

November 30, 2016

## **DEGREE REQUIREMENTS 2018-2019 Catalog**

Bachelor of Science - Geology  
Bachelor of Arts - Earth Science

### **INTRODUCTION**

The Department of Geological and Atmospheric Sciences offers the Bachelor of Science degree in geology and the Bachelor of Arts degree in Earth science. The B.S. in geology focuses on traditional and environmental geology, while laying a solid foundation for further graduate study. The B.A. in Earth science provides a broader overview of geology and supporting sciences and is designed primarily for careers in secondary education.

### **GEOLOGY PROGRAM**

The B.S. degree is the only degree offered in the geology program and is designed to acquaint the student with the broad discipline of geology and its supporting sciences. Sufficient depth of coursework is provided so that the student may pursue graduate study. Forty-four credits of geology are required, including Geol 100, 100L, 102, 102L, 302, 315, 315L, 316, 356, 365, 368, 479 and 9 credits of geology electives (Table 1). Required supporting courses include Chem 177, 177L, 178, 178L, Phys 111 and 112; Math 165, 166 or 181, 182, Engl 309 or 314, and 6 additional credits of either geology electives (Table 1) or courses from an approved departmental list of science, engineering, and mathematical disciplines outside of geology. Students with senior standing may use graduate geology courses (500-level or above) to fulfill the elective requirement; however, they should be aware that courses taken at the graduate level and counted toward the B.S. degree cannot be applied again toward a graduate degree at Iowa State University.

Geology courses generally have prerequisites in geology or in mathematics, chemistry, or physics. Prerequisites require that courses be taken in a prescribed sequence; however, because of differences in the preparation and background of each student, there is not a unique way to proceed through the B.S. program. Possible sequences of courses that will allow the student to complete a degree within four years are shown in Table 3. Students are advised to maintain frequent contact with their academic advisors so that all degree requirements are met in a timely fashion.

### **EARTH-SCIENCE PROGRAM**

The B.A. degree is offered in the Earth-science program. It requires fewer courses in geology, allows coursework in other disciplines, and prepares the student primarily for a career in secondary education. It requires 35 credits in geology, 3 credits in meteorology, and 6 credits in astronomy. The required courses are Geol 100, 100L, 102, 102L, 302, 315, 315L, 316, 356, 365, 368, 3 credits of a geology elective, Mteor 206,

and Astro 120 and 150 (Table 2). Additional courses in geology and agronomy are strongly recommended. The required supporting courses include Chem 177, 177L, 178, 178L, Phys 111 and 112, Math 151 or 160 or 165 or 181, Stat 101 or 104 or Com S 107, and a course in biology. In addition to these requirements, the student must meet the requirements for teacher licensure (outlined in Table 2; see also the listings under the Teacher Education Program in the ISU Catalog). Dr. Cinzia Cervato is the Teaching Coordinator for Earth Sciences.

The English requirements for the Earth-Science program are the same as for the Geology program.

### **MINOR IN GEOLOGY**

A minor in geology may be completed by taking Geology 100 and 100L (or 201), 102 and 102L, and additional credits at the 300-level or above for a total of 15 credits. A total of 9 credits must be unique to the minor and cannot be counted for both the major and the minor field of study. The minor will appear on the undergraduate transcript. Although it does not provide adequate preparation for a career in geology, the minor will provide a core experience that can augment a professional degree in environmental science or any field of physical science, agronomy, or engineering.

