

# Geosciences

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## Admission

The Department of Geosciences offers graduate study leading to the Master of Science degree in Geoscience and the Doctor of Philosophy degree in Earth and Atmospheric Science. An applicant to the program must have an undergraduate GPA of at least 2.75 on a scale of 4.00 for entry to the master's program and at least 3.00 at both the undergraduate and graduate level for entry to the doctoral program.

Although helpful, an undergraduate background in Geosciences is not a prerequisite for admission into the M.S. in Geoscience program. Applicants to the master's program in the Broadcast or Professional Meteorology concentrations are required to have passed Calculus I prior to arrival on campus, and the completion of Calculus II will greatly improve the chances of being accepted. All other master's applicants are recommended to have completed Calculus I.

Applicants to the doctoral program are required to have completed a thesis-based master's degree and have a background in one of the departmental emphasis areas. All applicants for the Doctoral program **must** identify a mentor (dissertation supervisor) prior to acceptance into the program. Applicants who have not completed a thesis or are from other science disciplines will be considered on a case-by-case basis through a petition, initiated by the identified mentor, to the department's graduate faculty. The doctoral degree student should anticipate a four-year program of study. Depending on the applicant's emphasis area of interest, Calculus I and II may be required for admission.

The application package must contain the application for admission; at least three letters of reference; official bachelor's degree transcript; official transcripts from all colleges attended after earning the bachelor's degree (both undergraduate and graduate work); and a statement of purpose. A student admitted to the Broadcast Meteorology concentration can only begin studies in the fall term. Applicants desiring assistantship funding consideration are strongly advised to submit the assistantship application no later than January 15.

## Provisional Admission

An applicant who has not fully met the GPA requirement stipulated by the University may be admitted on a provisional basis. The provisionally-admitted student is eligible for a change to regular status after receiving a 3.00 GPA on the first 9 hours of graduate courses at Mississippi State University (with no grade lower than a C). The first 9 hours of graduate courses must be within the student's program of study. Courses with an S grade, transfer credits, or credits earned while in Unclassified status cannot be used to satisfy this requirement. If a 3.00 is not attained, the provisional student **shall** be dismissed from the graduate program. Academic departments may set higher standards for students to fulfill provisional requirements; a student admitted with provisional status should contact the graduate coordinator for the program's specific requirements. **While in the provisional status, a student is not eligible to hold a graduate assistantship.**

## Academic Performance

The Department of Geosciences follows the Graduate School guidelines regarding academic dismissal from an academic program. Additionally, a grade of U given for thesis or dissertation research hours, three grades of C, or a grade of D or F for any regular class will result in dismissal from the program. A student in the Broadcast Meteorology concentration who earns a C in the first year of graduate study will be required to take a proficiency exam in the summer before the second year. Unsatisfactory performance on the exam will result in dismissal from the program.

## Concentration Descriptions

- The **Applied Meteorology Program** is designed for individuals with meteorological, environmental or hazards-related careers. This non-thesis concentration is offered through distance education.
- The **Broadcast Meteorology** concentration is designed for students intending to pursue meteorology careers in media. This non-thesis concentration combines meteorology coursework with the Practicum in Broadcast Meteorology sequence.
- **Environmental Geosciences** is a non-thesis concentration intended for students interested in a broader cross-section of the geosciences. It is offered both on-campus and through distance education.

- The **Geography** concentration is a thesis-based program appropriate for students interested in studying the spatial distribution of cultural and physical features across the Earth's surface. It can be tailored toward specific interests in either human or physical geography.
- The **Geology** concentration is thesis-based and intended to prepare students for careers in professional geology or further graduate study.
- The concentration in **Geospatial Sciences** is a thesis-based program designed to prepare students to use geospatial technologies to provide insight into Earth and atmospheric processes.
- The **Professional Meteorology/Climatology** concentration is thesis-based and is intended to prepare students for forecasting careers or further graduate study.
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## Master of Science Programs of Study

Both a thesis track and a non-thesis track are available at the master's level for both on-campus and distance learning delivery methods.

### General Departmental Requirements

Both options require competency in statistics or a foreign language. A student enrolled in a non-thesis concentration may petition the graduate faculty to complete a thesis. The department will not approve the request unless a faculty member has agreed to serve as major professor and a committee can be assembled. The department follows the Graduate School guidelines regarding the minimum number of course hours that must be at 8000-level or higher.

