

# Department of Geosciences

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B.S., M.S. and Ph.D. degrees in Geoscience are offered with emphasis in sub-disciplines described below. Minors are offered at both B.S. and M.S. levels in Geoscience.

The Department of Geosciences strives for an integrated, interdisciplinary study of the whole Earth at both the bachelor and master of science levels. Course offerings are grouped into six areas of emphasis:

1. Professional Geology - physical, biological, and chemical aspects of the Earth;
2. Geography - distribution of physical features and human interaction with the Earth;
3. Environmental Geoscience - conservation and management of Earth resources and remediation of natural and human hazards;
4. Broadcast Meteorology/Climatology - radio/television weathercasting;
5. Professional Meteorology/Climatology - atmospheric processes and climatic variability; and
6. Geographical Information Systems - spatial analysis and topological relationships of geographic data.

A general program of study is built upon a foundation of natural and social sciences, humanities, and computer applications. The Geoscience curriculum provides fundamental training for future employment in the petroleum and environmental industries; education; state and federal government agencies; environmental consulting; meteorological/ climatological consulting; weathercasting on radio and television; and advanced studies in graduate school.

Within the six areas of emphasis outlined above, a student may further focus interests in a variety of areas including: water resources, hydrogeology and environmental clean-up and monitoring, petroleum exploration and services, construction and urbanization involving geological applications, geophysics and geochemistry, sedimentary geology and paleontology, Quaternary geology and karst processes, paleomagnetism, Geographic Information Systems or analysis and prediction of weather and climate. A minimum of 40 credit hours in geoscience courses is required for the geoscience degree. A grade of C or higher is required on all departmental courses to satisfy graduation requirements. Students in the professional geology concentration are required to take the Association of State Board of Geologists Fundamentals of Geology (ASBOG-FG) exam.

A minor in geoscience consists of a minimum of 14 credit hours in courses numbered 2000 and above, in addition to the first year courses. The following are examples of variations within a geoscience minor. A minor with a Geology emphasis should include physical (GG 1113/GG 1111) and historical geology (GG 1123/GG 1121) plus 14 hours 2000 and above for a total of 22 hours; for an Environmental Geoscience emphasis, physical and historical geology with laboratory plus introduction to environmental geology (GG 3133) and other course work 2000 and above for a total of 22 hours; for emphasis in Geography, cultural geography (GR 2013), world geography (GR 1123) and other course work 2000 and above; and Broadcast Meteorology/climatology,

physical geography (GR 1114) and either introduction to environmental geology (GG 3133) or conservation of natural resources (GR 3113) and other course work 2000 and above for a total of 21 hours; for emphasis in Geographic Information Systems, physical geography (GR 1114) or physical geology (GG 1113/GG 1111, maps and remote sensing (GR 2313), Principles of GIS (GR 4303) and other course work 2000 and above for a total of 22 hours. Minors in Geoscience are also available at the M.S. level.

Three educational enhancement awards and five scholarships are available to students majoring in Geoscience, namely the F.F. Mellen, Forrest W. Pace, and Summer Geology Educational Enhancement awards, and the Gordon W. Gulmon, the John H. Richards, the Sistrunk Endowed, the Worthey Endowed, and the Dunn Memorial Scholarships. The three Educational Enhancement Awards provide financial assistance to those enrolled in field geology camp during the summer. The five Scholarships are awarded to students for academic excellence. All are restricted to students at junior or senior rank, with the exception of the Sistrunk Endowed Scholarship and the Worthey Endowed Scholarships.

The Department of Geosciences encourages involvement in Sigma Gamma Epsilon, a nationally recognized honorary Earth Science society. Requirements for acceptance include a grade-point average of at least 3.00 in 12 or more hours of geoscience and a cumulative average of 2.67.

The Department of Geosciences participates with the National Weather Association (NWA) and the American Meteorological Society (AMS) in training individuals for the respective "Weathercaster Seals of Approval". The Office of the State Climatologist and the MSU Climatology Laboratory are housed in the Department and are strongly involved in programs for all students with interests in broadcast meteorology and climatology.