**Table 1.** Requirements for B.S. in geology

<b>Required courses</b>				<b>9 credits of geology electives</b>					
<b>Dept.</b>	<b>No.</b>	<b>Title</b>	<b>Credit</b>	<b>Semester</b>	<b>Dept.</b>	<b>No.</b>	<b>Title</b>	<b>Credit</b>	<b>Semester</b>
Geol	100	The Earth*	3	F/S/SS	Geol	306	Geology Field Trip	1-2	F/S
Geol	100L	The Earth – Lab*	1	F/S	Geol	324	Energy and the Environment	3	S
Geol	102	History of the Earth	3	S	Geol	402	Watershed Hydrology	3	F
Geol	102L	History of the Earth – Lab	1	S	Geol	409	Field Methods in Hydrogeology	3	Alt.SS (even)
Geol	302	Summer Field Studies	6	SS	Geol	411	Hydrogeology	4	F
Geol	315	Mineralogy and Earth Materials	3	F	Geol	412X	Micropaleontology	3	Alt. F (even)
Geol	315L	Mineralogy and Earth Materials – Lab	1	F	Geol	414	Applied Groundwater Flow Modeling	3	Alt. S (even)
Geol	316	Optical Mineralogy	2	F	Geol	415	Paleoclimatology	3	Alt. S (odd)
Geol	356	Structural Geology	5	S	Geol	416	Hydrologic Modeling and Analysis	3	Alt. S (odd)
Geol	365	Igneous and Metamorphic Petrology	3	S	Geol	419	Aqueous and Environmental Geochemistry	3	S
Geol	368	Stratigraphy and Sedimentation	4	F	Geol	420	Mineral Resources	3	Alt. F (even)
Geol	479	Surficial Processes	3	F	Geol	426	Stable Isotopes in the Environment	3	Alt. S (even)
					Geol	430X	Principles of Radiometric Dating	2	S
					Geol	444	Petroleum Geoscience and Engineering	3	Alt. S (even)
					Geol	451	Applied & Environmental Geophysics	3	Alt. S (odd)
					Geol	452	GIS for Geoscientists	3	F/S
					Geol	457	Seismic Meth. in Geol, Engin., and Petrol. Explor.	3	Alt. S (even)
					Geol	468X	Applied Geostatistics for Geoscientists	3	F
					Geol	474	Glacial and Quaternary Geology	3	Alt. S (odd)
					Geol	483X	Environmental Biogeochemistry	3	Alt. S (odd)
					Geol	488	GIS for Geoscientists II	3	Alt. S (odd)
					Geol	489	Survey of Remote Sensing Technologies	3	S
					Geol	489L	Satellite Remote Sensing Laboratory	1	S
					Geol	490	Independent Study (up to 9 credits)		
					Geol	495	Undergraduate Seminar	1	F/S
					Geol	507	Midwestern Geology Field Trip	1-4	F
					Geol	558	Intro. to 3D Visualization of Scientif. Data	3	Alt. F (even)
					Geol	559X	Quantitative Methods in Geology	3	Alt. F (even)

\* Geol 201 may be substituted for Geol 100, 100L

<b>Required supporting courses</b>				<b>Required supporting courses</b>			
<b>Dept.</b>	<b>No.</b>	<b>Title</b>	<b>Credit</b>	<b>Semester</b>	<b>Dept.</b>	<b>No. (credit)</b>	
Math	165	Calculus I	4	F/S/SS			Six additional credits of either geology electives or courses from an approved departmental list of science, engineering, and mathematical disciplines outside of geology. Examples from the list include but are not limited to:
	166	Calculus II	4	F/S/SS			
<i>OR</i>							
Math	181	Calc. and Math. Mod. for the Life Sci.	4	F/S	Math	265(4), 266(3), 267(4), 385(3)	
	182	Calc. and Math. Mod. for the Life Sci.	4	S	Stat	101(4), 104(3)	
Chem	177	General Chemistry I	4	F/S/SS	Com S	107(3), 207(3)	
	178	General Chemistry II	3	F/S	CE	360(3)	
Chem	177L	General Chemistry I Lab	1	F/S/SS	Agron	360(3), 463(4)	
	178L	General Chemistry II Lab	1	F/S	Astro	120, 150	
Phys	111	General Physics	5	F/S/SS	Mteor	206	
	112	General Physics	5	F/S/SS			

(Continued)

Engl	309	Proposal and Report Writing	3	F/S
<i>OR</i>				
Engl	314	Technical Communication	3	F/S/SS