The department has on-campus concentrations in the following areas:

- Broadcast Meteorology
- Environmental Geosciences
- Geography
- Geology
- Geospatial Sciences
- Professional Meteorology/Climatology

The department also offers the following concentrations through distance education:

- Applied Meteorology Program (AMP)
- Environmental Geosciences (ENGS)

The AMP is designed for individuals who are already in meteorological, environmental, or hazards-related careers. The Environmental Geosciences concentration is intended for individuals interested in a broader cross-section of the geosciences. The TIG concentration is primarily designed for in-service teachers.

A student admitted to the Applied Meteorology program (AMP) must hold a B.S. degree in a science and have completed GR 4713 or its equivalent. A student who is admitted in the graduate program in Geosciences in the Broadcast Meteorology concentration must successfully complete a background assessment test in meteorology. The test will be administered during the spring of each year. A student scoring less than 80% on this test must successfully complete (grade of B or better) GR 1604 from MSU by Distance Learning before starting his or her initial enrollment on campus for study in Broadcast Meteorology. A student admitted to the Environmental Geosciences concentration must have completed GG 1113 and GR 1604 or their equivalents. All prerequisite courses may be taken through distance education prior to enrolling in the graduate programs. Specific classes may require further prerequisites.

### Master of Science in Geosciences with Applied Meteorology Concentration

GR 8553	Research Methods in Geoscience	3
GR 6303	Principles of GIS	3
GR 8833	Weather and Society	3
GR 8453	Quantitative Analysis in Climatology	3
GR 8573	Research in Applied Meteorology	3
Select at least one of the following:		3
GR 6923	Severe Weather	
GR 6943	Tropical Meteorology	
Select at least nine hours from the following: <sup>1</sup>		9
GR 6313	Advanced GIS	
GR 6333	Remote Sensing of the Physical Environment	
GR 6473	Numerical Weather Prediction	
GR 6603	Climatology	

GR 6753	Satellite and Radar Meteorology	
GR 6823	Dynamic Meteorology I	
GR 6933	Dynamic Meteorology II	
GG 8203	Ocean Science	
GG 8233	Environmental Geoscience	
GG 8613	Hydrology	
GR 8613	Hydrometeorology	
GR 8613	Hydrometeorology	
GR 8633	Climate Change	
GR 8813	Advanced Hazards and Disasters	
GR 8133	Foundations in Forecasting	
GR 8143	Advanced Forecasting Techniques	
Additional graduate-level coursework <sup>2</sup>		9
<b>Total Hours</b>		<b>36</b>

<sup>1</sup> Substitutions may be made with the approval of the major professor and committee and with appropriate documentation. They must be noted on the program of study. Note: A split-level course completed at the undergraduate level cannot be repeated on the graduate level for use on the program of study.

<sup>2</sup> A research project presentation and a written and oral comprehensive examination are required.

## Master of Science in Geosciences, Broadcast Meteorology Concentration

GR 8553	Research Methods in Geoscience	3
Select at least 9 hours from the following: <sup>1</sup>		9
GR 6502	Practicum in Broadcast Meteorology I	
GR 6512	Practicum in Broadcast Meteorology II	
GR 6522	Practicum in Broadcast Meteorology III	
GR 6532	Practicum in Broadcast Meteorology IV	
GR 6613	Applied Climatology	
GR 6623	Physical Meteorology	
GR 6733	Synoptic Meteorology	
GR 6753	Satellite and Radar Meteorology	
GR 6823	Dynamic Meteorology I	
GR 6203	Geography of North America	
GR 6813	Natural Hazards and Processes	
GR 8843	Advanced Mesoscale Meteorology	
GR 8453	Quantitative Analysis in Climatology	
Additional graduate-level coursework <sup>2</sup>		24
<b>Total Hours</b>		<b>36</b>

<sup>1</sup> A student who has taken any of these 9 hours in an undergraduate Geosciences program may substitute these or other appropriate MSU graduate-level courses. Substitutions may be made with the approval of the major professor and committee. They must be noted on the program of study. Note: A split-level course completed at the undergraduate level cannot be repeated on the graduate level for use on the program of study.

