

# BACHELOR OF SCIENCE IN EARTH SCIENCES ROADMAP

120 Total Units Required  
 Minimum Number of Units in the Major: 69

**This roadmap is a suggested plan of study and does not replace meeting with an advisor. Please note that students may need to adjust the actual sequence of courses based on course availability. Please consult an advisor in your major program for further guidance.**

Course	Title	Units
<b>First Semester</b>		
CHEM 115	General Chemistry I (Major Science and Math Foundation)	5
ENG 114	Writing the First Year: Finding Your Voice (A2) <sup>1</sup>	3
MATH 226	Calculus I (Major Science and Math Foundation, B4) <sup>2</sup>	4
GE Area A <sup>3</sup>		3
		<b>Units 15</b>
<b>Second Semester</b>		
Select One Set of Courses (Major Science and Math Foundation): <sup>4</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)	
GE Area A		3
GE Area E		3
SF State Studies or University Elective - Take Two		6
		<b>Units 16</b>
<b>Third Semester</b>		
ERTH 400	Earth Systems I (Major Core)	3
GE Area B: Life Science (B2)		3
GE Area C - Take Two		6
GE Area D		3
		<b>Units 15</b>
<b>Fourth Semester</b>		
ERTH 205	Techniques in Earth Sciences (Major Core)	2
Select One Set of Courses (Major Math and Science Foundation): <sup>4</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	
GE Area C		3
GE Area D		3
GE Area F <sup>±</sup>		3
		<b>Units 15</b>
<b>Fifth Semester</b>		
Major Emphasis (34 units) - Take Two <sup>5</sup>		6
GE Area UD-B: Upper-Division Physical and/or Life Sciences		3
GE Area UD-C: Upper-Division Arts and/or Humanities		3
U.S. and California Government ( <a href="http://bulletin.sfsu.edu/undergraduate-education/american-institutions/#usg">http://bulletin.sfsu.edu/undergraduate-education/american-institutions/#usg</a> )		3
		<b>Units 15</b>
<b>Sixth Semester</b>		
ERTH 500	Earth Systems II (Major Core)	3
ERTH 505	Quantitative Methods in Earth Sciences (Major Core)	3
ERTH 600GW	Earth's Climate History - GEAR (Major Core)	3
Major Emphasis (34 units) - Take Two <sup>5</sup>		6
		<b>Units 15</b>
<b>Seventh Semester</b>		
Major Emphasis (34 units) - Take Four <sup>5</sup>		12
GE Area UD-D: Upper-Division Social Sciences		3
		<b>Units 15</b>
<b>Eighth Semester</b>		
ERTH 690	Earth Sciences Capstone Presentation (Major Culminating Experience) <sup>6</sup>	1
Culminating Experience - Select One <sup>6</sup>		3-4
Major Emphasis (34 units) - Take Three <sup>5</sup>		10
		<b>Units 14-15</b>
		<b>Total Units 120-121</b>

<sup>1</sup> ENG 114 can only be taken if you complete Directed Self-Placement (DSP) and select ENG 114; if you choose ENG 104/ENG 105 through DSP you will satisfy A2 upon successful completion of ENG 105 in the second semester; multilingual students may be advised into alternative English courses.

<sup>2</sup> To determine the best B4 course option, students should complete the online advising activity at [mathadvising.sfsu.edu](https://mathadvising.sfsu.edu) (<https://mathadvising.sfsu.edu/>). Questions? Contact Gator Smart Start. (<https://gatorsmartstart.sfsu.edu/>)

<sup>3</sup> To avoid taking additional units, it is recommended that you meet the **SF State Studies** (AERM, GP, ES, SJ) requirements within your GE or major.

<sup>4</sup> PHYS 111/PHYS 112 are prerequisites for PHYS 121/PHYS 122. PHYS 220/PHYS 222 are prerequisites for PHYS 240/PHYS 242.

<sup>5</sup> **Major Emphasis (34 units)**

*Students must select one of the following emphases*

**Geology Emphasis**

The Geology emphasis provides students with an in-depth understanding of the solid Earth, the processes that shape it, and the skills to conduct field investigations of geologic problems. Students who complete these emphasis requirements will be prepared for graduate school in geology or to enter the workforce directly as a professional geologist. The coursework prepares students to pass the Association of State Board Geology (ASBOG) exam to be a licensed professional geologist.

*Required Courses (22–23 units)*

ERTH 210 Physical Geology (4 units) (B1, B3, ES)

ERTH 420 Mineralogy and Petrology I (4 units)

ERTH 510 Structural Geology (4 units)

ERTH 515 Sedimentology and Stratigraphy (4 units)

ERTH 620 Field Methods in Geology (2 units)

and either

ERTH 522 ( units)

**or**

CHEM 215 General Chemistry II: Quantitative Applications of Chemistry Concepts (3 units)

and CHEM 216 General Chemistry II Laboratory: Quantitative Applications of Chemistry Concepts (2 units)

*Electives (11–12 units)*

Select (upon advisement) additional Geology emphasis electives needed to reach 34 units.

**Hydrology Emphasis**

The Hydrology emphasis provides students with an in-depth understanding of the behavior of water on and beneath Earth's surface, how water shapes the solid earth, and environmental problems associated with water. Students who complete these emphasis requirements will be prepared for graduate school in hydrology or to enter the workforce directly as a professional hydrologist.

*Requirements (21–22 units)*

Select one of the following (3-4 units):

ERTH 210 Physical Geology (4 units) (B1, B3, ES)

ERTH 230 Environmental Geology (3 units) (B1, B3, ES)

ERTH 330 California Water (3 units) (UD-B, ES)

ERTH 425 Geomorphology (4 units)

ERTH 430 ( units)

ERTH 442/GEOG 342 Surface Water Hydrology (4 units)

ERTH 444 Hydrogeology (4 units)

ERTH 544 Groundwater Contamination (3 units)

*Electives (12–13 units)*

Select (upon advisement) additional Hydrology emphasis electives needed to reach 34 units. (May include courses from the list above not selected to meet emphasis requirements.)

**Ocean, Weather & Climate Emphasis (34 units)**

The Ocean, Weather & Climate emphasis provides students with an understanding of the structure and behavior of oceans, the atmosphere, and climate, and the physical processes that shape and change them. Students who complete these emphasis requirements will be prepared for graduate school work in Earth sciences disciplines such as oceanography, meteorology, or climate science, or to enter the workforce directly.

*Requirements (21-23 units)*

ERTH 260 Physical Processes in the Atmosphere (4 units) (B1, B3, ES, GP)

And five courses selected from the following:

ERTH 335 Global Warming (3 units) (UD-B, ES, GP)

or EARTH 360 California Weather Events (3 units) (UD-B, ES, GP)

or EARTH 365 Extreme Weather in a Warming World (3 units) (UD-B, ES, GP)

ERTH 430 ( 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)

MATH 227 Calculus II (4 units)

*Electives (11-13 units)*

Select (upon advisement) additional Ocean, Weather, and Climate emphasis electives needed to reach 34 units. (May include courses from the list above not selected to meet emphasis requirements.)

<sup>6</sup> **Culminating Experience (4-5 units)**

In addition to EARTH 690, students must select one of the following options:

ERTH 695 Senior Project (1-3 units)

**or**

An honors thesis consisting of:

ERTH 697 Undergraduate Research (2 units)

and

ERTH 698 Senior Thesis (2 units)

**or** (for Geology emphasis and Hydrology emphasis only):

Field Geology or equivalent (at another institution) for 4 units

± Given catalog rights, fall 2023 transfer students do not need to complete an Area F course.