Geology

Degrees Offered

- Master of Science
- Doctor of Philosophy

Nature of the Program

The graduate program in geology provides study opportunities in the following areas:

- Hydrogeology and environmental geology with strengths in ground water flow and modeling; aqueous, contaminant and isotope geochemistry; mine reclamation; and floods and debris flows
- Basin analysis and sedimentary geology with strengths in seismic modeling, basin structures, deposition analysis, sequence stratigraphy, biostratigraphy, diagenesis, and plate tectonics
- Energy geology and geophysics with strengths in the exploration and development of oil, gas, and coal; and environmental impacts of fossil fuel usages
- Paleobiology and paleontology with strengths in macroevolution, paleoecology, and phylogenetics, particularly in relation to arthropods and mass extinctions
- Igneous petrology and volcanology with strengths in arc magmatism and the emplacement of lava flows and pyroclastic currents
- Computational and geochemical analysis

Tracks within the Masters Degree

The Research Track requires student to complete independent scholarly research culminating in a thesis. This track is intended for students interested in a more-traditional research-based graduate degree.

The Professional Studies Track requires students to complete a Professional Development credits/tasks in place of thesis-based research. This track is intended for students looking to obtain additional knowledge and skills for their professional careers in Energy Geology or Environmental Geology.

FACULTY

CHAIR
- Timothy Carr - Ph.D. (Univ. of Wisconsin-Madison)

ASSOCIATE CHAIR FOR GEOLOGY
- Jaime Toro - Ph.D. (Stanford Univ.)

PROFESSORS
- Timothy Carr - Ph.D. (Univ. of Wisconsin-Madison)
  Sedimentology, Petroleum Geology
- Kathleen Benison - Ph.D. (Univ. of Kansas)
  Sedimentology, Stratigraphy, Evaporites
- Dengliang Gao - Ph.D. (Duke Univ.)
  Geophysics, Petroleum
- Jaime Toro - Ph.D. (Stanford Univ.)
  Structural Geology, Tectonics, Energy
- Dorothy Vesper - Ph.D. (Penn State Univ.)
  Geochemistry, karst, hydrogeology
- Timothy Warner - Ph.D. (Purdue Univ.)
  Remote Sensing

ASSOCIATE PROFESSORS
- Shikha Sharma - Ph.D. (Univ. of Lucknow, India)
  Isotope Geochemistry, Biogeochemistry, Energy
- Amy Weislogel - Ph.D. (Stanford Univ.)
  Stratigraphy, Sedimentology, Energy
ASSISTANT PROFESSORS

- Graham Andrews - Ph.D. (Univ. of Leicester)
  Igneous Petrology
- James Lamsdell - Ph.D. (Univ. of Kansas)
  Paleobiology, Paleocology, Macroevolution
- Chris Russinello - Ph.D. (Univ. of Delaware)
  Hydrogeology, coastal processes

TEACHING ASSOCIATE PROFESSOR

- Joseph Lebold - Ph.D. (West Virginia Univ.)
  Earth Science Education, Stratigraphy, Paleocology

PROFESSORS EMERITI

- Robert Behling - Ph.D. (Ohio State Univ.)
- Alan Donaldson - Ph.D. (Pennsylvania State Univ.)
- Joe Donovan - Ph.D. (Penn State)
- Thomas Kammer - Ph.D. (Indiana Univ.)
- J Steven Kite - Ph.D. (Univ. of Wisconsin-Madison)
- Henry Rauch - Ph.D. (Pennsylvania State Univ.)
- John (Jack) Renton - Ph.D. (West Virginia Univ.)
- Robert Shumaker - Ph.D. (Cornell Univ.)
- Richard Smosna - Ph.D. (Univ. of Illinois)
- Thomas Wilson - Ph.D. (West Virginia Univ.)

Admissions

PROCEDURES AND PREREQUISITES

Applicants seeking admission and financial support for the fall semester should apply by February 1. For spring semester, apply by October 1.

