

MASTER OF ARTS IN EARTH AND ENVIRONMENTAL SCIENCES

The Department of Earth and Environmental Sciences offers a program leading to the degree of Master of Arts in Earth and Environmental Sciences. This program is designed for students who desire further training prior to initiation of a doctoral program at another university or for whom the master's degree will be the terminal degree. Graduate students are offered a unique opportunity for accelerated and personal instruction in a small department setting with strengths in geology, volcanology, ocean sciences, planetary science, and environmental science. All admitted students are offered a full-tuition waiver, stipend, and benefits for this two-year program.

COURSES

Students typically take six upper-level science or math course credits (of which at least four must be in E&ES) and two MA thesis research credits (E&ES549 and E&ES550). Based on a student's background and research interests, the thesis committee will decide on the program of study, which may include increasing or decreasing the number of required courses. Students who enter the MA program with greater than eight upper-level science or math courses (the minimum necessary for a Wesleyan E&ES BA) may use those courses in place of Wesleyan MA credits. Students must earn a minimum of six credits (including the two MA thesis research credits) at Wesleyan. All students are expected to enroll in a graduate pedagogy course in the first semester of enrollment and E&ES557, Research Discussion in Earth and Environmental Sciences, each semester it is offered.

Full-time graduate students are expected to complete all courses with a grade of B- or better. Failure to achieve these minimal expectations may result in dismissal from the program. All degree-seeking graduate students are required to register for at least one credit in each semester that they are enrolled in the university.

LANGUAGE REQUIREMENT

There is no language requirement for the MA in Earth and Environmental Sciences.

PROGRESS AND QUALIFYING EXAMS

Qualifying Exam. Competence in general knowledge about the Earth and environmental sciences will be assessed by a written examination taken after the end of the second semester. The thesis advisor, in concert with the E&ES faculty, will construct several questions. The student will then have two days to answer these questions. The student can use any written source for guidance ("open book" format), and each answer should not exceed one page (single-spaced). The committee and any interested E&ES faculty will then meet with the student to have a 30-minute conversation about the questions and answers. Based on the outcome of the exam, the committee may suggest coursework or independent study on particular topics.

TEACHING

FUNDING

Upon admission, graduate students are typically offered one 9-month and one 12-month stipend. The terms of the teaching stipend require that the student devote approximately 10 hours per week on departmental responsibilities, such as driving the departmental vans, assisting in laboratory maintenance, or teaching assistantships. Teaching assistants are assigned specific duties by their supervising faculty. Duties may include the supervision of laboratories, assisting the faculty in lecture preparation, providing help sessions, and grading.

Instructional holidays and university breaks apply to academic course meetings, but not necessarily to research. Be aware that the faculty uses much of these breaks to perform research as they have other commitments during the academic year. As a student's research often involves close collaboration with the faculty, graduate students will commonly devote university breaks to research. Students' vacations should be planned with the faculty advisor to ensure continuity of research.

Graduate students are expected to fully participate in the scholarly activities in the department, including teaching opportunities, attending departmental seminars, and presenting their own work to the Wesleyan and scientific communities.

PRACTICAL INFORMATION

Graduate Office. Each student has access to the shared graduate student office (SC 307). A telephone is available there for local calls. Some students may have their desk in one of the laboratories, depending on their research topic.

RESEARCH

Conducting original research is an important component of graduate studies. Upon arrival, students are expected to discuss their research interests with the E&ES faculty. Students should identify a project and advisor in the course of their first semester so that they can start their research as soon as possible. Students must realize that they will spend much of their time on the chosen research project, so they should ensure that the topic indeed represents their interests.