## Geosciences Core

### General Education and College Requirements

#### English Composition

EN 1103	English Composition I	3
or EN 1163	Accelerated Composition I	
EN 1113	English Composition II	3
or EN 1173	Accelerated Composition II	

#### Foreign Language

2 semesters - one Foreign Language (see advisor)	6
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#### Humanities

Literature - see General Education courses	3
History - see General Education courses	3

#### Mathematics

Specified under concentration areas	6
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#### Fine Arts

CO 1503	Introduction to the Theatre (for Broadcast Meteorology)	3
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See A&S Core requirements (for other concentrations)

#### Natural Sciences

Specified under concentration areas	9-12
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#### Social Sciences

GR 1123	Introduction to World Geography	3
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CO 1403	Introduction to the Mass Media (for Broadcast Meteorology)	3
see Gen. Ed./A&S Core (other concentrations)		3
<b>Major Core</b>		
<b>Basic Courses</b>		
GG 1113	Survey of Earth Sciences I	3
GG 1111	Earth Sciences I Laboratory	1
GR 1114	Elements of Physical Geography	4
<b>Oral Communication Requirement</b>		
CO 1003	Fundamentals of Public Speaking	3

Choose one of the following concentrations:

### Professional Geology Concentration (GEOL)

#### Mathematics

MA 1713	Calculus I	3
MA 1723	Calculus II	3

#### Natural Sciences

CH 1213	Chemistry I	3
CH 1211	Investigations in Chemistry I	1
CH 1223	Chemistry II	3
CH 1221	Investigations in Chemistry II	1
PH 1113	General Physics I	3
PH 1123	General Physics II	3
PH 1133	General Physics III	3
or GG 4233	Applied Geophysics	

#### Concentration Requirements

GG 1121	Earth Sciences II Laboratory	1
GG 1123	Survey of Earth Sciences II	3
GG 3133	Introduction to Environmental Geology	3
GG 3613	Water Resources <sup>1</sup>	3
GG 4114	Mineralogy	4
GG 4123	Petrology	3
GG 4201	Practicum on Paleontology	1
GG 4304	Principles of Sedimentary Deposits I	4
GG 4413	Structural Geology	3
GG 4333	Geowriting <sup>2</sup>	3
GG 4443	Principles of Sedimentary Deposits II	3
GG 4503	Geomorphology	3
GR 2313	Maps and Remote Sensing	3
ST 3123	Introduction to Statistical Inference <sup>1</sup>	3
or GR 4633	Statistical Climatology	

Summer Field Camp <sup>3</sup> 6

Choose one of the following: 3

GG 4203	Principles of Paleobiology	
GG 4113	Micropaleontology	
GG 4133	Principles of Paleocology	

Choose two of the following: 6

GG 1133	Planetary Geology	
GG 3603	Introduction to Oceanography	
GG 4523	Coastal Environments	
GR 1603	Introduction to Meteorology	

Choose three of the following: 9

GG 4063	Development of Fossil Fuel Resources	
GG 4153	Engineering Geology	
GG 4433	Subsurface Methods	
GG 4613	Physical Hydrogeology	
GR 4303	Principles of GIS	

#### General Electives

General Electives 3

**Total Hours** 124

<sup>1</sup> Fulfills Computer Literacy Requirement.

<sup>2</sup> Fulfills Computer Literacy Requirement and Writing Requirement.

<sup>3</sup> From an approved university. See advisor.

### Environmental Geoscience Concentration (ENGS)

#### Mathematics

MA 1313	College Algebra	3
MA 1323	Trigonometry	3

#### Natural Sciences

Science with lab (CH, PH, BIO)	6-8
Science without lab (CH, PH, BIO)	3

#### Concentration Requirements

GG 3603	Introduction to Oceanography	3
GG 3613	Water Resources <sup>1</sup>	3
GG 4333	Geowriting <sup>2</sup>	3
GR 1603	Introduction to Meteorology	3
GR 4633	Statistical Climatology <sup>1</sup>	3

4000 level departmental courses 18

Choose one of the following: 3

GG 1133	Planetary Geology	
GG 3133	Introduction to Environmental Geology	
GG 4523	Coastal Environments	
GR 2313	Maps and Remote Sensing	
GR 3113	Conservation of Natural Resources	
GR 4813	Natural Hazards and Processes	

#### General Electives

Consult advisor 39

**Total Hours** 124

<sup>1</sup> Fulfills Computer Literacy Requirement.

<sup>2</sup> Fulfills Computer Literacy Requirement and Writing Requirement.