GRADUATE ADMISSION REQUIREMENTS FOR ALL GRADUATE PROGRAMS

- Transcripts from all universities attended
- An undergraduate GPA of 3.0 or higher
- Scores of the Graduate Record Examination
- A minimum of two letters of reference (3 preferred)
- Statement of goals. MS applicants must identify their intended Track (Research or Professional Studies)
- International students must fulfill the English Language Proficiency requirements of WVU (https://graduateadmissions.wvu.edu/information-for/international-students/).

ADDITIONAL ADMISSION REQUIREMENTS FOR THE MASTERS PROGRAM WITH A PROFESSIONAL STUDIES TRACK

- B.A. or B.S. degree in a STEM or relevant field that includes coursework in general physics, chemistry, and calculus. Completed coursework in geology is preferred

ADDITIONAL ADMISSION REQUIREMENTS FOR THE MASTERS PROGRAM WITH A RESEARCH TRACK

Students seeking admission to the M.S. program with a Research Track must complete the equivalents of the geology and allied science and mathematics courses required for the B.S. in Geology at WVU:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>GEOL 284</td>
<td>Mineralogy</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 285</td>
<td>Introductory Petrology</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 311</td>
<td>Stratigraphy and Sedimentation</td>
<td>4</td>
</tr>
<tr>
<td>GEOL 341</td>
<td>Structural Geology</td>
<td>4</td>
</tr>
<tr>
<td>GEOL 404</td>
<td>Geology Field Camp</td>
<td>6</td>
</tr>
<tr>
<td>MATH 155</td>
<td>Calculus 1</td>
<td>4</td>
</tr>
<tr>
<td>MATH 156</td>
<td>Calculus 2</td>
<td>4</td>
</tr>
</tbody>
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At least 4 courses for the following 3 subject areas:
Similar courses from other universities or relevant experiences may be substituted if approved during admission review. A requirement may be waived by the committee if the student can demonstrate competence in that subject area.

Master of Science

Degree Requirements

• Completed Plan of Study
• Credit Hours: Students are required to complete a minimum of 32 graduate credit hours at the 400, 500 or 600 level
• Grade Point Average: Students must earn minimum overall GPA of a 3.0 and a minimum GPA of 3.0 in coursework applied to their graduate program.

• Degree Requirements:
  • Complete a plan of study
  • Complete 24 formal (graded) course credit-hours
  • At least 15 of the 24-required formal course credits taken from GEOL and GEOG
  • Courses outside of GEOL and GEOG to be approved by the student's advisor unless they are on the approved list of outside courses

• Completion Requirements: students must select a completion track for a total of 8 credits. Available tracks are the
  • Research track: students must complete a Master's thesis including:
    • Thesis Proposal Defense
    • Thesis Defense
  • Professional studies track: students have the option of completing an internship, completing a project with a faculty member, taking the ASBOG Fundamental exam (first step in professional licensure), additional coursework, or a combination of these options.

CURRICULUM REQUIREMENTS

Core Requirements

Any GEOL courses at the 400, 500 or 600 level*

Electives

Select three courses from the list below:

Any additional GEOL courses at the 400, 500 or 600 level**

AEM 401 Environmental Microbiology
AGRN 417 Soil Genesis and Classification
AGRN 455 Reclamation of Disturbed Soils
AGRN 552 Pedology
ENVP 460 Environmental Impact Assessment
ENVP 515 Hazardous Waste Training
ENVP 555 Environmental Sampling and Analysis
FHYD 444 Watershed Management
PNGE 632 Reservoir Simulation and Modeling
PNGE 735 Advanced Formation Evaluation
RESM 444 Advanced GIS for Natural Resource Management
RESM 441 Introduction Geographic Information Systems Natural Science
RESM 480 Environmental Regulation
RESM 540 Geospatial Modeling
RESM 545 Spatial Hydrology and Watershed Analysis
STAT 511 Statistical Methods 1
STAT 512 Statistical Methods 2
### Doctor of Philosophy

#### Degree Requirements

- **Credit Hours:** Students are required to complete a minimum number of nine credit hours of formal coursework at the 400, 500, 600 or 700 level. Additionally, students will complete a minimum of 10 additional credits in research, colloquium, and seminar.

