# Earth Sciences BS and Geosciences SF Scholars Roadmap

The San Francisco State Scholars program provides undergraduate students with an accelerated pathway to a graduate degree. Students in this program pursue a bachelor’s and master’s degree simultaneously. This program allows students to earn graduate credit while in their junior and/or senior year, reducing the number of semesters required for completion of a master’s degree.

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
### First Year
#### Fall Semester
- **CHEM 115**
  - General Chemistry I: Essential Concepts of Chemistry (Major Science and Math Foundation)
  - Units: 5

- **ENG 114**
  - Writing the First Year: Finding Your Voice (A2)
  - Units: 3

- **MATH 226**
  - Calculus I (Major Science and Math Foundation, B4)
  - Units: 4

- GE Area A
  - Units: 3

#### Spring Semester
- Select One Set of Courses (Major Science and Math Foundation):
  - **PHYS 111 & PHYS 112**
    - General Physics I and General Physics I Laboratory (B1, B3)
    - Units: 4

  - **PHYS 220 & PHYS 222**
    - General Physics with Calculus I and General Physics with Calculus I Laboratory (B1, B3)
    - Units: 4

- GE Area A
  - Units: 3

- GE Area D
  - Units: 3

- SF State Studies or University Elective
  - Units: 3

### Units: 15-16

## Second Year
#### Fall Semester
- **ERTH 400**
  - Earth Systems I (Major Core)
  - Units: 3

- Select One Set of Courses (Major Math and Science Foundation):
  - **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 B: Life Science (B2)**
  - **GE Area C**
  - **GE Area D**

### Units: 16

## Third Year
#### Fall Semester
- **ERTH 205**
  - Techniques in Earth Sciences (Major Core)
  - Units: 2

- Major Emphasis (34 units) - Take Two
  - **GE Area C - Take Two**
  - **GE Area UD-B: Upper-Division Physical and/or Life Sciences (Consider SF State Studies Course)**
  - Units: 3

### Units: 14-16

## Fourth Year
#### Fall Semester
- **ERTH 700**
  - Graduate Seminar in Geosciences (Graduate Core)
  - Units: 2

- Major Emphasis (34 units) - Take Three
  - **Culminating Experience**
  - Units: 3

### Units: 14-18

## Spring Semester
- **ERTH 600GW**
  - Earth’s Climate History - GWAR (Major Core)
  - Units: 3
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERTH 898</td>
<td>Master’s Thesis (Graduate Core)</td>
<td>3</td>
</tr>
<tr>
<td>Graduate Elective (13 units) - Take Three</td>
<td>7</td>
<td></td>
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<tr>
<td>Units</td>
<td>15</td>
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<tr>
<td>Spring Semester</td>
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<tr>
<td>ERTH 702</td>
<td>Quantitative Methods in Geosciences (Graduate Core)</td>
<td>3</td>
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<tr>
<td>ERTH 897</td>
<td>Research Project (Graduate Core)</td>
<td>3</td>
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<tr>
<td>Graduate Elective (13 units) - Take Three</td>
<td>7</td>
<td></td>
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<tr>
<td>Units</td>
<td>9</td>
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<tr>
<td>Total Units</td>
<td>145-156</td>
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</tbody>
</table>

1 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.

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

3 To avoid taking additional units, it is recommended that you meet SF State Studies (AERM, GR ES, SJ) and Ethnic Studies requirements within your GE or major.

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

5 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 421 Mineralogy and Petrology II (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 Geochemistry (4 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 Fluid Dynamics in Earth Systems (3 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 ERTH 360 California Weather Events (3 units) (UD-B, ES, GP)
   - or ERTH 365 Extreme Weather in a Warming World (3 units) (UD-B, ES, GP)
   - 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)
   - 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.)

   **Culminating Experience (4-5 units)**
In addition to ERTH 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

Graduate Elective Courses (13 units)

Upper-division or graduate elective courses on advisement.

Elective units are chosen from courses offered by the Earth & Climate Sciences Department or other University departments, and must be selected by students in consultation with their faculty advisors. At least 6 units must be courses numbered 700 or higher, and 6 units must be courses offered in the Earth & Climate Sciences Department.

To help prepare for their careers, graduate students are strongly encouraged to serve as a Graduate Teaching Assistant (GTA) for at least one semester. GTAs typically teach lab sections attached to lectures in introductory, general education courses in geology (ERTH 112, ERTH 210, ERTH 230), meteorology (ERTH 162), and oceanography (ERTH 172). To support their professional development in teaching, GTAs are strongly encouraged to enroll in a professional development course such as SCI 750 (2 units) before or during their service as a GTA, to learn about research-based best practices in teaching and learning. These courses count toward the 13-unit graduate elective unit requirement.

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