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 - GWAR	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
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 Government (https://bulletin.sfsu.edu/undergraduate-education/american-institutions/)	LD or UD	3	USG/CSLG

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) 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/)

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/)

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.