

BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCE: CONCENTRATION IN NATURAL RESOURCE MANAGEMENT AND CONSERVATION

The Bachelor of Science in Environmental Science with a concentration in Natural Resource Management and Conservation provides students with the theoretical and applied knowledge and skills in ecology, conservation biology, and natural resources they need to address natural resource management and conservation issues. Required courses provide knowledge in ecology, conservation biology, statistics, and natural resource management and provide students with a solid background in both quantitative and qualitative problem-solving techniques. Students choose additional coursework in ecology, biodiversity studies, applied methods, and management of specific resources.

Program Learning Outcomes

1. Demonstrate understanding of the relationships between social justice and environmental problems in local, national, and global contexts.
2. Demonstrate understanding of chemical, biological, and social processes related to environmental problems and the ability to integrate these with the understandings and critical evaluations of descriptive statistics commonly used in environmental literature.
3. Communicate clearly and accurately both orally and in writing and be able to conduct research appropriate to the area of emphasis.
4. Demonstrate a basic understanding of civic activities and processes, and of methods of engagement in those processes.
5. Demonstrate readiness to enter the professional job market by preparing/training students in developing appropriate job market skills (e.g., resume and cover letter writing, interview preparation, writing well and engagingly, acquiring professional experience via internship).
6. Demonstrate understanding of ecological and conservation biology theories and how they relate to natural resource management and conservation decisions.
7. Demonstrate understanding of natural resource management techniques and approaches.

Environmental Science (B.S.): Concentration in Natural Resource Management and Conservation – 66 units minimum

Foundation Requirements (26-28 units)

Biology and Environment Foundation (17 units)

| Code | Title | Units |
|----------|---------------------------------------|-------|
| BIOL 230 | Introductory Biology I | 5 |
| BIOL 240 | Introductory Biology II | 5 |
| ENV 205 | Our Environment Through Data | 3 |
| GEOG 160 | Introduction to Environmental Science | 4 |

Chemistry (3-4 units)

Select One:

| Code | Title | Units |
|----------|--|-------|
| CHEM 115 | General Chemistry I | 4 |
| CHEM 180 | Chemistry for Energy and the Environment | 3 |

Physical Environment (3-4 units)

Select One:

| Code | Title | Units |
|----------|-----------------------------------|-------|
| ERTH 112 | Our Dynamic Earth Lecture and Lab | 4 |
| ERTH 230 | Environmental Geology | 4 |
| GEOG 101 | Our Physical Environment | 3 |

Human-Environment Relations (3 units)

Select One:

| Code | Title | Units |
|----------|-----------------------|-------|
| ENVS 130 | Environmental Studies | 3 |
| GEOG 102 | The Human Environment | 3 |

Core Requirements (13-16 units)

Upper-Division Environmental Science (10-12 units)

| Code | Title | Units |
|-----------|--|-------|
| ENVS 450 | Environmental Law and Policy | 3 |
| ENV 500GW | Physical and Human Dimensions of Climate Change - GEAR | 3 |
| ENVS 680 | Environmental Studies Internship | 1-3 |
| GEOG 603 | Introduction to Geographic Information Systems | 3 |

Statistics and Data Science (3-4 units)

Select One:

| Code | Title | Units |
|----------|----------------------------|-------|
| BIOL 458 | Biostatistics | 4 |
| GEOG 604 | Environmental Data Science | 3 |

Capstone (3 units)

| Code | Title | Units |
|---------|------------------|-------|
| ENV 690 | Capstone Seminar | 3 |

Topical Areas (24-33 units)

Students should consult with a faculty advisor prior to selection of topical area courses to determine which courses are most appropriate for the student's particular interests and/or career path. Choose course(s) from each area to meet the total units indicated on the right. No course can be used to fulfill more than one core or topical area requirement.