<sup>2</sup> A research project presentation and a written and oral comprehensive examination are required.

## Master of Science in Geosciences with Environmental Geosciences Concentration

GR 8553	Research Methods in Geoscience	3
GR 8410	Field Methods Seminar	3
or GR 8573	Research in Applied Meteorology	
Select at least 9 hours from the following: <sup>1</sup>		9
GG 6033	Resources and the Environment	
GG 6063	Earth and Atmospheric Energy Resources	
GR 6303	Principles of GIS	

GR 6313	Advanced GIS	
GR 6333	Remote Sensing of the Physical Environment	
GG 6503	Geomorphology	
GG 6523	Coastal Environments	
GR 6123	Urban Geography	
GG 6613	Physical Hydrogeology	
GR 6813	Natural Hazards and Processes	
GR 6603	Climatology	
GR 6613	Applied Climatology	
GG 8203	Ocean Science	
GG 8233	Environmental Geoscience	
GR 8633	Climate Change	
GR 8813	Advanced Hazards and Disasters	
Additional graduate-level coursework <sup>2</sup>		15
<b>Total Hours</b>		<b>30</b>

<sup>1</sup> A student who has taken any of these 9 hours in an undergraduate Geosciences program may substitute these or other appropriate MSU graduate-level courses. Substitutions may be made with the approval of the major professor and committee. They must be noted on the program of study.

Note: A split-level course completed at the undergraduate level cannot be repeated on the graduate level for use on the program of study.

<sup>2</sup> A capstone research project (oral presentation and paper) and a written and oral comprehensive examination are required.

### Master of Science in Geosciences with Geography Concentration

GG 8561	Geoscience Seminar	1
GR 8542	Geographic Literature	2
or GG 8572	Geologic Literature	
Select at least 9 hours from the following: <sup>1</sup>		9
GR 6123	Urban Geography	
GR 6203	Geography of North America	
GR 6213	Geography of Latin America	
GR 6223	Geography of Europe	
GR 6233	Geography of Asia	
GR 6243	Geography of Russia and the Former Soviet Republics	
GR 6253	Geography of Africa	
GR 6263	Geography of the South	
GR 6283	Geography of Islamic World	
GR 8313	Advanced Human Geography	
Additional graduate-level coursework		12
GR 8000	<sup>2</sup>	6
<b>Total Hours</b>		<b>30</b>

<sup>1</sup> A student who has taken any of these 9 hours in an undergraduate Geosciences program may substitute these or other appropriate MSU graduate-level courses. Substitutions may be made with the approval of the major professor and committee. They must be noted on the program of study.

Note: A split-level course completed at the undergraduate level cannot be repeated on the graduate level for use on the program of study.

<sup>2</sup> A thesis defense / comprehensive exam is required.

### Master of Science in Geosciences with Geology Concentration

GG 8561	Geoscience Seminar	1
GR 8542	Geographic Literature	2
or GG 8572	Geologic Literature	
Select at least 9 hours from the following: <sup>1</sup>		9
GG 6033	Resources and the Environment	
GG 6063	Earth and Atmospheric Energy Resources	
GG 6114	Mineralogy	

GG 6123		
GG 6153	Engineering Geology	
GG 6201	Practicum in Paleontology	
GG 6203	Principles of Paleobiology	
GG 6233	Applied Geophysics	
GG 6304	Principles of Sedimentary Deposits I	
GG 6403	Gulf Coast Stratigraphy	
GG 6413		
GG 6433	Subsurface Methods	
GG 6443	Principles of Sedimentary Deposits II	
GG 6503	Geomorphology	
GG 6523	Coastal Environments	
GG 6613	Physical Hydrogeology	
GG 6623	Chemical Hydrogeology	
GG 8713	Regional Geology of Eastern North America	
Additional graduate-level coursework		12
GG 8000	2	6
<b>Total Hours</b>		<b>30</b>

<sup>1</sup> A student who has taken any of these 9 hours in an undergraduate Geosciences program may substitute these or other appropriate MSU graduate-level courses. Substitutions may be made with the approval of the major professor and committee. They must be noted on the program of study.

Note: A split-level course completed at the undergraduate level cannot be repeated on the graduate level for use on the program of study.

<sup>2</sup> Thesis defense / comprehensive exam is required.