Areas of faculty specialization (also check faculty webpages):

- Barry Chernoff: Systematics and biogeography of freshwater fishes of Latin America; morphological evolution; conservation of aquatic ecosystems
- Kim Diver: Island biogeography, Geographic Information Systems (GIS)
- Martha S. Gilmore: Planetary geomorphology; remote sensing of Mars, Venus, southwest U.S., and Long Island Sound
- James Greenwood: Cosmochemistry, hydrogen, oxygen and sulfur isotopic systematics of lunar rocks, chondrites and martian meteorites, Mars analogue studies in St. Lucia
- Tim Ku: Aqueous geochemistry; isotope geochemistry; the biogeochemistry of marine and terrestrial sediments of the tropics (Panama, St. Lucia) and North America
- Suzanne O'Connell: Sedimentology; marine geology, paleoceanography/ climate change, continental margin sedimentology in the North Atlantic and Southern Oceans
- Phil Resor: Structural geology and crustal deformation, Geographic Information Systems (GIS)

- Dana Royer: Terrestrial paleoclimatology and paleoecology, paleobotany, carbon cycle, plant physiology
- Ellen Thomas: Paleontology; paleoceanography and micropaleontology of deep ocean basins, coastal salt marshes and marginal basins in the northeastern U. S.
- Joop C. Varekamp: Geochemistry; volcanic and geothermal fluids, volcanology, volcanic petrology, pollution geochemistry, Long Island Sound studies

MA or BA/MA students in the natural sciences and mathematics may elect a course of study resulting in the planetary science concentration. Details may be found here: <http://www.wesleyan.edu/planetary/Graduate.html>.

THESIS AND DEFENSE

Thesis Proposal

Upon admission to the program, the student will meet with the E&ES Graduate Program committee to discuss the general requirements and goals of graduate study. Students should select an advisor, thesis topic, and thesis committee by the end of the first semester. After students have made a choice of faculty advisor and thesis committee, they must, in cooperation with the advisor, write a 1-2 page thesis proposal, in which they provide an outline of the proposed research. The thesis committee will read the proposal, and discuss it with the student before acceptance of the research project.

Meetings with the Thesis Committee

At the beginning of each semester, and at the beginning of the summer, each graduate student will be asked to prepare a written summary (2-3 pages) of his or her progress and accomplishments and meet with their thesis committee. This summary will be reviewed by the thesis committee and used to discuss and evaluate the student's progress; failure to make adequate progress can be grounds for dismissal from the program. The discussion of the committee will be summarized by the student's advisor and relayed to the student in writing. Typical topics of discussion by the committee include:

1. Review of objectives and status of research and plans for future work.
2. Review of performance in course work taken. Outline of courses planned for the future, and their relationship to research and career goals.
3. Review of other accomplishments (i.e., department assistance, teaching).
4. General progress and comfort in the program.

In addition to a written statement of progress, the student is required during the 3rd semester to deliver an oral presentation about their research to the department (typically as part of EES 557). The purpose of this exercise is to give the student an opportunity to organize and present their work in a semi-formal setting and receive direct feedback.

An ideal timeline of student responsibilities is:

Beginning of first semester: Orientation meeting with E&ES graduate program committee.

Beginning of second semester (BA/MA last semester of senior year): Identification of and meeting with advisor and thesis committee. Submission of thesis proposal.

End of second semester/Beginning of summer: Written statement of progress/meeting with thesis committee.

Early Summer: Qualifying exam.

End of Summer/Beginning of third semester: Written statement of progress/meeting with thesis committee.

Early third semester (BA/MA first semester MA year): Oral presentation of results to date.

Beginning of fourth semester (BA/MA last semester MA year): Written statement of progress/meeting with thesis committee.

End of program: Thesis and Defense.

Thesis and Defense

Competence in research will be assessed by a written thesis and an oral presentation of research results before the faculty. The format of the written work is to be discussed and agreed upon with the student's advisor and committee.

The advisor and thesis committee in consultation with the student will agree upon the schedule of the defense. All members of the thesis committee must have read and must approve, in writing, a complete thesis before a defense can be scheduled. Practically, this requires that a thesis draft, already vetted by the advisor, be made available to the remainder of the thesis committee at least one month before any proposed defense date. Once the committee has agreed that the thesis is ready to defend, the form for scheduling the defense can be obtained from the E&ES department.

There are three readers on a thesis, including the thesis advisor. The thesis advisor gives the research grade; the two readers determine the quality of work with an emphasis on the thesis as a written document. One reader from outside Wesleyan University or from another department within Wesleyan University is allowed. The defense is attended by the readers plus other members of the E&ES faculty.

