

ASIAN-PACIFIC STUDIES

PROGRAM OFFERED

- Minor in Asian-Pacific Studies

The minor in Asian-Pacific Studies gives students exposure to the cultures, histories, literatures, philosophies, politics and psychologies related to the study of the Asian-Pacific region. The minor in Asian-Pacific Studies is appropriate for students interested in understanding the diverse perspectives and influences, traditional and modern, emanating from this part of the world.

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FACULTY

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REQUIREMENTS FOR THE MINOR IN ASIAN-PACIFIC STUDIES (18 units)

Lower-Division Requirements (0 units):
None.

Upper-Division Requirements (18 units):

Eighteen units from the following list (also includes Lower Division courses):

ART 112	Arts of the Eastern World (3)
ENGL 452	Asian/Asian American Literature (3)
HIST 380	History of the Pacific Islands (3)
HIST 391	Traditional China (3)
HIST 392	Modern China (3)
HIST 393	Contemporary China (3)
HIST 394	Traditional Japan (3)
HIST 395	Modern Japan (3)
HIST 396	East Asia: Then and Now (3)
PHED 102	Traditional Asian Martial Arts: Tai Ji (repeatable) (1)
PSY 344	Psychology and Traditional Asian Thought (3)
PSY/HIST 436	Psychology and History of Asian Warrior Cultures (3)

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
- Master of Science in Biotechnology and Bioinformatics
- Minor in Biology
- Certificate in Biotechnology
- Honors in Biology

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 degree in Biology provides students with a broad background in the biological sciences. The degree program requires coursework in fundamental areas of biology and then allows students to tailor the degree through electives to suit their interests. Students interested in earning a Single Subject Teaching Credential can supplement the BS degree program with 14 units of required courses (see specified courses below) to satisfy the requirements for subject matter preparation in biology.

The Bachelor of Science in Biology with an Emphasis in Cell and Molecular Biology 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 Master of Science Degree in Biotechnology and Bioinformatics is a professional degree program designed to meet the needs of biotechnology industry and related public and private agencies and organizations. The program combines rigorous scientific training in interdisciplinary areas in biotechnology and bioinformatics with course work and experience in business management and regulatory affairs. The program includes a set of core courses with two emphases to choose from; biotechnology and bioinformatics. Biotechnology is centered in the laboratory and employs sophisticated molecular biology techniques for applications in human and animal health, agriculture, environment, and specialty biochemical manufacturing. In the next century, the major driving force for biotechnology will be the strategic use of the data derived from large-scale genome sequencing projects. Bioinformatics turns raw data from genome sequencing and new experimental methodologies such as microarrays and proteomics into useful and accessible information about gene function, protein structure, molecular evolution, drug targets and disease mechanisms using computational analyses, statistics, and pattern recognition. Our approach also includes team projects drawn from biotechnology industries to focus on real-world problems and applications of biological and computational sciences and to inculcate interpersonal as well as problem-solving skills using multiple perspectives. Graduates from this program will develop analytical, managerial and interpersonal skills along with sophisticated expertise in biotechnology and bioinformatics. They will be ready to make immediate contributions to scientific research and development, management in biotechnological, biomedical and pharmaceutical industries, biotechnology law and regulations, governmental or environmental agencies, research institutes, consulting firms, research and clinical laboratories, private and public health organizations, or education.

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 impacts 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. The requirement for a Minor in Biology is 21 units.

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

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

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 105 Pre-Calculus or MATH 150 Calculus I (4)
3. Physical Sciences
CHEM 121 General Chemistry I (4)
CHEM 122 General Chemistry II (4)
PHYS 100 Introduction to Physics I (4)
PHYS 101 Introduction to Physics II (4)
(PHYS 200/201 may be substituted for the above physics sequence.)

(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 (21 units)

- BIOL 300 Cell Biology (4)
BIOL 302 Genetics (4)
BIOL 303 Evolutionary Biology (3)
BIOL 304 Comparative Animal Physiology (3)
BIOL 433* Ecology and the Environment (4)

AND select one of the following (2):

- BIOL 492 Internship
BIOL 494 Independent Research
BIOL 497 Directed Study

AND

- BIOL 499 Senior Capstone Colloquium (1)

Electives in Biology (10-12 units)

Select at least three courses from the following list, one of which must be a lab course.

