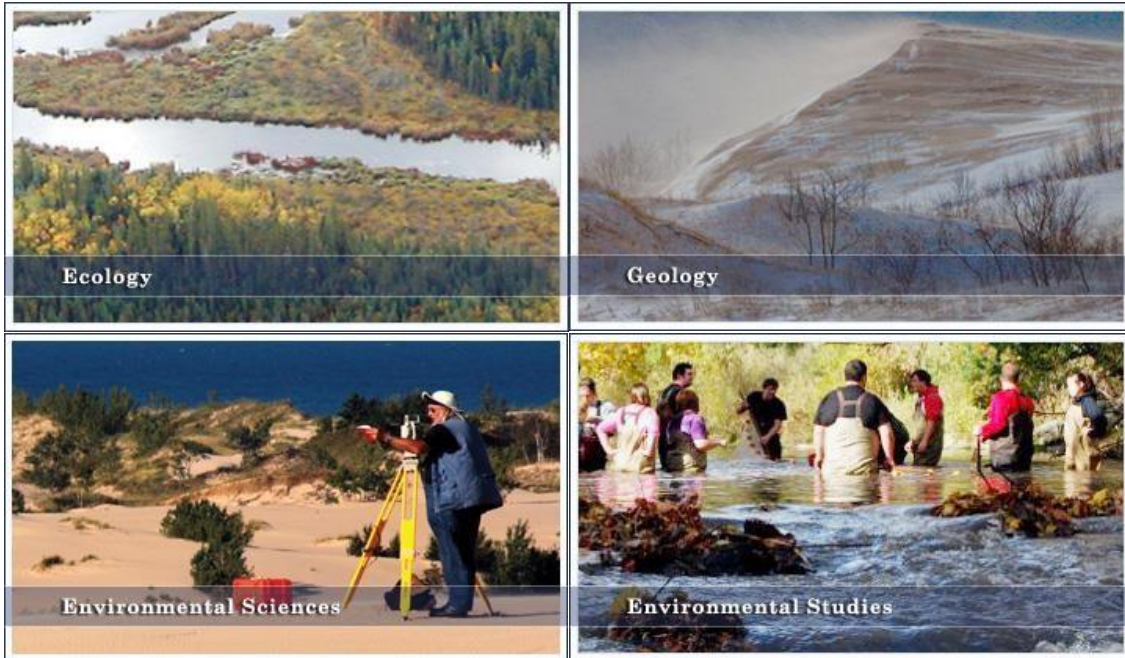


Department of Environmental Sciences (DES) Graduate Handbook

The Department of Environmental Sciences is an interdisciplinary group of ecologists and geologists whose research and teaching interests address human impacts on the environment, earth surface processes, and ecosystem science.



We are committed to providing all students with an excellent educational experience that includes real-life problem solving, and field and laboratory work <https://www.utoledo.edu/nsm/envsciences/>

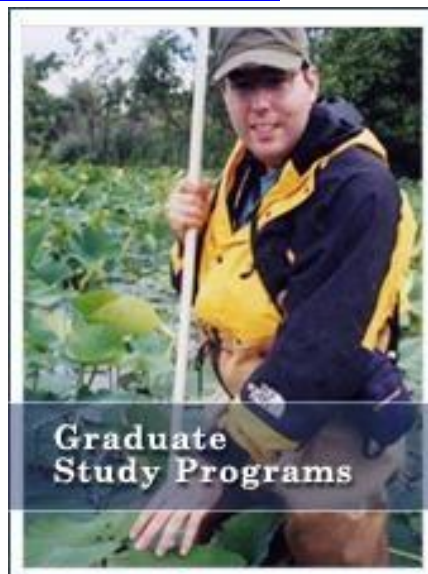


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Welcome to the Department of Environmental Sciences!

You have been chosen as a top student from many applicants, and we look forward to working with you in your capacity of a graduate student in the department. While you may have had a taste of graduate work while doing some undergraduate research, or have completed a MS degree elsewhere, being a graduate student requires full-time commitment, and dedication to learning. Graduate level courses do not teach-to-the-exam and often do not have course study guides—instead, course work is designed to broaden your horizons and continue the process of mastering your subject area. Graduate school should not be thought of as a job, punching a 40hour a week clock. You are at the beginning of learning your profession, in which you will be employed as a professional, meaning you work until the job is done. Discuss with your major professor what their expectations are for you. As a graduate student in the department there will be many opportunities to influence others outside the department, which will reflect upon the character of the department. Know that you are a department ambassador. The department is held in high regards across the university. This reputation must be retained and strengthened. As a growing department, we are always on the lookout for more students at both the undergraduate and graduate level. As a department ambassador, you have a role to play in generating positive interest in the department as you influence others as a teaching assistant, presenter at conferences, and wherever you are identified as one of our students. This is an exciting time in your life as a student in the Department of Environmental Sciences. You have abundant time to explore what interests you most, working amongst like-minded students, and with guidance from faculty holding national and international reputations. The opportunity is yours to excel—it is a time for you to take control of your education to make yourself, and us, proud of your accomplishments. There is hard work ahead, it was never meant to be easy, and the reward will be commensurate with the investment. Again, welcome to the department, we the faculty look forward to helping you grow.

