

SCHOOL OF EARTH SCIENCES UNDERGRADUATE B.S. MAJOR

GEOLOGICAL SCIENCES SUBPROGRAM PREPARATION FOR THE MAJOR

Course number	Course name	Credit hours
Chem 1210	General Chemistry 1	5
Math 1151	Calculus 1	5
Math 1152	Calculus 2	5
Bio 1113	Energy Transfer and Development	4
Physics 1250	Mechanics, Thermal Physics, Waves	5
Earth Sciences 1121	The Dynamic Earth	4
Earth Sciences 1122	Earth through Time	4
Earth Sciences 2245	Introductory Data Analysis for Earth and Environmental Sciences	4
Complete either Chem 1220 or Physics 1251	General Chemistry 2 or E&M, Optics, Modern Physics	5
Minimum of 2 additional courses in sciences and mathematics, chosen from: Chem 1220 and above Math 2153 and above Physics 1251 and above EEOB 3310 (Evolution) Geog 5900 (Weather, Climate & Global Warming) Geog 5200 (Elements of Cartography) Other options require approval by an SES advisor.		6–10
Total semester hours in Preparation for the major		47-51
Note: Where available, an Honors offering can be substituted for the equivalent non-Honors course listed in the Preparation for the Major.		

GEOLOGICAL SCIENCES SUBPROGRAM REQUIREMENTS

Course number	Course name	Credit hours	Prerequisites
<p>Complete a minimum of 31 semester credit hours, including the following requirements:</p> <p>a) Core Requirements. Complete the following courses:</p>			
Earth Sciences 4421	Earth Materials	3	Chemistry 1210
Earth Sciences 4423	Intro Petrology	3	Earth Sciences 1121 & 4421
Earth Sciences 4530	Structural Geology	4	Earth Sciences 1121 & Physics 1250
Earth Sciences 4999.01(H)	Undergraduate Research for Thesis in Earth Sciences	1 (graded)	Rank 4 in Earth Sciences & permission of instructor
Earth Sciences 5189.01	Field Geology 1	3	Earth Sciences 4423 & 4530 & permission of instructor
Earth Sciences 5189.02	Field Geology 2	3	Earth Sciences 5189.01
Earth Sciences 4501	Paleontology	4	Earth Sciences 1122 & 3 cr hrs in Biological Sciences
Earth Sciences 4502	Stratigraphy and Sedimentology	4	Earth Sciences 1121 & 1122
<p>b) Complete at least 2 courses (minimum of 6 semester credit hours) from Earth Sciences courses at the 5000-level or above (except from Earth Sciences 5189.03, 5189.04, 5189.05, 5189.06, 5580, and 5584)</p> <p style="text-align: center;">or</p> <p>Complete at least 1 course (minimum of 3 semester credit hours) from Earth Sciences courses at the 5000-level or above (except Earth Sciences 5189.03, 5189.04, 5189.05, 5189.06, 5580, and 5584), and GEOSCIM 5781:</p>			
EARTHSC upper-level electives (Note: EARTHSC 5189.03, 5189.04, 5189.05, 5189.06, 5580, and 5584 cannot be used to meet this requirement)		6	Varies by course
Total semester credit hours		31	

**SCHOOL OF EARTH SCIENCES UNDERGRADUATE B.S. MAJOR
EARTH SYSTEM SCIENCE SUBPROGRAM
PREPARATION FOR THE MAJOR**

Course number	Course name	Credit hours
Chem 1210	General Chemistry 1	5
Math 1151	Calculus 1	5
Math 1152	Calculus 2	5
Bio 1113	Energy Transfer and Development	4
Physics 1250	Mechanics, Thermal Physics, Waves	5
Earth Sciences 1121	The Dynamic Earth	4
Earth Sciences 1122	Earth through Time	4
Earth Sciences 2245	Introductory Data Analysis for Earth and Environmental Sciences	4
Complete either Chem 1220 or Physics 1251	General Chemistry 2 or E&M, Optics, Modern Physics	5
Minimum of 2 additional courses in sciences and mathematics, chosen from: Chem 1220 and above Math 2153 and above Physics 1251 and above EEOB 3310 (Evolution) Geog 5900 (Weather, Climate & Global Warming) Geog 5200 (Elements of Cartography) Other options require approval by an SES advisor.		6–10
Total semester hours in Preparation for the major		47–51
Note: Where available, an Honors offering can be substituted for the equivalent non-Honors course listed in the Preparation for the Major.		