- **Grade Point Average:** Students must maintain a minimum GPA of 3.0 overall and in the major.

#### Curriculum Requirements

<table>
<thead>
<tr>
<th>Core Courses:</th>
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<tbody>
<tr>
<td>GEOL 699</td>
<td>Graduate Colloquium (1 credit, taken twice)</td>
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<tr>
<td>GEOL 697</td>
<td>Research (at least 6 credits)</td>
</tr>
<tr>
<td>GEOL 799</td>
<td>Graduate Colloquium (1 credit, taken twice)</td>
</tr>
</tbody>
</table>

- **Formal Coursework**

  Graduate coursework at the 400, 500, 600 or 700 level*  

| Total Hours | 9 |

* Excludes GEOL 600, 697, 698, 700, 797, and 798. Courses will be selected in consultation with an advisor.

#### Degree Progress - Masters

- Students whose GPA falls below 3.0 will be put on probation for one semester. If they remain below 3.0 for a second semester, they are dismissed from the program.
- Withdrawing from classes is only permitted with the permission of the student's advisor or the Geology Graduate Program Committee.
- Students must complete annual progress reports (see graduate handbook for details)
- For students completing the Research track, deadlines are below: (for January starting students)
  - **Proposal defense:**
    - Target date: May 1-Year 2 (August 1-Year 2);
    - Probation date: August 1-Year 1 (December 1-Year 1);
    - Funding termination date: May 1-Year 2 (August 1-Year 2)
b. Thesis defense:
   • Target date: May 1-Year 2 (August 1-Year 2);
   • Probation date: May 1-Year 2 (August 1-Year 2)

Degree Progress - Ph.D.
   • Students whose GPA falls below 3.0 will be put on probation for one semester. If they remain below 3.0 for a second semester, they are dismissed from the program.
   • Withdrawing from classes is only permitted with the permission of the student's advisor or the Geology Graduate Program Committee.
   • Students must complete annual progress reports (see graduate handbook for details).
   • Deadlines are below: (for January starting students)
     a. Preliminary Exam:
        • Target date: May 1-Year 1 (December 1-Year 1);
        • Dismissal date (re-takes only): August 1-Year 1 (December 1-Year 2)
     b. Proposal/Comprehensive (Candidacy) Exam:
        • Target date: May 1-Year 2 (December 1-Year 2);
        • Probation date: December 1-Year 3 (May 1-Year 3);
        • Funding termination date:  May 1-Year 3 (December 1-Year 3)
     c. Dissertation Defense
        • Target date: May-Year 4 (December-Year 4)

Major Learning Outcomes

GEOLOGY

Students obtaining a masters in Geology with a Research Track will be able to:

• Communicate geologic concepts orally and in writing
• Apply research skills to analyze geologic questions
• Propose, produce and defend original research in their field of study
• Explain geologic principles as they relate to their area of research

Students obtaining a masters in Geology with a Professional Studies Track will be able to:

• Communicate geologic concepts orally and in writing
• Demonstrate knowledge in either energy geology or environmental geology
• Apply geological knowledge and methods to (1) find, develop and produce energy resources particularly natural gas, natural gas liquids and oil; OR, (2) to assess environmental issues

Students obtaining a doctorate in geology degree will be able to:

• Communicate geologic concepts orally and in writing
• Apply research skills to analyze geologic questions
• Propose, produce and defend original research of publishable quality
• Explain geologic principles as they relate to their area of research
• Effectively communicate the state of knowledge in their research area
• Identify research questions in geology
• Critique and assess peer-reviewed literature