biology and Molecular Genetics (4)

2. Organic Chemistry and Biochemistry

- CHEM 311 Organic Chemistry I (3)  
CHEM 312 Organic Chemistry I Laboratory (1)  
CHEM 318 Biological Chemistry (3)

(An organic chemistry I-equivalent course with laboratory taken at a community college may be accepted for the Biology major in lieu of CHEM 311 and 312.)

3. Ethics

**Select one of the following:**

- BIOL 346\* Scientific and Professional Ethics (3)  
PHYS/ENGL 338\* Science and Conscience (3)

4. Medical Imaging

- BIOL/PHYS 416 Radiobiology and Radionuclides (3)  
BIOL/PHYS 434\* Introduction to Biomedical Imaging (3)  
BIOL/PHYS 464 Biomedical Instrumentation (4)

5. Computing in Medical Imaging

- BIOL 410 Computer Applications in Biomedical Fields (3)  
BIOL 430\* Research Design and Data Analysis (3)

6. Service Learning

**A minimum of 2 units taken from the following:**

- PHYS 492 Physics Internship (3)
- BIOL 494 Independent Research (1-3)
- PHYS 494 Independent Research (3)
- BIOL 497 Directed Study (1-3)
- PHYS 497 Directed Study (3)

7. Capstone

- BIOL/PHYS 499 Senior Capstone Colloquium (1)

\* Courses with an \* are double-counted toward upper-division GE credits.

**Electives in Biology and Physics (10 units):**

10 units chosen from upper-division courses in Biology and/or Physics.

**Required Supporting and Other GE Courses (33 units):**

- ENGL 330 Writing in the Disciplines (3)
- American Institutions Requirement (6)
- Other GE Courses in Categories A-E (24)

**REQUIREMENTS FOR THE MINOR IN BIOLOGY (21 units)**

Biology as a discipline has been rapidly advancing in the last decade. With the information derived from the sequencing of the genomes of many organisms, it will have far-reaching impact on the environment, public health, and on local, regional, and global economies. The Biology Minor allows students in majors other than biology to gain an understanding of these exciting developments. It will provide a solid background in biology and the opportunity to explore selected area(s) at a greater depth. Equipped with a minor in biology, students with a major in other disciplines will have a greater understanding and knowledge of the latest advances in many areas of biology and will therefore be more versatile in their career paths.

**Lower Division Requirements (8 units):**

- BIOL 200 Principles of Organismal and Population Biology (4)
- BIOL 201 Principles of Cell and Molecular Biology (4)

**Upper Division Requirements (13 units):**

1. Biology (8 Units)
  - BIOL 300 Cell Physiology (4)
  - BIOL 302 Genetics and Evolution (4)

2. Biology Electives (5 Units)

A minimum of 5 units of 300-400 level biology courses, with no more than one course selected from BIOL 331-333, 343, 410 and 430.

**REQUIREMENTS FOR THE CERTIFICATE IN BIOTECHNOLOGY (23-24 units)**

(For students with a B.S. degree in biology pursuing a certificate in biotechnology)

1. B.S. degree in biology (may be concurrent);
2. Completion of the following courses with C or better grades:
  - CHEM 318 or CHEM 400 Biological Chemistry or Biochemistry I (3-4)
  - BIOL 401 Biotechnology and Recombinant DNA Techniques (5)
  - BIOL 420 Cellular and Molecular Immunology (4)
  - BIOL 431 Bioinformatics (4)
3. Complete another 4 units of upper-division biology course in consultation with the program.
4. Complete an internship course.
5. Complete the capstone course.
6. Approval by the Biology program.

**REQUIREMENTS FOR HONORS IN BIOLOGY**

Candidacy for honors in biology is voluntary. To be eligible, a student must fulfill the following requirements:

1. Achieve a minimum grade point average of 3.5 for all courses satisfying the requirements for the major as defined above.
2. Take at least seven courses in the major at this University.
3. Satisfactorily complete a Service Learning course.
4. Satisfactorily complete a Senior Capstone course.

Application for candidacy must be made at the beginning of the senior year. Approval of candidacy and of the Service Learning project and project advisor rests with the Biology Program. The project advisor will have the sole responsibility for acceptance of the completed project.

The Biology Program may grant honors to exceptional students who have not met the above requirements, but who have in the judgment of the Program brought distinction upon themselves and the Program in some other significant and appropriate manner.

Note: This program had not received final approval at the time this catalog went to press. Please visit our Web site at [www.csuci.edu](http://www.csuci.edu) for confirmation of its approval.