GEOLOGICAL SCIENCES (GRADUATE FIELD)

Program Website (http://www.eas.cornell.edu/)

Field 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.

Data and Statistics

- Research Master's Program Statistics (https://gradschool.cornell.edu/about/program-metrics-assessments-and-outcomes/research-masters-program-statistics/?SelectGradField=30)
- Doctoral Program Statistics (https://gradschool.cornell.edu/about/program-metrics-assessments-and-outcomes/doctoral-program-statistics/?SelectGradField=30)

Field Manual

- Manual (https://www.eas.cornell.edu/eas/programs/graduate-programs/graduate-student-handbook/)

Subject and Degrees

Earth Science and Engineering

No results were found.

Geological Sciences

- Geological Sciences (MS) (https://catalog.cornell.edu/programs/geological-sciences-ms/)
- Geological Sciences (PhD) (https://catalog.cornell.edu/programs/geological-sciences-phd/)

Concentrations by Subject

Earth Science and Engineering

- earth science and engineering

Geological Sciences

- 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

Faculty

Geoffrey A. Abers (http://www.eas.cornell.edu/faculty-directory/geoffrey-abers/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: geophysics; geotectonics; seismology
- **Research Interests**: Earthquake seismology, earth structure, material exchange between the earth surface and deep interior, and deformation at active plate boundaries; emphasis on deep roots of volcanoes and on fault systems generating great earthquakes

Chloe Fanny Arson (http://www.engineering.cornell.edu/faculty-directory/chloe-arson/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: engineering geology; geophysics; rock mechanics
- **Research Interests**: Damage and healing mechanics • Fracture and breakage mechanics Poromechanics • Homogenization and multi-scale modeling Computational geomechanics • Machine Learning • Bio-inspiration

Toby R Ault (http://www.eas.cornell.edu/faculty-directory/toby-r-ault/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: Quaternary geology
- **Research Interests**: paleoclimatology/quaternary geology

Grace Barcheck (http://www.engineering.cornell.edu/faculty-directory/grace-barcheck/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: geophysics; rock mechanics; seismology
- **Research Interests**: Glaciology, earthquakes, seismology, geophysics, rock mechanics

Riley Tayor Culberg (http://www.engineering.cornell.edu/faculty-directory/riley-culberg/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: environmental geophysics; geohydrology; geophysics; planetary geology
- **Research Interests**: Glaciology, ice-penetrating radar, geophysics, geohydrology, planetary geology, environmental geophysics

Louis A Derry (http://www.eas.cornell.edu/faculty-directory/louis-derry/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: general geology; geochemistry and isotope geology; ocean science and technology
- **Research Interests**: low-temperature geochemistry; isotope geochemistry; biogeochemical cycles

Gregory P. Dietl (http://fellows.atkinson.cornell.edu/view.php?NetID=gpd3)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: ocean science and technology; paleontology
- **Research Interests**: paleontology

Nicole Marie Fernandez (http://www.eas.cornell.edu/faculty-directory/nicole-fernandez/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: geochemistry and isotope geology; geohydrology; geomorphology
- **Research Interests:** https://www.eas.cornell.edu/faculty-directory/nicole-fernandez

Patrick Fulton (http://www.eas.cornell.edu/faculty-directory/patrick-fulton/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: geohydrology; geophysics; ocean science and technology; rock mechanics; structural geology
- **Research Interests:** earthquake physics, hydrogeology, fluid flow and heat transport, geomechanics, fault zone drilling, scientific ocean drilling, borehole observations, and sub-seafloor monitoring

Maria Alejandra Gandolfo Nixon (http://cals.cornell.edu/maria-alejandra-gandolfo-nixon/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: geobiology; paleontology; sedimentology
- **Research Interests**: paleobiology, evolution of terrestrial ecosystems based on the plant fossil record, evolution of Southern Hemisphere paleofloras, Patagonian paleoecosystems, seed plant evolution

Esteban Gazel (http://www.eas.cornell.edu/faculty-directory/esteban-gazel/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: general geology; geochemistry and isotope geology; petrology; planetary geology
- **Research Interests**: geochemical record of magmatic processes, intraplate volcanism, subduction processes, crustal generation and evolution, deep earth geochemical reservoirs, material exchange between the earth

Alexander Hayes (http://astro.cornell.edu/alexander-hayes/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: planetary geology

Brandon P Hedrick (http://www.vet.cornell.edu/brandon-p-hedrick-phd/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences:* geobiology; paleontology
- **Research Interests:** Dr. Hedrick is an evolutionary biologist, comparative anatomist, and ecologist interested primarily in questions relating to ecomorphology and macroevolutionary trends. To address these questions, the Hedrick lab works on the functional morphology of a wide variety of vertebrate groups, including sensory, musculoskeletal, and reproductive systems. They commonly use micro-computed tomographic imaging, contrast-enhanced imaging

(e.g., diceCT), evolutionary and biogeographical modeling, and geometric morphometrics.