## Master of Science in Geosciences with Geospatial Sciences Concentration

GG 8561	Geoscience Seminar	1
GR 8542	Geographic Literature	2
or GG 8572	Geologic Literature	
Select at least 9 hours from the following: <sup>1</sup>		9
GR 6303	Principles of GIS	
GR 6313	Advanced GIS	
GR 6323	Cartographic Sciences	
GR 6333	Remote Sensing of the Physical Environment	
GR 6363	Geographic Information Systems Programming	
GR 6411	Remote Sensing Seminar	
GR 8303	Advanced Geodatabase Systems	
Additional graduate-level coursework		12
GR 8000	2	6
<b>Total Hours</b>		<b>30</b>

<sup>1</sup> A student who has taken any of these 9 hours in an undergraduate Geosciences program may substitute these or other appropriate MSU graduate-level courses. Substitutions may be made with the approval of the major professor and committee. They must be noted on the program of study.

Note: A split-level course completed at the undergraduate level cannot be repeated on the graduate level for use on the program of study.

<sup>2</sup> A thesis defense / comprehensive exam is required.

## Master of Science in Geosciences with Professional Meteorology/Climatology Concentration - Thesis

GG 8561	Geoscience Seminar	1
GR 8542	Geographic Literature	2
or GG 8572	Geologic Literature	
Select at least 9 hours from the following: <sup>1</sup>		9
GR 6613	Applied Climatology	

GR 6623	Physical Meteorology	
GR 6733	Synoptic Meteorology	
GR 6753	Satellite and Radar Meteorology	
GR 6823	Dynamic Meteorology I	
GR 6933	Dynamic Meteorology II	
GR 6813	Natural Hazards and Processes	
GR 8843	Advanced Mesoscale Meteorology	
GR 8453	Quantitative Analysis in Climatology	
Additional graduate-level coursework		12
GR 8000	2	6
<b>Total Hours</b>		<b>30</b>

<sup>1</sup> A student who has taken any of these 9 hours in an undergraduate Geosciences program may substitute these or other appropriate MSU graduate-level courses. Substitutions may be made with the approval of the major professor and committee. They must be noted on the program of study. Note: A split-level course completed at the undergraduate level cannot be repeated on the graduate level for use on the program of study.

<sup>2</sup> Thesis defense / comprehensive exam is required.

## Doctoral Program of Study

### Doctor of Philosophy in Earth and Atmospheric Sciences

GR 8913	Philosophy and Ethics in Geosciences	3
GG 8561	Geoscience Seminar	2
GG 9000	Research in Geology	20
or GR 9000	Research in Geography	
Additional courses offered within the Department of Geosciences <sup>1</sup>		19
<b>Total Hours</b>		<b>44</b>

<sup>1</sup> At the discretion of the student's Ph.D. committee, other courses offered from MSU may also be used to satisfy this requirement. Six hours must be at the 8000 level. Note: A split-level course completed at the undergraduate level cannot be repeated on the graduate level for use on the program of study.

The doctoral program will include 44 hours beyond the master's and the completion of a dissertation. Written and oral comprehensive examinations are administered at the end of required coursework. A dissertation proposal defense is also required. Doctoral students are required to maintain on-campus residency through their admission to candidacy, which occurs at the successful completion of their comprehensive examinations and dissertation proposal defense.

## Geospatial and Remote Sensing Certificate

Geospatial technology refers to the acquisition and analysis of spatial data. The Geospatial and Remote Sensing Certificate allows any MSU students from across the University to receive recognition for mastering geospatial coursework. Both undergraduate and graduate certificate degrees are available for both the Starkville and Online education learners. The certificate comprises 15 hours of coursework in four different areas: geographic information systems (3 credit hours), remote sensing (3 credit hours), advanced geospatial course work (3 credit hours), and geospatial applications (6 credit hours). The successful completion of the GRSC will give students the foundation to utilize geospatial technologies within their field and it will provide the opportunity to promote their geospatial mastery to potential employers or potential graduate programs. Interested graduate students should contact either the graduate coordinator or department head. Students must maintain a GPA of 3.00 for the certificate to be awarded. The graduate committee for all doctoral students must be comprised of at least 50% graduate faculty from within the Department of Geosciences.