EARTH SCIENCES, PHD

Contact

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Faculty

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Program Description

Graduate study in the Department of Earth and Environmental Sciences offers students opportunities for field-based geological and geophysical research worldwide. Ongoing research in the department is focused primarily in the areas of solid earth sciences/tectonics/crustal evolution, climate science and water resources/hydrology. The department is housed in the William B. Heroy Geology Laboratory, which contains state-of-the-art analytical and computing facilities, modern well-equipped teaching spaces. All faculty are engaged in research and teaching.

The department typically has a combination of students pursuing either the M.S. or Ph.D. degree. Several of our faculty-led research projects are large collaborative, multi-institutional, multi-national programs that afford our graduate students' opportunities to work in diverse parts of the world with teams of internationally recognized scholars. Department faculty and graduate students are currently pursuing field studies worldwide.

Admission

Applicants must hold a minimum of a B.S. or B.A. degree. Incoming students are expected to have two semesters of the following courses: calculus, chemistry, and physics or biology, as well and at least three Earth science courses, such as: Paleobiology, Sedimentology, Mineralogy, Structural Geology, Geochemistry, Geophysics, Climatology, Geomorphology and/or Hydrogeology. Any missing coursework must be completed during the first two years of graduate study. Students are strongly encouraged to have participated in an approved summer field course or comparable field experience. Substitutions may be granted upon petition of the department. The department only admits students that have identified faculty advisors, so it is recommended prospective students contact potential advisors in your field of interest prior to submitting your application. GRE scores are now optional for graduate admission and departmental support (teaching and research assistantships). We evaluate applications based on fit with your advisor, grades and GPA, coursework, personal statement, research experience, and letters of recommendation. International/non-native English speakers must present scores from one of the Syracuse University approved proficiency examinations. While we require a minimum composite TOEFL score of 85 and no sub-score below 20, competitive applicants typically have scores > 100.

Degree Programs

The Department offers programs of graduate study leading to the M.A., M.S., and Ph.D. Minimum requirements for each degree are an average GPA of 3.0 in major subjects and an overall average of 2.8.

Students who wish to continue graduate study toward a Ph.D. in Earth Sciences following a master's degree must submit a Syracuse University Graduate School application form, including letters of reference, to the Department.

Graduate Awards

Graduate students are expected to pursue their studies energetically and to complete their advanced degree work without undue delay. Financial support typically will be given to a student for four semesters at the master's level or eight semesters in the Ph.D. program.

Graduate Scholarships Awarded to students with superior qualifications, provide, in most cases, full tuition for academic year.

Graduate Teaching Assistantships

Offered to some Graduate Scholarship recipients; teaching assistantships are 9-month appointments that average no more than 20 hours of work per week; Students receive a stipend in addition to tuition scholarship for up to 24 credits per year as needed.

Graduate Research Assistantships

Offered to some Graduate Scholarship recipients; no more than 20 hours per week (9 to 12 months); a stipend in addition to 24 tuition scholarship credits per year as needed. Students must be in good standing with no missing or incomplete grades: have made progress in completing core requirements.

Syracuse University Graduate Fellowships

A stipend for 9 months of full-time study; 9 credit hours for each of the fall and spring semesters and 6 credits for summer, for a total of 30 credit hours per academic fellowship.

Department Research Support

The Department has various funds available to support graduate student travel and research.

Facilities

The Heroy Geology Laboratory has well-equipped laboratories and graduate student offices. The department houses state-of-the-art workstation-based seismic data processing, GIS, and image-processing facilities; first-class laboratory space for clean and ultra-clean geochemistry. The department hosts two regional user facilities - the Electron Microprobe Lab (with a Cameca SXFive instrument, plus a Renishaw Raman Spectrometer) and the Multi-Sensor Core Logging Lab. Also housed in Heroy are the stable isotope geochemistry lab, the paleoclimate dynamics lab, a low-temperature geochemistry lab, a water chemistry lab and a water dynamics lab. Amongst other instrumentation are a scanning electron microscope, a number of unmanned aerial vehicles (drones) with various cameras, geophysical equipment such as ground-penetrating radar and resistivity systems, and a 384-core computing cluster. The department also has a range of sample preparation facilities.