Megan Elizabeth Holycross (http://www.eas.cornell.edu/faculty-directory/megan-holycross/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: general geology; geochemistry and isotope geology; mineralogy; petrology; planetary geology
- **Research Interests:** mass transport and kinetic processes in Earth systems, planetary redox cycles, trace element geochemistry and thermobarometry, high temperature and pressure experimentation

David Lee Hysell (http://www.engineering.cornell.edu/faculty-directory/david-lee-hysell/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: geophysics
- **Research Interests**: geophysics; upper atmosphere physics; radar remote sensing; space plasmas

Teresa Eileen Jordan (http://www.eas.cornell.edu/faculty-directory/teresa-eileen-jordan/)

- **Campus**: Ithaca - (Graduate School Professor)
- **Concentrations**: *Geological Sciences*: general geology; geotectonics; ocean science and technology; petroleum geology; sedimentology; stratigraphy
- **Research Interests**: stratigraphy; sedimentology; tectonics; geomorphology

Kade Keranen (http://www.engineering.cornell.edu/faculty-directory/kade-keranen/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: geophysics; geotectonics; seismology
- **Research Interests**: Tectonics at active plate boundaries; structure of the crust and lithosphere; induced earthquakes; hazards and resources

Rowena B. Lohman (http://www.eas.cornell.edu/faculty-directory/rowena-b-lohman/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: geophysics
- **Research Interests**: geophysics

Natalie M. Mahowald (http://www.eas.cornell.edu/faculty-directory/natalie-m-mahowald/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: geochemistry and isotope geology
- **Research Interests**: global interactions between climate and bio-geochemistry through aerosols

Sturt W. Manning (http://classics.cornell.edu/sturt-manning/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: geochemistry and isotope geology; Quaternary geology
- **Research Interests:** dendrochronology; dendroclimatology; dendrochemistry in the Mediterranean, Near East and Northeast North America; radiocarbon dating and calibration; Aegean, Cypriot and East Mediterranean history

Gregory C. McLaskey (http://www.cee.cornell.edu/faculty-directory/greg-mclaskey/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: geophysics; rock mechanics; seismology
- **Research Interests**: Earthquake source physics, laboratory earthquakes, seismology, friction, and piezoelectric sensors.

Michael T Mellon (http://astro.cornell.edu/)

- **Campus:** Ithaca
- **Concentrations:** *Geological Sciences:* planetary geology
- **Research Interests:** Planetary science, geomorphology, volatiles, climate change, surface-atmosphere interactions, and cryospheric processes

Bruce Monger (http://www.eas.cornell.edu/faculty-directory/bruce-monger/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: ocean science and technology
- **Research Interests**: Satellite remote sensing; biological oceanography

Carolina Patricia Munoz Saez (http://www.eas.cornell.edu/faculty-directory/carolina-munoz-saez/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: economic geology; general geology; geochemistry and isotope geology; geohydrology; geophysics; planetary geology; Quaternary geology
- **Research Interests**: Geological processes involving fluids, including problems in transport of critical metals in hydrothermal environments, hydrothermal/volcanic evolution, life in extreme environments, quaternary deposits, and paleoclimate.

Karin Elizabeth Olson Hoal (http://www.eas.cornell.edu/faculty-directory/karin-elizabeth-olson-hoal/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: economic geology; general geology; mineralogy; petrology; Precambrian geology
- **Research Interests:** integrated mineral projects, uncovering new resources in mine waste, predicting environmental impacts, diamonds

Matthew E. Pritchard (http://www.eas.cornell.edu/faculty-directory/matthew-pritchard/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: geophysics; geotectonics; planetary geology; seismology
- **Research Interests**: active tectonics/earthquake cycle; volcanology; planetary geophysics

Sara C. Pryor (http://www.eas.cornell.edu/faculty-directory/sara-c-pryor/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: geochemistry and isotope geology; geohydrology; ocean science and technology; seismology
- **Research Interests**: Development and application of coupled earth system models. Biogeochemical cycling. Seismic detection of atmospheric phenomena. Extreme events and atmosphere-surface coupling.

Matthew Charles Reid (http://www.cee.cornell.edu/faculty-directory/matthew-charles-reid/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: geobiology; geochemistry and isotope geology; geohydrology
- **Research Interests**: environmental biogeochemistry, fate and transport of contaminants including arsenic and nitrogen, couplings between physical-chemical and microbiological processes

Robert M. Ross (http://www.priweb.org/staff-directory/robert-ross/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: general geology; geobiology; paleontology; Quaternary geology; sedimentology; stratigraphy
- **Research Interests**: evolutionary paleobiology; paleoceanography; geoscience education; micropaleontology

Seth Avram Saltiel (http://www.eas.cornell.edu/eas/faculty-directory/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: geophysics; rock mechanics; seismology
- **Research Interests**: As an experimental geophysicist, my research interests focus on the frictional and seismic behavior of geologic interfaces under shear. My work includes applications to: tectonic faults, glacier beds, fractures that control permeability and induced seismicity in subsurface energy, water, and waste reservoirs, landslide, rock slope, and avalanches.

Britney E. Schmidt (http://schmidt.eas.gatech.edu/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: geobiology; geophysics; ocean science and technology; planetary geology
- **Research Interests**: Astrobiology: Rise and detection of habitable systems; Icy shell and ocean dynamics of icy moons and planets, especially Europa; Ice-ocean interactions on Earth and Europa; Glaciology of Earth's ice shelves and glacier tongues; Evolution of water-rich asteroids and other small bodies; History of water in the early solar system

Tammo S Steenhuis (http://cals.cornell.edu/tammo-steenhuis/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: geohydrology
- **Research Interests**: geohydrology

Jefferson W. Tester (http://www.cheme.cornell.edu/faculty-directory/jefferson-w-tester/)

- **Campus**: Ithaca
- **Concentrations**: *Geological Sciences*: economic geology; engineering geology; geochemistry and isotope geology; geohydrology; petroleum geology; rock mechanics
- **Research Interests**: geothermal energy; advanced drilling technology; unconventional fossil fuel upgrading; carbon capture and sequestration; water purification and use