

GEOSCIENCES

Degree Requirements

Master of Science (M.S.)

Requirements listed here are in addition to Graduate Council policies listed under GCAC-600 Research Degree Policies. (<https://gradschool.psu.edu/graduate-education-policies/>)

Upon arrival, students will be advised initially by a committee appointed by the associate head for graduate program and research. The committee in turn will designate an interim adviser. Before the end of the first academic year of residence, the student is expected to develop specific academic and research interests so that an appropriate permanent academic adviser and research supervisor may be chosen. The academic adviser and research supervisor are usually the same person, except when the research supervisor is not a member of the geosciences Graduate Faculty. In such a case, a geosciences program family member serves as the academic adviser.

Master's degree students are required to take a minimum of 30 credits at the 400, 500, 600, and 800 level, including at least 18 credits at the 500 to 600 level combined, and a minimum of 6 credits of thesis research (GEO SC 600 or GEO SC 610). The 12 to 16 common degree credits described below satisfy the Graduate School minimum of at least 12 credits in course work in the major program.

As part of the M.S. program, each student is required to complete a thesis. The thesis must be defended in an oral examination administered by an M.S. committee. The thesis must be accepted by the advisers and/or committee members, the head of the graduate program, and the Graduate School.

All graduate students in geosciences are expected to acquire breadth of knowledge in the geosciences, a fundamental and advanced knowledge of their subdiscipline, and skills in the areas of data collection and quantitative analysis. Toward that end, all graduate students must select one of the approved courses in each of the following areas:

1. Geosciences Breadth – 3-4 credits
2. Disciplinary Fundamentals – 3-4 credits
3. Data Gathering – 3-4 credits
4. Quantitative Analysis – 3-4 credits

Code	Title	Credits
Required Courses		
GEO SC 500	Issues in Geosciences	3
<i>Disciplinary Fundamentals</i>		
Select 3-4 credits from the following:		3-4
GEO SC 488	An Introduction to Seismology	
GEO SC 489	Dynamics of the Earth	
GEO SC 502	Evolution of the Biosphere	
GEO SC 518		
GEO SC 519	Mineral Equilibria	
GEO SC 533	Principles of Geochemistry	
GEO SC 542	Quantitative Methods in Hydrogeology	
GEO SC 548	Surface Processes	
GEO SC 585	Sedimentary Geology	
<i>Data Gathering and Interpretation</i>		

Select 3-4 credits from the following: 3-4

GEO SC 410	Marine Biogeochemistry	
GEO SC 413W	Techniques in Environmental Geochemistry	
GEO SC 483	Environmental Geophysics	
GEO SC 508	Mechanics of Earthquakes and Faulting	
GEO SC 558	Multi-channel Seismic Processing and Interpretation	
GEO SC 565	Tectonic Geomorphology	
GEO SC 572	Field Stratigraphy	

Quantitative Analysis

Select 3-4 credits from the following: 3-4

EMCH 524A	Mathematical Methods in Engineering	
GEO SC 514	Data Inversion in the Earth Sciences	
GEO SC 560	Kinetics of Geological Processes	
GEO SC 561	Mathematical Modeling in the Geosciences	
PNG 425	Principles of Well Testing and Evaluation	

Electives 12

Culminating Experience

GEO SC 600	Thesis Research	6
or GEO SC 610	Thesis Research Off Campus	

Total Credits 30

Doctor of Philosophy (Ph.D.)

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Upon arrival, students will be advised initially by a committee appointed by the associate head for graduate program and research. The committee in turn will designate an interim adviser. Before the end of the first academic year of residence, the student is expected to develop specific academic and research interests so that an appropriate permanent academic adviser and research supervisor may be chosen. The academic adviser and research supervisor are usually the same person, except when the research supervisor is not a member of the geosciences Graduate Faculty. In such a case, a geosciences program faculty member serves as the academic adviser.

Continuation in the Ph.D. program is determined by an oral qualifying examination before a qualifying examination committee. Preparation and defense of two research proposals will serve as one means of assessing the student's ability. At least one of these proposals should represent original work by the student, but the other may be an actual dissertation proposal and involve limited initial input from the adviser or others.

Course work in addition to the degree requirements described below will be selected by the student in consultation with his/her committee.

The comprehensive examination is both oral and written. It is administered by the Ph.D. committee after the student has essentially completed course work. To earn the Ph.D. degree, doctoral students must also write a dissertation that is accepted by the Ph.D. committee, the head of the graduate program, and the Graduate School. A final oral defense of the dissertation is required.

All graduate students in geosciences are expected to acquire breadth of knowledge in the geosciences, a fundamental and advanced knowledge of their subdiscipline, and skills in the areas of data collection and

quantitative analysis. Toward that end, all graduate students must select one of the approved courses in each of the following areas:

1. Geosciences Breadth – 3-4 credits
2. Disciplinary Fundamentals – 3-4 credits
3. Data Gathering – 3–4 credits
4. Quantitative Analysis – 3-4 credits

Code	Title	Credits
Required Courses		
GEOSC 500	Issues in Geosciences	3
<i>Disciplinary Fundamentals</i>		
Select 3-4 credits from the following:		3-4
GEOSC 488	An Introduction to Seismology	
GEOSC 489	Dynamics of the Earth	
GEOSC 502	Evolution of the Biosphere	
GEOSC 518		
GEOSC 519	Mineral Equilibria	
GEOSC 533	Principles of Geochemistry	
GEOSC 542	Quantitative Methods in Hydrogeology	
GEOSC 548	Surface Processes	
GEOSC 585	Sedimentary Geology	
<i>Data Gathering and Interpretation</i>		
Select 3-4 credits from the following:		3-4
GEOSC 410	Marine Biogeochemistry	
GEOSC 413W	Techniques in Environmental Geochemistry	
GEOSC 483	Environmental Geophysics	
GEOSC 508	Mechanics of Earthquakes and Faulting	
GEOSC 558	Multi-channel Seismic Processing and Interpretation	
GEOSC 565	Tectonic Geomorphology	
GEOSC 572	Field Stratigraphy	
<i>Quantitative Analysis</i>		
Select 3-4 credits from the following:		3-4
EMCH 524A	Mathematical Methods in Engineering	
GEOSC 514	Data Inversion in the Earth Sciences	
GEOSC 560	Kinetics of Geological Processes	
GEOSC 561	Mathematical Modeling in the Geosciences	
PNG 425	Principles of Well Testing and Evaluation	