Student Learning Outcomes

1. Conduct independent research in the Earth and Environmental Sciences at the specialist level
2. Present and communicate scientific information to a general audience through undergraduate teaching of laboratories and recitations
3. Analyze and evaluate research results

4. Communicate scientific research in writing at the specialist level
5. Describe fundamental concepts in earth sciences relevant to the area of specialization

Ph.D. in Earth Sciences

Forty-eight total graduate credit hours are required. The following course work towards the 48 total graduate credits are required with exception for students with M.S.

Ph.D. students coming to the program **without** a M.S. must take at least 36 credits in graduate coursework that includes the Foundations and Graduate Scope of Earth Sciences 9-crediit blocks. The remaining 18 credits will comprise coursework numbered 500 and higher. The remaining 12 credits are dissertation credits (EAR 999 Dissertation). The Ph.D. candidate must pass an oral qualifying examination and must give an oral defense of the written dissertation.

Ph.D. students coming to the program **with** a M.S. may transfer up to 30 credit hours. An additional 18 credit hours are required. Incoming students already holding an M.S. degree must complete the **Foundations 9-credit block** at Syracuse University, minus the Numerical Skills requirement if they have prior equivalent coursework. Prior coursework from the M.S. degree may also count toward the **Graduate Scope of Earth Sciences 9-credit block** requirement. All remaining credit hours must be in graduate coursework, with the balance made up by dissertation credits.

Foundations (9 Credits)

Practicum and Communication (4 Credits)

- EAR 616 Practicum in Earth and Environmental Scientific Communication 2 credit(s)
  and
- EAR 636 Foundations of Geosciences
  and
- EAR 634 Professional Development

1 Numerical Skills Lectures Course: (3 Credits)

- EAR 602 Numerical Methods in Geosciences 3 credit(s)
  or
- EAR 609 Environmental Data Science 3 credit(s)
  or
- Other numerical/coding course approved by the graduate advisory committee

Discipline-Specific Seminar Course (2 Credits)

- EAR 612 HydroReads 1 credit(s) **(1 credit, repeated once)**
  or
- EAR 628 PaleoX Research Seminar 1 credit(s) **(1 credit, repeated once)**
  or
- EAR 666 The SESSion - Solid Earth Seminar Series 1 credit(s) **(1 credit, repeated once)**

Graduate Scope of Earth Sciences (9 Credits)

1 cross-disciplinary course in the Earth System Sciences: (3 credits)

courses that are relevant across all facets of the Earth Sciences

Code	Title	Credits
EAR 610	Applications of GIS in the Earth Sciences	3
EAR 617	Geochemistry	3
EAR 622	Applications of Electron Probe Microanalysis	3
EAR 623	Stable Isotope Geochemistry	3

2 courses chosen from 2 of the 3 department disciplinary areas: (6-7 credits)

cross-cutting courses only count once

Solid Earth/Geodynamics

Code	Title	Credits
EAR 603	Geomorphology	3
EAR 608	Sedimentary Basin Analysis	3
EAR 618	Petrology	4
EAR 631	Plate Tectonics	3
Other relevant course approved by the graduate advisory committee		

Ancient Climates and Ecosystems

Code	Title	Credits
EAR 607	Climate Change and Human Origins	3
EAR 614	The Holocene: Climate and Environmental Change	3
EAR 615	Introduction to Climate Dynamics	3
EAR 629	Topics in Paleobiology	3
EAR 655	Geochemical Patterns in the History of Earth and Life	3
Other relevant course approved by the graduate advisory committee		

Water Science

Code	Title	Credits
EAR 601	Hydrogeology	3
EAR 603	Geomorphology	3
EAR 619	Environmental Aqueous Geochemistry	3
EAR 620	Contaminant Hydrogeology	3
Other relevant course approved by the graduate advisory committee		
EAR 665	Groundwater Modeling	3