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. (http://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 (GEOSC 600 or GEOSC 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

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tr>
<td>GEOSC 500</td>
<td>Issues in Geosciences</td>
<td>3</td>
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**Disciplinary Fundamentals**

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 558 Multi-channel Seismic Processing and Interpretation
- GEOSC 565 Tectonic Geomorphology
- GEOSC 572 Field Stratigraphy

**Quantitative Analysis**

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

**Electives**

12

**Culminating Experience**

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<tr>
<td>GEOSC 600</td>
<td>Thesis Research</td>
<td>6</td>
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<tr>
<td>or GEOSC 610</td>
<td>Thesis Research Off Campus</td>
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**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.
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

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**Disciplinary Fundamentals**

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

**Data Gathering and Interpretation**

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

**Quantitative Analysis**

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