EARTH SYSTEM SCIENCE SUBPROGRAM REQUIREMENTS

Course number	Course name	Credit hours	Prerequisites
<p>Complete a minimum of 30 semester credit hours, including the following requirements:</p> <p>a.1) Core Requirements. Complete 4 of the following courses, with at least 2 courses having labs:</p>			
Earth Sciences 4450	Water, Ice and Energy in the Earth System	3	Earth Sciences 1121 and Chemistry 1210 or Physics 1250
Earth Sciences 4502	Stratigraphy and Sedimentation (with lab)	4	Earth Sciences 1121 & 1122
Earth Sciences 5206	Advanced Oceanography	4	Earth Sciences 1100 or 1105 or 1121 or graduate standing or permission of instructor
Earth Sciences 5550	Geomorphology (with lab)	4	Earth Sciences 1121 & 1122 or permission of instructor
Earth Sciences 5621	Introduction to Geochemistry	3	Rank 4 standing in Earth Sciences or related field and Chemistry 1220 or above or permission of instructor
Earth Sciences 5651	Hydrogeology (with lab)	3	Earth Sciences 5189.02
Earth Sciences 5655	Land Surface Hydrology	3	Math 1152 or above; Chemistry 1210 or above; and Physics 1250 or above
<p>a.2) Complete the following course</p>			
Earth Sciences 4999.01 (H)		1 (graded)	Rank 4 in Earth Sciences & permission of instructor
Total semester credit hours		31	
<p>b) Complete each of the following 3 requirements:</p>			
1) Complete at least 3 semester credits of Internship, Research, and/or Field Experience from one or a combination of the following:		3	<p>Earth Sciences 5191: Rank 3 or above & permission of instructor</p> <p>Earth Sciences 4998(H)/4999.02(H): Permission of instructor (and Honors Program for 4998H and 4999.02H)</p>
Earth Sciences 5191	Internship in the Earth Sciences		
Earth Sciences 4998(H) or 4999.02(H)	Undergraduate Research in the Earth Sciences or Undergraduate Research for Thesis in the Earth Sciences		

Earth Sciences 5XXX	An approved field course (e.g., Earth Sciences 5602.02, 5670, 5189.01)		Field course: Varies; minimum is Earth Sciences 1100 or 1121
2) Complete at least 2 Earth Sciences courses (minimum of 6 semester credits) at the 4000-level or above, or at least 1 Earth Sciences course at the 4000-level or above (minimum of 3 semester credits) and GEOSCIM 5781 (Note: Earth Sciences 5580, 5584, and 5189.03, 5189.04, 5189.05, 5189.06 cannot be used to satisfy B.S. requirements)		6	Varies
3) Complete at least 2 courses (minimum of 6 semester credits) from outside Earth Sciences, chosen from the following list: (Other courses require approval by an Earth Sciences advisor)		6	
Geog 3900	Global Climate Change: Causes and Consequences	3	
Geog 3901	Global Climate and Environmental Change	3	
Geog 3980	Biogeography: An Introduction to Life on Earth	3	
Geog 5900 (if not used to satisfy Preparation for the Major)	Weather, Climate and Global Warming	3	
Geog 5801	Environmental Conservation	3	
Geog 5802	Globalization and Environment	3	
Geog 5220	Fundamentals of Geographic Information Systems	3	
Geog 5223	Design and Implementation of GIS	3	Geography 5220
ATMOSSC 2940	Basic Meteorology	3	Math 1151 and Physics 1250
EEOB 4950	Field Ecology	2	Rank 3 standing or above; 12 semester hours of biological sciences or permission of instructor
EEOB 3310	Evolution	4	Bio 1114 or 1114H