### Geography Concentration (GPHY)

#### Mathematics

MA 1313	College Algebra	3
MA 1323	Trigonometry	3

#### Natural Sciences

Science with lab (CH, PH, BIO)	6-9
Science without lab (CH, PH, BIO)	3

#### Concentration Requirements

GG 4333	Geowriting <sup>1</sup>	3
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GR 2013	Cultural Geography	3
GR 2313	Maps and Remote Sensing	3
GR 4203	Geography of North America	3
GR 4303	Principles of GIS	3
4000 level departmental courses		9
Choose four of the following:		12
GG 1133	Planetary Geology	
GG 3133	Introduction to Environmental Geology	
GG 3603	Introduction to Oceanography	
GG 3613	Water Resources <sup>2</sup>	
GG 4523	Coastal Environments	
GR 1603	Introduction to Meteorology	
GR 3113	Conservation of Natural Resources	
GR 4813	Natural Hazards and Processes	
Choose one of the following:		3
GR 4213	Geography of Latin America	
GR 4223	Geography of Europe	
GR 4233	Geography of Asia	
GR 4243	Geography of Russia and the Former Soviet Republics	
GR 4253	Geography of Africa	
GR 4263	Geography of the South	

**General Electives**

Consult Advisor		36
<b>Total Hours</b>		124

<sup>1</sup> Fulfills Computer Literacy Requirement.

<sup>2</sup> Fulfills Computer Literacy Requirement and Writing Requirement.

**Broadcast Meteorology Concentration (BMP)****Mathematics**

MA 1713	Calculus I	3
MA 1723	Calculus II	3

**Natural Sciences**

CH 1043	Survey of Chemistry I	3
PH 1113	General Physics I (w/ lab)	3
PH 1123	General Physics II (w/ lab)	3

**Concentration Requirements**

GG 3613	Water Resources <sup>1</sup>	3
GR 1603	Introduction to Meteorology	3
GR 4402	Weather Analysis I	2
GR 4412	Weather Analysis II	2
GR 4422	Weather Forecasting I	2
GR 4432	Weather Forecasting II	2
GR 4613	Applied Climatology	3
GR 4623	Physical Meteorology	3
GR 4633	Statistical Climatology <sup>1</sup>	3
GR 4733	Synoptic Meteorology	3
GR 4753	Satellite and Radar Meteorology	3
GR 4813	Natural Hazards and Processes	3
GR 4823	Dynamic Meteorology I	3
GR 4933	Dynamic Meteorology II	3

GR 4963	Mesoscale Meteorology	3
GR 4502	Practicum in Broadcast Meteorology I	2
GR 4512	Practicum in Broadcast Meteorology II	2
GR 4522	Practicum in Broadcast Meteorology III	2
GR 4532	Practicum in Broadcast Meteorology IV	2
CO 2013	Voice and Articulation	3
CO 3313	News Writing for the Electronic Media <sup>2</sup>	3
CO 2333	Television Production	3
CO 3333	Advanced Television Production	3
Choose two of the following:		6
GG 1133	Planetary Geology	
GG 3133	Introduction to Environmental Geology	
GG 3603	Introduction to Oceanography	
GG 4523	Coastal Environments	
GR 3113	Conservation of Natural Resources	
GR 4203	Geography of North America	

**General Electives**

Consult Advisor		8
<b>Total Hours</b>		124

<sup>1</sup> Fulfills Computer Literacy Requirement.

<sup>2</sup> Fulfills Writing Requirement.

**Professional Meteorology Concentration (PMET)****Mathematics**

MA 1713	Calculus I	3
MA 1723	Calculus II	3
MA 2733	Calculus III	3
MA 3253	Differential Equations I	3

**Natural Sciences**

CH 1213	Chemistry I	3
CH 1211	Investigations in Chemistry I	1
PH 2213	Physics I	3
PH 2223	Physics II	3

**Concentration Requirements**

GG 4333	Geowriting <sup>2</sup>	3
GR 1603	Introduction to Meteorology	3
GR 4402	Weather Analysis I	2
GR 4412	Weather Analysis II	2
GR 4422	Weather Forecasting I	2
GR 4432	Weather Forecasting II	2
GR 4613	Applied Climatology	3
GR 4623	Physical Meteorology	3
GR 4633	Statistical Climatology <sup>1</sup>	3
GR 4733	Synoptic Meteorology	3
GR 4753	Satellite and Radar Meteorology	3
GR 4823	Dynamic Meteorology I	3
GR 4933	Dynamic Meteorology II	3
GR 4963	Mesoscale Meteorology	3

Choose two of the following:		6
GG 1133	Planetary Geology	

GG 3133	Introduction to Environmental Geology	
GG 3603	Introduction to Oceanography	
GG 3613	Water Resources	
GG 4523	Coastal Environments	
GR 4813	Natural Hazards and Processes	
GR 3113	Conservation of Natural Resources	
GR 4203	Geography of North America	