Ecology and Biodiversity (6-9 units)

Select Two:

| Code | Title | Units |
|----------|--|-------|
| BIOL 460 | General Entomology | 4 |
| BIOL 470 | Natural History of Vertebrates | 4 |
| BIOL 482 | Ecology | 3 |
| BIOL 514 | Plant Biodiversity and California Field Botany | 5 |
| BIOL 530 | Conservation Biology | 3 |
| BIOL 532 | Restoration Ecology | 3 |

| | | |
|-------------|-----------------------|---|
| BIOL 534 | Wetland Ecology | 4 |
| GEOG 316 | Biogeography | 4 |
| LS/ENVS 430 | Future of the Forests | 3 |

Ecosystem Interactions (3-4 units)

Select One:

| Code | Title | Units |
|---------------|--|-------|
| CHEM 380 | Chemistry Behind Environmental Pollution | 3 |
| ERTH 335 | Global Warming | 3 |
| ERTH/BIOL 577 | Climate and Ecological Interactions | 4 |
| GEOG 314 | Bioclimatology | 4 |
| GEOG 317 | Soils | 4 |
| GEOG 644 | Water Quality | 3 |

Environmental Management (9-12 units)

Select Three:

| Code | Title | Units |
|---------------|---|-------|
| ENVS 470 | Climate Politics and Policy | 3 |
| ENVS 480 | Climate Change Adaptation and Justice | 3 |
| GEOG 427 | Agriculture and Food Supply | 4 |
| GEOG/ERTH 642 | Watershed Assessment and Restoration | 4 |
| GEOG 647 | Geography of Water Resources | 4 |
| GEOG 648 | Management of National Parks and Protected Areas | 4 |
| GEOG/USP 652 | Environmental Impact Analysis | 4 |
| GEOG/ENVS 657 | Natural Resource Management: Biotic Resources | 4 |
| GEOG/USP 658 | Land-Use Planning | 4 |
| GEOG 666 | Geography of Garbage: Recycling and Waste Reduction | 3 |

Sustainability and Social Justice (3-4 units)

Select One:

| Code | Title | Units |
|----------------------|---|-------|
| ENVS/I R 331 | Global Environmental Crisis | 4 |
| ENVS 460 | Energy, Justice, and Sustainability | 3 |
| ENVS 470 | Climate Politics and Policy | 3 |
| ENVS 480 | Climate Change Adaptation and Justice | 3 |
| ENVS 570 | Applied Local Sustainability | 3 |
| I R/GEOG 428 | International Political Economy of Food and Hunger | 4 |
| PHIL 470 | Environmental Ethics | 3 |
| SOC/RRS 410 | Grassroots Organizing for Change in Communities of Color | 3 |
| USP 514 | Sustainable Development in Cities | 4 |
| USP 515/ GEOG 667 | Environmental Justice: Race, Poverty, and the Environment | 4 |

Tools and Techniques (3-4 units)

Select One:

| Code | Title | Units |
|----------|---|-------|
| BIOL 458 | Biostatistics | 4 |
| GEOG 602 | Field Methods in Environmental Science & Physical Geography | 4 |

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|--------------|---|---|
| GEOG 604 | Environmental Data Science | 3 |
| GEOG 610 | Remote Sensing of the Environment I | 4 |
| GEOG 620 | Geographical Information Systems | 4 |
| GEOG 621 | Geographic Information Systems for Environmental Analysis | 4 |
| GEOG/USP 652 | Environmental Impact Analysis | 4 |

General Education Requirements

| Requirement | Course Level | Units | Area Designation |
|--|--------------|-------|------------------|
| English Composition | LD | 3 | 1A |
| Critical Thinking | LD | 3 | 1B |
| Oral Communication | LD | 3 | 1C |
| Mathematical Concepts and Quantitative Reasoning | LD | 3 | 2 |
| Arts | LD | 3 | 3A |
| Humanities | LD | 3 | 3B |
| Social and Behavioral Sciences* | LD | 6 | 4 |
| Physical Science | LD | 3 | 5A |
| Biological Science | LD | 3 | 5B |
| Laboratory | LD | 1 | 5C |
| Ethnic Studies | LD or UD | 3 | 6 |
| Science or Math/Quantitative Reasoning | UD | 3 | 5UD or 2UD |
| Arts or Humanities | UD | 3 | 3UD |
| Social and Behavioral Sciences | UD | 3 | 4UD |

*Students will fulfill USH through their Area 4 courses

SF State Studies

Courses certified as meeting the SF State Studies requirements may be upper or lower division in General Education (GE), a major or minor, or an elective.

| | | | |
|---|----------|---|------|
| American Ethnic and Racial Minorities | LD or UD | 3 | AERM |
| Environmental Sustainability and Climate Action | LD or UD | 3 | ESCA |
| Global Perspectives | LD or UD | 3 | GP |
| Social Justice | LD or UD | 3 | SJ |

American Institutions

US and California LD or UD 3 USG/CSLG
Government
(<https://bulletin.sfsu.edu/undergraduate-education/american-institutions/>)

Note: LD = Lower-Division; UD = Upper-Division.