EEOB 5420	Aquatic Ecosystems: Ecology of Inland Waters	1.5	EEOB 3410
EEOB 3410	Ecology	4	Bio 1114 or 1114H
AEDECON 2001	Principles of Food and Resource Economics	3	
AEDECON 4310	Environmental and Natural Resource Economics	3	AEDE 2001 or Econ 2001
AEDECON 4320/ INTSTDS 4320	Energy, the Environment, and the Economy	3	AEDE 2001 or Econ 2001
ENVENG 3200	Fundamentals of Environmental Engineering	3	Chemistry 1210
ENVENG 2100	Environmental Engineering Analytical Methods	3	Chemistry 1210 and 1220
CIVILEN 5001	Fundamentals of Geographic Information Systems	4	CE 2050 or written permission of instructor.
ENR 3000	Soil Science	3	
ENR 3280	Water Quality Management	2	
ENR 4260	Soil Resource Management	3	ENR 3000 or permission of instructor
ENR 2367	Communicating Contemporary Environmental and Natural Resource Issues	3	
INTSTDS 4800	Cultural Diplomacy	3	Rank 2 or above, or permission of instructor
CHEM 2210 or 2210H	Analytical Chemistry 1: Quantitative Analysis	5	Chemistry 1220 and Math 1151

**GEOPHYSICS SUBPROGRAM
PREPARATION FOR THE MAJOR**

Course number	Course name	Credit hours
Chem 1210	General Chemistry 1	5
Math 1151	Calculus 1	5
Math 1152	Calculus 2	5
Bio 1113	Energy Transfer and Development	4
Physics 1250	Mechanics, Thermal Physics, Waves	5
Earth Sciences 1121	The Dynamic Earth	4
Earth Sciences 1122	Earth through Time	4
Earth Sciences 2245	Introductory Data Analysis for Earth and Environmental Sciences	4
Physics 1251	E&M, Optics, Modern Physics	5
Minimum of 2 additional courses in sciences and mathematics, chosen from: Chemistry 1220 and above Math 2153 and above Physics 1251 and above EEOB 3310 (Evolution) Geog 5900 (Weather, Climate & Global Warming) Geog 5200 (Elements of Cartography) Other options require approval by an SES advisor.		6–10
Total semester hours in Preparation for the major		47–51
Note: Where available, an Honors offering can be substituted for the equivalent non-Honors course listed in the Preparation for the Major.		

**GEOPHYSICS SUBPROGRAM
CORE REQUIREMENTS**

Course number	Course name	Credit hours	Prerequisites
Complete a minimum of 31 semester credit hours, including the following requirements:			
a) Complete the following courses (7 credit hours):			
Earth Sciences 4421	Earth Materials	3	Chem 1210
Earth Sciences 4423	Intro Petrology	3	Earth Sciences 1121 & 4421
Earth Sciences 4999.01(H)	Undergraduate Research for Thesis in Earth Sciences	1 (graded)	Rank 4 in Earth Sciences & permission of instructor
b) Complete 2 of the following solid Earth geophysics and geomathematics courses (6 credit hours)			
Earth Sciences 5641	Geostatistics	3	Stat 5301 and Math 1152 or above, or permission of instructor
Earth Sciences 5642	Geomathematical Analysis	3	Math 1152 or above, or permission of instructor
Earth Sciences 5646	Geodynamics	3	Math 1152, Physics 1250 & EARTHSC 4530, or permission of instructor
Earth Sciences 5680	Deep Earth Geophysics	3	Math 1152 and Physics 1251
GEOSCIM 5781	Geodesy & Geodynamics	3	Math 1152 or above, or Physics 1251, or permission of instructor
c) Complete 2 of the following applied geophysics courses (6 or 7 credit hours)			
Earth Sciences 4310	Remote Sensing in the Earth Sciences	3	Earth Sciences 1121; Physics 1250; Math 1151 or above
Earth Sciences 4560	Applied Geophysics	3	Earth Sciences 1121, Math 1151 & Physics 1250
Earth Sciences 5687	Energy Geophysics	3	Earth Sciences 1121; Math 1151; Physics 1250
Earth Sciences 5751	Quantitative Reservoir Modeling	4	Earth Sciences 2245 & Math 1152, or permission of instructor
Earth Sciences 5780	Reflection Seismology	4	Earth Sciences 1121; Math 1151; Physics 1250
Earth Sciences 5781	Gravity Exploration	3	Math 1152 or above, grad standing or permission of instructor
Earth Sciences 5782	Magnetic Exploration	3	Math 1152 or above, grad standing or permission of instructor