**Specified Electives**

See advisor 20-23

**AMS (Broadcast Meteorology)**

GR 4502	Practicum in Broadcast Meteorology I	2
GR 4512	Practicum in Broadcast Meteorology II	2
GR 4522	Practicum in Broadcast Meteorology III	2
GR 4532	Practicum in Broadcast Meteorology IV	2
GG 3613	Water Resources	3
GR 4813	Natural Hazards and Processes	3
CO 2333	Television Production	3
CO 3333	Advanced Television Production	3

**GIS**

GR 2313	Maps and Remote Sensing	3
GR 3303	Survey of Geospatial Technologies	3
GR 4303	Principles of GIS	3
GR 4313	Advanced GIS	3
GR 4323	Cartographic Sciences	3
GR 4333	Remote Sensing of the Physical Environment	3
GR 4353	Geodatabase Design	3

**ROTC**

AS 1012	Foundations of U.S. Air Force-I	2
AS 1022	Foundations of U.S. Air Force-II	2
AS 2012	Air and Space Power-I	2
AS 2022	Air and Space Power-II	2
AS 3013	Air Force Leadership Studies-I	3
AS 3023	Air Force Leadership Studies-II	3
AS 4013	National Security Affairs and Preparation for Active Duty-I	3
AS 4023	National Security Affairs and Preparation for Active Duty-II	3

**General Electives**

Consult advisor 1-4

**Total Hours** 124<sup>1</sup> Fulfills Computer Literacy Requirement.<sup>2</sup> Fulfills Writing Requirement.**Geographic Information Systems (GIS) Concentration****Mathematics**

MA 1313	College Algebra	3
MA 1323	Trigonometry	3

**Natural Sciences**

Science with lab (CH, PH, BIO)	6-9
Science without lab (CH, PH, BIO)	3

**Concentration Requirements**

GR 1603	Introduction to Meteorology	3
GR 2313	Maps and Remote Sensing	3
GR 3303	Survey of Geospatial Technologies	3
GR 3113	Conservation of Natural Resources	3
GR 3311	Geospatial Applications	1
GR 4303	Principles of GIS	3
GR 4313	Advanced GIS	3
GR 4323	Cartographic Sciences	3
GR 4333	Remote Sensing of the Physical Environment	3
GR 4353	Geodatabase Design	3
GG 4333	Geowriting <sup>2</sup>	3
GR 4990	Special Topics in Geography	9

4000-level departmental courses 12

CSE 1284	Introduction to Computer Programming	4
ECE 4423	Introduction to Remote Sensing Technologies	3
ST 3123	Introduction to Statistical Inference	3

Choose two of the following: 6

GG 1133	Planetary Geology	
GG 3133	Introduction to Environmental Geology	
GG 3603	Introduction to Oceanography	
GG 3613	Water Resources <sup>1</sup>	
GG 4523	Coastal Environments	
GR 4813	Natural Hazards and Processes	

Choose three of the following: 9

GR 4633	Statistical Climatology <sup>1</sup>	
WFA 4253	Application of Spatial Technologies to Wildlife and Fisheries Management	
ABE 3513	The Global Positional System and Geographic Information Systems in Agriculture and Engineering	
ST 4213	Nonparametric Methods	
PSS 4373	Geospatial Agronomic Management	
PSS 4411	Remote Sensing Seminar	
FO 4313	Spatial Technologies in Natural Resources Management	
FO 4452	Remote Sensing Applications	

**General Electives**

Consult advisor 4-5

**Total Hours** 124<sup>1</sup> Fulfills Computer Literacy Requirement.<sup>2</sup> Fulfills Computer Literacy Requirement and Writing Requirement.**Distance Learning Programs**

The Department of Geosciences offers four distance learning programs listed below. Each program utilizes recorded lectures and the Internet for course instruction.

**Broadcast Meteorology Program.** A three-year, 17 course, 52 credit hour program of study that can lead to a B.S. degree in Geosciences. Primarily for individuals in television weather.

**Operational Meteorology Program.** A three-year, 17 course, 52 credit hour program of study that can lead to a B.S. degree in Geosciences.

Teachers In Geoscience Program. A two-year, 12 course, 36 credit hour program of study that leads to a M.S. degree in Geosciences. Primarily for K-12 teachers. An additional two-year, 10 course, 30 credit hour program of advance course work is available.

Applied Meteorology Program. A two-year, 12 course 36 credit hour program of study that leads to a M.S. degree in Geosciences. Primarily for individuals with meteorological, environmental, or hazards-related careers.