BACHELOR OF SCIENCE IN EARTH SCIENCES: OCEAN, WEATHER & CLIMATE EMPHASIS ROADMAP

120 Total Units Required  
Minimum Number of Units in the Major: 68

### Course  | Title  | Units
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**First Semester**
CHEM 100  | Preparation for Chemistry  | 3
or SF State Studies or University Elective if CHEM 115 prerequisites are already satisfied  
MATH 199  | Pre-Calculus ¹  | 4
or SF State Studies or University Elective if MATH 226 prerequisites are already satisfied  
GE Area A: Oral Communication (A1) or Critical Thinking (A3) ²  | 3  
GE Area A: Written English Communication (A2) ³  | 3  
GE Area D: U.S. History (D2) or U.S. and California Government (D3)  | 3
  
**Units**  | 16

**Second Semester**
CHEM 115  | General Chemistry I: Essential Concepts of Chemistry  | 5
MATH 226  | Calculus I ¹  | 4
GE Area A: Oral Communication (A1) or Critical Thinking (A3) ²  | 3  
GE Area A: Written English Communication II (A4)  | 3  
or Written English Communication (A2) Stretch II  
  
**Units**  | 15

**Third Semester**
PHYS 111  | General Physics I or General Physics with Calculus I and General Physics with Calculus I Laboratory  | 4
PHYS 112  or PHYS 220 and PHYS 222  |  
GE Area B: Life Science (B2)  | 3  
GE Area C: Arts (C1)  | 3  
GE Area C: Humanities: Literature (C3)  | 3
  
**Units**  | 13

**Fourth Semester**
ERTH 260  | Physical Processes in the Atmosphere  | 4
PHYS 121  & PHYS 122 or PHYS 240 and PHYS 242  |  
GE Area C: Arts (C1) or Humanities (C2)  | 3  
GE Area D: Social Sciences (D1)  | 3  
GE Area D: U.S. History (D2) or U.S. and California Government (D3)  | 3
  
**Units**  | 17

**Fifth Semester**
ERTH 400  | Earth Systems I  | 3  
Major Emphasis – Take Two ⁴  | 6-8  
GE Area UD–B: Upper Division Physical and/or Life Sciences (Consider SF State Studies Course)  | 3  
SF State Studies or University Elective  | 3
  
**Units**  | 15-17

**Sixth Semester**
ERTH 205  | Techniques in Earth Sciences  | 2  
ERTH 600GW  | Earth's Climate History - GWAR  | 3  
Major Emphasis Elective – Take Two ⁵  | 6  
GE Area UD–C: Upper Division Arts and/or Humanities (Consider SF State Studies Course)  | 3  
SF State Studies or University Elective  | 2
  
**Units**  | 16

**Seventh Semester**
ERTH 500  | Earth Systems II  | 3  
ERTH 505  | Quantitative Methods in Earth Sciences  | 3  
Major Emphasis – Take Two ⁴  | 6-8  
GE Area UD–D: Upper Division Social Sciences (Consider SF State Studies Course)  | 3
  
**Units**  | 15-17

**Eighth Semester**
ERTH 690  & ERTH 695 or ERTH 697 and ERTH 698  | Earth Sciences Capstone Presentation or Undergraduate Research and Senior Thesis  | 4  
Major Emphasis ⁴  | 3-4  
Major Emphasis Elective – Take Two ⁵  | 6
  
**Units**  | 13-14

**Total Units**  | 120-125
Depending on courses completed through Early Start and in high school, students in Pathway/Category 3 or 4 may be required to enroll in additional courses before they can take MATH 199 or MATH 226. Most students in Pathway/Category 3 or 4 will need to take a stretch format for MATH 199 (MATH 197 in Fall 2018 and MATH 198 in Spring 2019). Before enrolling in a B4 course, students should verify their MATH Pathway/Category in their Student Center (http://cms.sfsu.edu/content/student-center). Information regarding the courses that correspond with your MATH Pathway/Category can be found on the Developmental Studies Office Website (http://developmentalstudies.sfsu.edu).

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

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.

Major Emphasis Courses
Select five of the following:
ERTH 335 Global Warming (3 units)  
or ERTH 360 California Weather Events (3 units)  
or ERTH 365 Extreme Weather in a Warming World (3 units)  
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)

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