

# BACHELOR OF SCIENCE IN EARTH SCIENCES: OCEAN, WEATHER AND CLIMATE EMPHASIS - GEOL ASSOCIATE DEGREE FOR TRANSFER ROADMAP

This is a sample pathway for students who transfer to San Francisco State University in the current Bulletin year with an AS-T in Geology. Twenty-six units in the major (CHEM 115/CHEM 215/CHEM 216, EARTH 500, MATH 226, MATH 227, 5 elective units) and all lower-division GE requirements have been satisfied. Additional units in the major may have been satisfied. Check with a major advisor about the most appropriate course sequence. **Degree completion guaranteed in 60 units**; see the Associate Degree for Transfer (ADT) section for more information (<http://bulletin.sfsu.edu/undergraduate-admissions/transfer-students/>).

Course	Title	Units
<b>First Semester</b>		
ERTH 205	Techniques in Earth Sciences (Major Core)	2
ERTH 400	Earth Systems I (Major Core)	3
Select One Set of Courses (Science and Math Foundation): <sup>1</sup>		4
PHYS 111 & PHYS 112	General Physics I and General Physics I Laboratory (B1, B3)	
PHYS 220 & PHYS 222	General Physics with Calculus I and General Physics with Calculus I Laboratory (B1, B3)	
Ocean, Weather, and Climate Emphasis Requirement – Select One:		3
ERTH 335	Global Warming (UD-B, ES, GP)	
ERTH 360	California Weather Events (UD-B, ES, GP)	
ERTH 365	Extreme Weather in a Warming World (UD-B, ES, GP)	
University Elective		3
	Units	15
<b>Second Semester</b>		
ERTH 260	Physical Processes in the Atmosphere (Major Emphasis, B1, B3, ES, GP)	4
ERTH 505	Quantitative Methods in Earth Sciences (Major Core)	3
ERTH 600GW	Earth's Climate History - GEAR (Major Core)	3
Select One Set of Courses (Science and Math Foundation): <sup>1</sup>		4
PHYS 121 & PHYS 122	General Physics II and General Physics II Laboratory	
PHYS 240 & PHYS 242	General Physics with Calculus III and General Physics with Calculus III Laboratory	
	Units	14
<b>Third Semester</b>		
Ocean, Weather, and Climate Emphasis Requirement – Take Two <sup>2</sup>		6
ERTH 697	Undergraduate Research (Major Culminating Experience)	2
or University Elective <sup>3</sup>		
Ocean, Weather, and Climate Emphasis Elective (2 units) <sup>4</sup>		2

U.S. and California Government ( <a href="http://bulletin.sfsu.edu/undergraduate-education/graduation-requirements/#usg">http://bulletin.sfsu.edu/undergraduate-education/graduation-requirements/#usg</a> )	3
or University Elective if US/CA Government met before transfer	
GE Area UD-C: Upper-Division Arts and/or Humanities	3
	Units 16
<b>Fourth Semester</b>	
Ocean, Weather, and Climate Emphasis Requirement – Take One <sup>2</sup>	3
ERTH 690	Earth Sciences Capstone Presentation (Major Culminating Experience) 1
Major Culminating Experience - Select One:	2-3
ERTH 695	Senior Project
ERTH 698	Senior Thesis
GE Area UD-D: Upper-Division Social Sciences	3
US History ( <a href="http://bulletin.sfsu.edu/undergraduate-education/graduation-requirements/#USHaGR">http://bulletin.sfsu.edu/undergraduate-education/graduation-requirements/#USHaGR</a> )	3
or University Elective if US History met in transfer	
University Elective	3
	Units 15-16
	Total Units 60-61

<sup>1</sup> PHYS 111/PHYS 112 are prerequisites for PHYS 121/PHYS 122. PHYS 220/PHYS 222 are prerequisites for PHYS 240/PHYS 242.