**Table 2.** Requirements for B.A. in Earth science

<b>Required courses</b>					<b>3 credits of a geology elective</b>				
<b>Dept.</b>	<b>No.</b>	<b>Title</b>	<b>Credit</b>	<b>Semester</b>	<b>Dept.</b>	<b>No.</b>	<b>Title</b>	<b>Credit</b>	<b>Semester</b>
Geol	100	The Earth*	3	F/S/SS	Geol	306	Geology Field Trip	1-2	F/S
Geol	100L	The Earth – Lab*	1	F/S	Geol	324	Energy and the Environment	3	S
Geol	102	History of the Earth	3	S	Geol	402	Watershed Hydrology	3	F
Geol	102L	History of the Earth - Lab	1	S	Geol	409	Field Methods in Hydrogeology	3	Alt. SS (even)
Geol	302	Summer Field Studies	6	SS	Geol	411	Hydrogeology	4	F
Geol	315	Mineralogy and Earth Materials	3	F	Geol	412X	Micropaleontology	3	Alt. F (even)
Geol	315L	Mineralogy and Earth Materials – Lab	1	F	Geol	414	Applied Groundwater Flow Modeling	3	Alt. S (even)
Geol	316	Optical Mineralogy	2	F	Geol	415	Paleoclimatology	3	Alt. S (odd)
Geol	356	Structural Geology	5	S	Geol	416	Hydrologic Modeling and Analysis	3	Alt. S (odd)
Geol	365	Igneous and Metamorphic Petrology	3	S	Geol	419	Aqueous and Environment. Geochemistry	3	S
Geol	368	Stratigraphy and Sedimentation	4	F	Geol	420	Mineral Resources	3	Alt. F (even)
Mteor	206	Introduction to Meteorology	3	F/S	Geol	426	Stable Isotopes in the Environment	3	Alt. S (even)
Astro	120	The Sky and the Solar System	3	F/S/SS	Geol	430X	Principles of Radiometric Dating	2	S
Astro	150	Stars, Galaxies, and Cosmology	3	F/S	Geol	444	Petroleum Geoscience and Engineering	3	Alt. S (even)
					Geol	451	Applied & Environmental Geophysics	3	Alt. S (odd)
					Geol	452	GIS for Geoscientists	3	F/S
					Geol	457	Seismic Meth. in Geol, Engin., and Petr. Expl.	3	Alt. S (even)
					Geol	468X	Applied Geostatistics for Geoscientists	3	F
					Geol	474	Glacial and Quaternary Geology	3	Alt. S (odd)
					Geol	479	Surficial Processes	3	F
					Geol	483X	Environmental Biogeochemistry	3	Alt. S (odd)
					Geol	488	GIS for Geoscientists II	3	Alt. S (odd)
					Geol	489	Survey of Remote Sensing Technologies	3	S
					Geol	489L	Satellite Remote Sensing Laboratory	1	S
					Geol	490	Independent Study (up to 9 credits)		
					Geol	495	Undergraduate Seminar	1	F/S
					Geol	507	Midwestern Geology Field Trip	1-4	F
					Geol	558	Intro. to 3D Visualiz. of Scientif. Data	3	Alt. F (even)
					Geol	559X	Quantitative Methods in Geology	3	Alt. F (even)

\* Geol 201 may be substituted for Geol 100, 100L

<b>Required supporting courses</b>					<b>Requirements for Teacher Certification (see catalog for complete detail)</b>	
<b>Dept.</b>	<b>No.</b>	<b>Title</b>	<b>Credit</b>	<b>Semester</b>	<b>Dept.</b>	<b>Course Number</b>
Math	151 or 160 or 165 or 181	Calc. for Bus. and Soc. Sci., or Survey of Calc., or Calc. I, or Calc. and Math. Mod. for Life Sciences	3 or 4	F/S/SS	C I	202, 204, 219, 280M, 333, 347, 406, 418, 419, 468J, 468K, and 417J
Chem	177	General Chemistry I	4	F/S/SS	Engl	150 and 250
	178	General Chemistry II	3	F/S	Psych	230 or HD FS 102
Chem	177L	General Chemistry I Lab	1	F/S/SS	Lib	160
	178L	General Chemistry II Lab	1	F/S	Spec. Ed.	401
Phys	111	General Physics	5	F/S/SS		9 credits in Social Sciences*
	112	General Physics	5	F/S/SS		6 credits in Humanities
Com S	107	Applied Computer Programming	3	F/S		9 credits in Communication Skills
OR						<i>*One course must be taken in either American History or American Government</i>

(Continued)

Stat	101 or 104	Principles of Statistics, Intro. to Statistics	4,3	F/S/SS	
Engl	309	Proposal and Report Writing	3	F/S	One additional course in interpersonal or group presentation (see approved list on Teacher Ed. website)
<i>OR</i>					
Engl	314	Technical Communication	3	F/S/SS	
Biol		1 course in Biology, Botany, or Zoology			<i>Note: Admission to the Teacher Ed. Program requires the PPST exam (PRAXIS)</i>

**Table 3.** Sequence of courses for B.S. in geology

<b>a. Year</b>	<b>Semester</b>	<b>Geology Requirement (cr.)</b>	<b>Math - Science Requirement (cr.)</b>	<b>Geology Elective (cr.)</b>
1	Fall	100(3), 100L(1)	Math 181(4), Chem 177(4), 177L(1)	
	Spring	102(3), 102L(1)	Math 182(4), Chem 178(3), 178L(1)	
2	Fall	315(3), 315L(1), 316(2)	Phys 111(5)	
	Spring	365(3)	Phys 112(5)	
3	Fall	368(4),479(3)	Six credits of geology or science electives	306(1-2) or 402(3) or 420(3) or 452(3) or 490(max 9) or 495(1) or 507(1-4)
	Spring	356(5)		306(1-2) or 324(3) or 414(3) or 415(3) or 416(3) or 426(3) or 430X(3) or 444(3) or 451(3) or 457(3) or 474(3) or 488(3) or 490(max 9) or 495(1)
Summer		302(6)		
4	Fall			411(4) or 412X(3) or 468X(3) or 558(3) or 559X(3)
	Spring			419(3) or 452(3) or 483X(3) or 489(3) or 489L(1) or 490(max 9)