d) Complete at least 11 semester hours from the following courses			
Earth Sciences 4310	Remote Sensing in the Earth Sciences	3	Earth Sciences 1121; Physics 1250; Math 1151 or above
Earth Sciences 4310 (if not used to meet requirement "c")	Remote Sensing in the Earth Sciences	3	Earth Sciences 1121; Physics 1250; Math 1151
Earth Sciences 4450	Water, Ice, and Energy in the Earth System	3	Earth Sciences 1121, and Chem 1210 or Physics 1250, or permission of instructor
Earth Sciences 4501	Paleontology	4	Earth Sciences 1122 and 3 cr hrs in biological sciences.
Earth Sciences 4502	Stratigraphy and Sedimentation	4	Earth Sciences 1121; Earth Sciences 1122
Earth Sciences 4530	Structural Geology	4	Earth Sciences 1121; Physics 1250 or above
Earth Sciences 4560 (if not used to meet requirement "c")	Applied Geophysics	3	Earth Sciences 1121, Math 1151 & Physics 1250
Earth Sciences 4998(H) (Maximum of 3 credit hours of 4998(H) + 4999.02(H) + 5191 allowed)	Research	1-3	Permission of instructor (Honors Program for 4998H)
Earth Sciences 4999.02(H) (Maximum of 3 credit hours of 4998(H) + 4999.02(H) + 5191 allowed)	Research for Thesis	1-3	Permission of instructor (Honors Program for 4999.02(H))
Earth Sciences 5189.01	Field Geology I	3	Earth Sciences 4423; Earth Sciences 4530; and permission of instructor.
Earth Sciences 5189.02	Field Geology II	3	Earth Sciences 5189.01
Earth Sciences 5191 (Maximum of 3 credit hours of 4998(H) +	Internship	1-3	Permission of instructor

4999.02(H) + 5191 allowed)			
Earth Sciences 5206	Advanced Oceanography	3	Earth Sciences 1100 or Earth Sciences 1105 or Earth Sciences 1121 or graduate student standing or permission of instructor
Earth Sciences 5550	Geomorphology	4	Earth Science 1121; Earth Science 1122; or permission of instructor
Earth Sciences 5621	Introduction to Geochemistry	3	Rank 4 in Earth Science or related fields; Chemistry 1220 or above, or permission of instructor
Earth Sciences 5629	Principles of Petrology	3	Rank 4 or Grad standing in Earth Science or related fields, or permission of instructor
Earth Sciences 5641 (if not used to meet requirement "b")	Geostatistics	3	Statistics 5301 and Math 1152 or above, or permission of instructor
Earth Sciences 5642 (if not used to meet requirement "b")	Geomathematical Analysis	3	Math 1152 or above, or permission of instructor
Earth Sciences 5646 (if not used to meet requirement "b")	Geodynamics	3	Math 1152 and Physics 1250 & Earth Science 4530, or permission of instructor
Earth Sciences 5650	Glaciology	3	Earth Science 4450 or permission of instructor
Earth Sciences 5651	Hydrogeology	4	Earth Science 1121; Math 1152 or above
Earth Sciences 5655	Land Surface Hydrology	3	Math 1152 or above, Chemistry 1210 or above, and Physics 1250 or above
Earth Sciences 5661	Petroleum Geology	4	Earth Science 4423 & 4502; or written permission of instructor
Earth Sciences 5680 (if not used to meet requirement "b")	Deep Earth Geophysics	3	Math 1152 and Physics 1251
Earth Sciences 5687 (if not used to meet requirement "c")	Energy Geophysics	3	Earth Sciences 1121; Math 1151; Physics 1250

Earth Sciences 5751 (if not used to meet requirement "c")	Quantitative Reservoir Modeling	4	Earth Sciences 2245 & Math 1152, or permission of instructor
Earth Sciences 5780 (if not used to meet requirement "c")	Reflection Seismology	4	Earth Sciences 1121; Math 1151; Physics 1250
Earth Sciences 5781 (if not used to meet requirement "c")	Gravity Exploration	3	Math 1152 or above, grad standing or permission of instructor
Earth Sciences 5782 (if not used to meet requirement "c")	Magnetic Exploration	3	Math 1152 or above, grad standing or permission of instructor
GEOSCIM 5781 (if not used to meet requirement "b")	Geodesy & Geodynamics	3	Math 1152 or above, or Physics 1251, or permission of instructor