First-Time Student Roadmap (4 Year)

The roadmaps presented in this Bulletin are intended as suggested plans of study and do not replace meeting with an advisor. For a more personalized roadmap, please use the [Degree Planner \(https://registrar.sfsu.edu/degreeplanner\)](https://registrar.sfsu.edu/degreeplanner) tool found in your [Student Center](#).

[First-Time Student Roadmap \(https://bulletin.sfsu.edu/colleges/science-engineering/environment/bs-environmental-science-concentration-natural-resource-management-conservation/roadmap-first-time/\)](https://bulletin.sfsu.edu/colleges/science-engineering/environment/bs-environmental-science-concentration-natural-resource-management-conservation/roadmap-first-time/)

Transfer Student Roadmap (2 Year)

For students with an AS-T in **Biology**.

[BIOL ADT Roadmap \(https://bulletin.sfsu.edu/colleges/science-engineering/environment/bs-environmental-science-concentration-natural-resource-management-conservation/biol-adt-roadmap/\)](https://bulletin.sfsu.edu/colleges/science-engineering/environment/bs-environmental-science-concentration-natural-resource-management-conservation/biol-adt-roadmap/)

General Advising Information for Transfer Students

1. Before transfer, complete as many lower-division requirements or electives for this major as possible.
2. The following courses are not required for admission but are required for graduation. Students are strongly encouraged to complete these units before transfer; doing so will provide more flexibility in course selection after transfer.
 - a course in U.S. History
 - a course in U.S. & California Government

For information about satisfying the requirements described in (1) and (2) above at a California Community College (CCC), please visit <http://www.assist.org> (<http://assist.org>). Check any geographically accessible CCCs; sometimes, options include more than one college. Use ASSIST to determine:

- Which courses at a CCC satisfy any lower-division major requirements for this major;
- Which courses at a CCC satisfy CSU GE, US History, and US & CA Government requirements.

Remedial courses are not transferable and do not apply to the minimum 60 semester units/90 quarter units required for admission.

Additional units for courses that are repeated do not apply to the minimum 60 units required for upper-division transfer (for example, if a course was not passed on the first attempt or was taken to earn a better grade).

Before leaving the last California Community College of attendance, obtain a summary of completion of lower-division General Education units (IGETC or CSU GE Breadth). This is often referred to as a GE certification worksheet. SF State does not require delivery of this

certification to Admissions, but students should retain this document for verifying degree progress after transfer.

Credit for Advanced Placement, International Baccalaureate, or College-Level Examination Program courses: AP/IB/CLEP credit is not automatically transferred from the previous institution. Units are transferred only when an official score report is delivered to SF State. Credit is based on the academic year during which exams were taken. Refer to the University Bulletin in effect during the year of AP/IB/CLEP examination(s) for details regarding the award of credit for AP/IB/CLEP.

Students pursuing majors in science, technology, engineering, and mathematics (STEM) disciplines often defer 6-9 units of lower-division General Education in Areas C and D until after transfer to focus on preparation courses for the major. This advice does not apply to students pursuing associate degree completion before transfer.

Transferring From Institutions Other Than CCCs or CSUs

Review SF State's lower-division General Education requirements. Note that, as described below, the four basic skills courses required for admission meet GE Areas 1A/A2, 1B/A3, 1C/A1, and 2/B4 in the SF State GE pattern. Courses that fulfill the remaining areas of SF State's lower-division GE pattern are available at most two-year and four-year colleges and universities.

Of the four required basic skills courses, a course in critical thinking (1B/A3) may not be widely offered outside the CCC and CSU systems. Students should attempt to identify and take an appropriate course no later than the term of application to the CSU. To review more information about the 1B/A3 requirement, please visit bulletin.sfsu.edu/undergraduate-education/general-education/lower-division/#AAEL.

Waiting until after transfer to take a single course at SF State that meets both US and CA/local government requirements may be an appropriate option, particularly if transferring from outside of California.