

GEOLOGICAL SCIENCES (PHD)

Graduate School

Program Website (<https://www.engineering.cornell.edu/eas/phd-programs/>)

CIP: 40.0601 | HEGIS: 1914.00 | NYSED: 13467

Graduate Field

Geological Sciences (<https://gradschool.cornell.edu/academics/fields-of-study/field/geological-sciences/>)

Program Description

The geological science program is designed to give students broad training in the basic sciences as well as field, theoretical, and practical experience through research in their specialty. The program has particular strengths in geophysics, geochemistry and petrology, structural geology, sedimentology, marine ecology, and energy resources. However, the exceptional flexibility of Cornell's graduate program provides ample opportunity for students to work across disciplinary areas. For example, arrangements exist for study of marine ecology, water resources, and various branches of applied geological science. Faculty members in other fields or divisions offer interdisciplinary courses including planetology and extraterrestrial geology, paleobotany, ecology and systematics, biogeochemistry, limnology, soil genesis, soil mineralogy, soil and rock mechanics, remote sensing, environmental fluid mechanics and hydrology, fluid dynamics, elasticity, geotechnical and earthquake engineering, regional planning, hydraulics and hydrology, and materials science and engineering.

At least one minor subject outside the field is required for the doctoral degree. Before the end of their third semester in residence, all students must take a qualifying examination. This exam, an addition to those required by the Graduate School, determines the candidate's fitness for undertaking advanced studies and enables the Special Committee to plan programs that will make the student familiar with the requisite knowledge in the chosen areas.

Research and Study Opportunities

Research programs are being conducted by the field in such diverse areas as fluid cycling in subduction zones; space-based geodetic studies of faults, volcanoes, and anthropogenic deformation; interaction of tectonics, topography, and climate in major mountain systems; investigation of igneous rocks in arc systems; tectonics, seismology, sedimentation, and geomorphology of the central Andes; planetary science, comparative planetology and solar system exploration; seismic reflection profiling of the deep crust and upper mantle; mechanics and properties of subduction zone megathrusts and other large faults; induced earthquakes; using seismic signals of earth noise to understand atmospheric and solid-earth phenomena; development and application of Earth System models; response of marine ecosystems to climate variability and change; surface responses to extreme precipitation; dynamics and mechanics of the lithosphere and asthenosphere; application of geophysical techniques to environmental and archaeological problems; marine ecological and paleontological studies; sedimentology and diagenesis of mudstones; dynamics of marine ecosystems and organisms from plankton to whales using remote sensing and other tools; volcanic hazard assessment; biogeochemistry, soil development, and dynamics in young volcanic terrains; geochemistry

and geophysics of oceanic islands, mid-ocean ridges and island arcs; and remote sensing of seismic and volcanic deformation of the crust.

The field maintains working agreements with institutions worldwide to facilitate research projects in those areas or to work on materials especially accessible there. Current and recent graduate students have carried out field investigations in such diverse places as Alaska, the Pacific Northwest, Honduras, Chile, Argentina, Hawaii, Puerto Rico, Monterey Bay (California), Papua New Guinea, Ethiopia, and Tibet. The Paleontological Research Institution, located near the campus, has world-renowned facilities and collections available to students interested in paleontology.

Concentrations

- Economic geology
- Engineering geology
- Environmental geophysics
- General geology
- Geobiology
- Geochemistry and isotope geology
- Geohydrology
- Geomorphology
- Geophysics
- Geotectonics
- Marine geology (minor)
- Mineralogy
- Ocean science and technology
- Paleontology
- Petroleum geology
- Petrology
- Planetary geology
- Precambrian geology
- Quaternary geology
- Rock mechanics
- Sedimentology
- Seismology
- Stratigraphy
- Structural geology

Program Information

- Instruction Mode: In Person
- Location: Ithaca, NY
- Minimum Credits for Degree: 158

Program Requirements

- Minimum Semesters for Degree: 10

Graduate School Milestones

- Responsible Conduct of Research Training: Required
- Open Researcher and Contributor ID (ORCID): Required
- Student Progress Reviews (SPR) begin: First Year
- Examination for admission to candidacy (A Exam): Spring of second year
- Defense of Dissertation (B Exam): Spring of fifth year

Field Specific Milestones

- Qualifying Examination (Q Exam): Spring of first year

Course Requirements

- Course requirements are determined by the student's Special Committee.
- Enrollment in a GRAD research course or the equivalent field specific research course is expected of all students.

University Graduation Requirements Requirements for All Students

In order to receive a Cornell degree, a student must satisfy academic and non-academic requirements.

Academic Requirements

A student's college determines degree requirements such as residency, number of credits, distribution of credits, and grade averages. It is the student's responsibility to be aware of the specific major, degree, distribution, college, and graduation requirements for completing their chosen program of study. See the individual requirements listed by each college or school or contact the college registrar's office (<https://registrar.cornell.edu/service-resources/college-registrar-directory/>) for more information.

Non-academic Requirements

Conduct Matters. Students must satisfy any outstanding sanctions, penalties or remedies imposed or agreed to under the Student Code of Conduct (Code) or Policy 6.4. Where a formal complaint under the Code or Policy 6.4 is pending, the University will withhold awarding a degree otherwise earned until the adjudication process set forth in those procedures is complete, including the satisfaction of any sanctions, penalties or remedies imposed.

Financial Obligations. Outstanding financial obligations will not impact the awarding of a degree otherwise earned or a student's ability to access their official transcript. However, the University may withhold issuing a diploma until any outstanding financial obligations owing to the University are satisfied.

Learning Outcomes

A candidate for a doctoral degree in Geological Sciences is expected to demonstrate mastery of knowledge in a sub-discipline within the broader domain of earth sciences and to synthesize and create new knowledge, making an original and substantial contribution to the sub-discipline in a timely fashion.

Proficiencies:

- Make an original and substantial contribution to one of the sub-disciplines within earth sciences:
 - Think originally and independently to develop concepts and/or methodologies
 - Identify new research opportunities within their field.
- Demonstrate advanced research skills:
 - Synthesize existing knowledge, identifying and accessing appropriate resources and other sources of relevant information, and critically analyze and evaluate their own findings and those of others
 - Master application of existing appropriate research methodologies, techniques, and technical skills

- Utilize both qualitative and quantitative approaches
- Communicate in a style appropriate to the discipline.
- Demonstrate commitment to advancing the values of scholarship:
 - Keep abreast of current advances within their sub-discipline of earth science and related areas
 - Show commitment to personal professional development through engagement in professional societies, publication, and other knowledge transfer modes
 - Show commitment to creating an environment that supports learning—through teaching, collaborative inquiry, mentoring, organization of community learning experiences, or demonstration.
- Demonstrate professional skills:
 - Advance ethical standards in the practice of earth sciences
 - Listen, give, and receive feedback effectively.