**PETROLEUM GEOLOGY & GEOPHYSICS SUBPROGRAM
PREPARATION FOR THE MAJOR**

Course number	Course name	Credit hours
Chem 1210	General Chemistry 1	5
Math 1151	Calculus 1	5
Math 1152	Calculus 2	5
Bio 1113	Energy Transfer and Development	4
Physics 1250	Mechanics, Thermal Physics, Waves	5
Earth Sciences 1121	The Dynamic Earth	4
Earth Sciences 1122	Earth through Time	4
Earth Sciences 2245	Introductory Data Analysis for Earth and Environmental Sciences	4
Complete either Chem 1220 or Physics 1251	General Chemistry 2 or E&M, Optics, Modern Physics	5
Minimum of 2 additional courses in sciences and mathematics, chosen from: Chemistry 1220 and above Math 2153 and above Physics 1251 and above EEOB 3310 (Evolution) Geog 5900 (Weather, Climate & Global Warming) Geog 5200 (Elements of Cartography) Other options require approval by an SES advisor.		6–10
Total semester hours in Preparation for the major		47–51
Note: Where available, an Honors offering can be substituted for the equivalent non-Honors course listed in the Preparation for the Major.		

**PETROLEUM GEOLOGY & GEOPHYSICS SUBPROGRAM
CORE REQUIREMENTS**

Course number	Course name	Credit hours	Prerequisites
Complete a minimum of 31 semester credit hours, including the following requirements:			
a) Core Requirements. Complete the following courses:			
Earth Sciences 4421	Earth Materials	3	Chemistry 1210
Earth Sciences 4423	Intro Petrology	3	Earth Sciences 1121 & 4421
Earth Sciences 4502	Stratigraphy and Sedimentology	4	Earth Sciences 1121 & 1122
Earth Sciences 4530	Structural Geology	4	Earth Sciences 1121 & Physics 1250
Earth Sciences 4999.01(H)	Undergraduate Research for Thesis in Earth Sciences	1 (graded)	Rank 4 in Earth Sciences & permission of instructor
Earth Sciences 5661	Petroleum Geology	4	Earth Sciences 4423 & 4502 or written permission of instructor
b) Complete 1 of the following Earth Sciences courses			
Earth Sciences 5687	Energy Geophysics	3	Earth Sciences 1121; Math 1251; Physics 1250
Earth Sciences 5780	Reflection Seismology	4	Earth Sciences 1121; Math 1251; Physics 1250
c) Complete Earth Sciences 5189.01, Earth Sciences 5189.02 and at least 1 other course from List A (below)			
or			
Complete at least 3 courses from List A (electives) for a minimum of 9 semester credit hours			
List A (electives)			
Earth Sciences 4310	Remote Sensing in the Earth Sciences	3	Earth Sciences 1121; Physics 1250 or above; Math 1151 or above
Earth Sciences 4560	Applied Geophysics	3	Earth Sciences 1121, Math 1151 & Physics 1250
Earth Sciences 5604	Sequence Stratigraphy	3	Earth Sciences 4502
Earth Sciences 5641	Geostatistics	3	Math 1151 or above or permission of instructor
Earth Sciences 5642	Geomathematical Analysis	3	Earth Sciences 5641; and Math 1251 or above or written permission of instructor
Earth Sciences 5646	Geodynamics	3	Earth Sciences 4530; math 1252 or above; Physics 1250 or above or permission
Earth Sciences 5661	Hydrogeology	4	Earth Sciences 1121; Math 1252 or above

Earth Sciences 5687 (if not used to meet requirement b)	Energy Geophysics	3	Earth Sciences 1121; Math 1151; Physics 1250
Earth Sciences 5780 (if not used to meet requirement b)	Reflection Seismology	4	Earth Sciences 1121; Math 1151; Physics 1250
Earth Sciences 5751	Quantitative Reservoir Modeling	4	Earth Sciences 2245 & Math 1152, or permission of instructor
Earth Sciences 5781	Gravity Exploration	3	Earth Sciences 5687 or written permission of instructor
Earth Sciences 5782	Magnetic Exploration	3	Earth Sciences 5687 or written permission of instructor
Geodetic Sciences 5781	Geodesy and Geodynamics	3	Permission of the Instructor
Math 2415	Ordinary and Partial Differential Equations	3	Math 2568
Math 2568	Linear Algebra	3	Math 2152