- BIOL 301 Microbiology (4)
BIOL 310 Animal Biology and Ecology (4)
BIOL 311 Plant Biology and Ecology (4)
BIOL 312 Marine Biology (4)
BIOL 313 Conservation Biology (4)
BIOL 316 Invertebrate Zoology (4)
BIOL 317 Parasitology (4)
BIOL 400 Molecular Biology and Molecular Genetics (4)
BIOL 401 Biotechnology and Recombinant DNA Techniques (5)
BIOL 402 Toxicology (3)
BIOL 420 Cellular and Molecular Immunology (4)
BIOL 421 Virology (3)
BIOL 422 Molecular Plant Physiology (4)
BIOL 423 Cellular and Molecular Neurobiology (3)
BIOL 424 Human Physiology (3)
BIOL 425 Human Genetics (3)
BIOL 427 Developmental Biology (4)
BIOL 428 Biology of Cancer (3)
BIOL 431* Bioinformatics (4)
BIOL 432* Principles of Epidemiology and Environmental Health (3)
BIOL 450 Ichthyology: The Biology of Fishes (4)

Required Supporting and Other GE Courses (45 units)

American institutions requirement (6)
Other GE courses in Categories A-E (39)

Electives in Any Discipline (12-14 units)

Required Courses for Subject Matter Preparation in Biology for Single Subject Teaching Credential (14 units)

Subject matter preparation in biology can be met by fulfilling the requirements for the BS in Biology and successfully completing the following 14 units:

- PHYS 105 Introduction to the Solar System (4)
GEOL 121 Physical Geology (4)
BIOL 335* The Biosphere (3)
EDUC 330 Introduction To Secondary Schooling (3)
(Courses with * are double-counted toward upper-division GE credits.)

REQUIREMENTS FOR THE BACHELOR OF SCIENCE DEGREE IN BIOLOGY WITH AN EMPHASIS IN CELL AND MOLECULAR BIOLOGY (120 units)

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. Physical Sciences

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

AND 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 (44 units)

1. Biology
BIOL 300 Cell Biology (4)
BIOL 301 Microbiology (4)
BIOL 302 Genetics (4)
BIOL 303 Evolutionary Biology (3)
BIOL 400 Molecular Biology and Molecular Genetics (4)
BIOL 401 Biotechnology and Recombinant DNA Techniques (5)
BIOL 431* Bioinformatics (4)

AND select one of the following (2):

- BIOL 492 Internship
BIOL 494 Independent Research
BIOL 497 Directed Study

AND

- BIOL 499 Senior Capstone Colloquium (1)

2. Organic Chemistry and Biochemistry

Select *one* of the following groups of courses:

Group A-

- 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)

Group B-

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

Group C-

(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. Required General Education Courses

- ENGL 330* Writing in the Disciplines (3)

AND Select one of the following:

- BIOL 326 Scientific and Professional Ethics (3)
PHYS/ENGL 338* Science and Conscience (3)

Electives in Biology (9 units)

Select at least 9 units of courses from the following list:

- BIOL 402 Toxicology (3)
BIOL 416 Radiobiology and Radionuclides (3)
BIOL 420 Cellular and Molecular Immunology (4)
BIOL 421 Virology (3)
BIOL 422 Molecular Plant Physiology (4)
BIOL 423 Cellular and Molecular Neurobiology (3)
BIOL 424 Human Physiology (3)
BIOL 425 Human Genetics (3)
BIOL 427 Developmental Biology (4)
BIOL 428 Biology of Cancer (3)
BIOL 432* Principles of Epidemiology and Environmental Health (3)
BIOL 433* Ecology and the Environment (4)

Required Supporting and Other GE Courses (36 units)

- American Institutions Requirement (6)
Other GE courses in Categories A-E (30)

(Courses with * are double-counted toward upper-division GE credits.)

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. Physical Sciences

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

AND 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 (39 units)

1. Biology and Physics

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

AND select one of the following (2):

- PHYS 492 Physics Internship,
BIOL 494 or PHYS 494 Independent Research
BIOL or PHYS 497 Directed Study

AND

- BIOL or PHYS 499 Senior Capstone Colloquium (1)

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. Required General Education Courses

- ENGL 330* Writing in the Disciplines (3)

AND Select one of the following:

- BIOL 326 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 (4)
BIOL/PHYS 464 Biomedical Instrumentation (4)

Electives in Biology and Physics (9 units)

Select at least 9 units of courses from the following list:

- BIOL 302 Genetics (4)
BIOL/PHYS 315 Introduction to Biophysics (4)
BIOL 401 Biotechnology and Recombinant DNA Techniques (5)
BIOL 420 Cellular and Molecular Immunology (4)
BIOL 421 Virology (3)
BIOL 423 Cellular and Molecular Neurobiology (3)
BIOL 424 Human Physiology (3)
BIOL 425 Human Genetics (3)
BIOL 427 Developmental Biology (4)
BIOL 428 Biology of Cancer (3)
BIOL 431* Bioinformatics (4)
BIOL 432* Principles of Epidemiology and Environmental Health (3)
BIOL 433* Ecology and the Environment (4)
PHYS 445 Image Analysis and Pattern Recognition (3)

Required Supporting and Other GE Courses (36 units)

- American Institutions Requirement (6)
Other GE courses in Categories A-E (30)

*Double-counted toward upper-division GE credits.)



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

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 Biology (4)
BIOL 302 Genetics (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-
342.

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

(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 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 from BIOL 492, 494 or 497;
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.