<sup>2</sup> **Ocean, Weather & Climate Emphasis Requirements**

Select three courses from the following:

ERTH 430 Fluid Dynamics in Earth Systems (3 units)

ERTH 434 Coastal Processes (3 units)

ERTH 465 Weather Analysis and Forecasting I (4 units)

ERTH 470 Physical Oceanography (4 units)

ERTH 535 Planetary Climate Change (4 units)

<sup>3</sup> Take EARTH 697 if selecting Honors Thesis as Major Culminating Experience. Take University Elective if selecting EARTH 695 - Senior Project as Major Culminating Experience.

<sup>4</sup> **Ocean, Weather, and Climate Emphasis Elective (2 units)**

Select additional Geology emphasis electives upon advisement, subject to the following constraints:

- Emphasis requirements above plus electives must total at least 34 units.
- Electives may be selected from among the following options:
  - Any EARTH course numbered 200 or higher
  - CHEM 680
  - Physics with calculus beyond courses used to meet the Physics requirements in the Science and Math Foundation portion of the degree (e.g., PHYS 230/PHYS 232, or for students who take PHYS 111/PHYS 112 and PHYS 121/PHYS 122, 2 of the 4 units for each of PHYS 220/PHYS 222 and PHYS 240/PHYS 242 can count toward the elective requirement)
  - Computer programming (e.g., CSC 309)
  - Any non-GE statistics or other data analysis (e.g., MATH 324)
  - Linear algebra and/or more advanced calculus (e.g., MATH 228, MATH 245)
  - GEOG 313, GEOG 314, GEOG 316, GEOG 317, GEOG 500GW, GEOG 602, GEOG 603, GEOG 606, GEOG 610, GEOG 611, GEOG 620, GEOG 621, GEOG 625, GEOG 629, GEOG 643, or GEOG 644
  - One non-GE course not listed above, with the approval of a Department of Earth & Climate Sciences advisor and the Department Chair.

When choosing electives, keep in mind that SF State requires all students to complete at least 40 units of upper-division coursework to graduate.

## To Do at SF State:

Enough total units to reach 120 minimum for graduation; 30 units minimum at the upper-division level; to include the following:

### University-Wide Requirements: 9-15 Units

- American Institutions (0-6 units): US History, US Government, California State and Local Government requirements if not taken before transfer.
- Upper-Division GE (9 units): Courses required for the major may double-count if approved for UD GE.
- Students transferring with the AS-T in Geology are not required to fulfill SF State Studies or Complementary Studies requirements.

### Earth Sciences Major (Emphasis in Ocean, Weather, and Climate): 41-44 Units

CHEM 115, MATH 226, MATH 227, EARTH 500, and 10 units of Ocean, Weather, and Climate emphasis electives (5 units of CHEM 215/CHEM 216, 1 unit of 4 units of Historical Geology, and 4 units of Physical Geology in the Geology AS-T) met in transfer.

- Basic Science & Math Foundation (8 units in PHYS): If some or all PHYS completed before transfer, consult with a major advisor about appropriate course choices.
- Earth Sciences Core/GWAR (11 units): Three of the 4 units of Historical Geology in the AS-T substitute for EARTH 500.
- Ocean, Weather, and Climate Emphasis (17-18 units): Four units of Calculus II in the Geology AS-T count toward the Emphasis requirements.
- Electives (1-2 units): Five units of CHEM 215/CHEM 216, 1 unit of 4 units of Historical Geology, and 4 units of Physical Geology in the Geology AS-T satisfy 10 units of the 11-12-unit elective requirement.
- Culminating Experience (4-5 units): Take EARTH 690 (1 unit) along with one of the following two options: Senior Honors Thesis (EARTH 697/EARTH 698 (2 units each), or Senior Project (EARTH 695, 3 units).

### **University Electives: 3 or More Units**

Depends on course choices made at the community college, how transferred units are applied to the requirements above, Culminating Experience option selected, and course choices at SF State. Some courses may meet more than one requirement, e.g., UD GE and the major.