The oral defense typically consists of:

- A 30-minute presentation of the research results by the student.
- A 30-minute question and answer period about the thesis.

Directly after the defense the faculty meets to decide whether to award the Master of Arts degree.

Please consult Wesleyan's Office of Graduate Student Services -

Graduation Requirements for the MA <https://www.wesleyan.edu/grad/academics/graduationrequirementsma.html> for information about the format of the thesis, scheduling of the defense, exit appointments and due dates for participating in Commencement. The student is responsible for following all University requirements.

CONCENTRATIONS

Planetary science is an emerging interdisciplinary field at the intersection of geology and astronomy with substantial contributions from physics, chemistry, and biology. The subject matter is planets, including those around other stars (exosolar systems). The science questions include the most important of our times: How do planets (including Earth) form? How common are they in the universe? What is their range of properties and how do they evolve? Is there or was there ever life on other planets? Certainly, the discovery of even microbial

life beyond Earth would rank as one of the greatest human achievements of all time, and this quest lies squarely within the purview of planetary science.

Program of Study. MA or BA/MA students in the natural sciences and mathematics may elect a course of study resulting in the planetary science concentration. The concentration is designed to engage students in the research results, skills, and methods of planetary science. The planetary science concentration requires:

- **Completion of a minimum of four courses from the list below with a grade of B- or better.** At least one of these courses must be from a department outside the student's home department.
- **Students are also required to attend the Planetary Science Seminar,** ASTR555/E&ES555.
- **All students must complete a written thesis on a topic relevant to planetary science.** A member of the student's thesis committee will be from the planetary science concentration committee. The planetary science concentration will be designated on the student's transcript upon the successful completion of this program of study and MA requirements of the student's home department. For more information, please contact the any of the members of the planetary science concentration committee or the graduate school.

Planetary Science Concentration Committee: Martha Gilmore, *Earth and Environmental Sciences*; James Greenwood, *Earth and Environmental Sciences*; William Herbst, *Astronomy*; Meredith Hughes, *Astronomy*; Seth Redfield, *Astronomy*

PLANETARY SCIENCE COURSES

Code	Title	Hours
Planetary Science Courses		
Select at least 4 of the following (one from outside the home department):		4
ASTR524	Exoplanets: Formation, Detection, and Characterization	
ASTR531	Stellar Structure and Evolution	
ASTR532	Galaxies, Quasars, and Cosmology	
BIOL214	MacroEvolution, Pattern and Process	
BIOL231	Microbiology	
CHEM337 & CHEM338	Physical Chemistry I: Quantum Mechanics and Spectroscopy and Physical Chemistry II: Thermodynamics, Statistical Mechanics, and Kinetics	
CHEM361	Advanced Inorganic Chemistry	
CHEM383	Biochemistry	
E&ES513	Petrogenesis of Igneous and Metamorphic Rocks	
E&ES517	Volcanology	
E&ES519	Meteorites and Cosmochemistry	
E&ES521	Planetary Evolution	
E&ES575	Modeling the Earth and Environment	
E&ES580	Introduction to GIS	
PHYS213	Waves and Oscillations	
MATH AND COMP courses as appropriate in consultation with advisor		
Seminar		
ASTR/E&ES555	Planetary Science Seminar (offered each semester; take a minimum of three semesters)	0.75

Thesis

The MA degree program requires a thesis that demonstrates the student's ability to perform original, independent research in planetary science. The specific guidelines for the thesis are those of the student's home department.

ADDITIONAL INFORMATION

THE BA/MA PROGRAM

Wesleyan offers a BA/MA program for exceptional Wesleyan students. The E&ES Department requirements for the BA/MA degree are the same as those of the MA degree outlined above, however please note the expectations for BA/MA students in the timeline.

For details about the BA/MA program see: https://www.wesleyan.edu/grad/graduate-programs/bama_program.html

For additional information, please visit wesleyan.edu/ees/graduate/ (<https://wesleyan.edu/ees/graduate/>)