Jonathan Bossenbroek
Chair of Environmental Sciences

Department of Environmental Sciences (DES) Contact Information

JONATHAN BOSSENBROEK Chairman and Professor, WO 1235E, BO 3043
(419) 530-4595
(419) 530-4421(fax)
jonathan.bossenbroek@utoledo.edu

W. VON SIGLER Associate Chairman and Professor, BO 2001B
(419) 530-2897 (419)
530-4421(fax)
von.sigler@utoledo.edu

SHIRLEY MICHEL Secretary 1, WO 1235H
(419) 530-2009 (419) 530-
4421 (fax)
shirley.michel@utoledo.edu

SCOTT MCBRIDE Business Services Officer, WO 1235G
(419) 530-7837
scott.mcbride2@utoledo.edu

STEVEN MURPHY Laboratory Machinist, WO 1235F
(419) 530-2578, (419) 530-4217
Steven.Murphy3@utoledo.edu

DES Graduate Affairs Committee:

DARYL MOORHEAD Graduate Advisor and Professor, BO 3007F
(419) 530-2017
daryl.moorhead@utoledo.edu

W. VON SIGLER Graduate Student Coordinator and Professor, BO
2001B (419) 530-2897
von.sigler@utoledo.edu

CHRISTINE MAYER Program Assessment Officer and Professor, BO 2007B
(419) 530-4570 (main campus), (419) 530-8377 (LEC)
christine.mayer@utoledo.edu

MICHAEL WEINTRAUB Admissions Coordinator and Professor, BO 3001B
(419) 530-2585
michael.weintraub@utoledo.edu

TODD CRAIL Teaching Assistant Coordinator and Lecturer, BO 2001E
(419) 530-4583
todd.crail@utoledo.edu

SCOTT MCBRIDE Business Services Officer, WO 1235G
(419) 530-7837
scott.mcbride2@utoledo.edu

College of Natural Sciences and Mathematics (NSM) Contact Information

JOHN PLENEFISCH Interim Dean and Associate Professor, WO 2246
(419) 530-8740
john.plenefisch@utoledo.edu

BRIAN ASHBURNER Associate Dean of Graduate Affairs
and Associate Professor, WO 2246
(419) 530-7845
brian.ashburner@utoledo.edu

PATRICIA PADILLA Executive Secretary and Assistant to the Dean, WO 2246
(419) 530-7842
patricia.padilla@utoledo.edu

College of Graduate Studies (COGS) Contact Information

AMANDA BRYANT-FRIEDRICH Vice Provost for Graduate Affairs and Dean, UH 3190
(419) 530-4968
amanda.bryant-friedrich@utoledo.edu

CYNDEE GRUDEN Associate Dean for Academic and Student Affairs, UH 3240
(419) 530-5254
cyndee.gruden@utoledo.edu

TERESA HAYES-LEPIARZ Executive Assistant to the Vice Provost/Dean, UH 3190
(419) 530-5253
teresa.hayes@utoledo.edu

MARY MAIN Business Manager, UH 3190 (Policies and Procedures)
(419) 530-2283
mary.main@utoledo.edu

ELAINE COOPSHAW Business Services Officer, UH 3190 (Processes GAPAs)
(419) 530-4268
elaine.coopshaw@utoledo.edu

Some Basic Information about DES Operations

Office Access & Mailboxes & Photocopier: Students have access to the department office WO1235 during normal working hours (8–5) Monday through Friday.

Mail: You will have a mailbox assigned to you in room WO1235B.

Mailing address: Your name
 Mail Stop 604, Department of Environmental Sciences
 University of Toledo 2801 West Bancroft St.
 Toledo, OH 43606-3390

Students can have assignments delivered to the main office, and student workers at the front office or the DES secretary, Shirley, can place items in your mail box. General undergraduate students should not be admitted into the mailroom.

Photocopy: The department photocopier is also a scanner, found in the mailroom. Shirley can assist you with difficulties. It may be used for your research and teaching needs, but not for personal use.

Supplies: The department does not supply you with office supply materials, but does provide such materials necessary for your teaching duties. Supplies can be accessed with Shirley's assistance, or your teaching lab supervisor.

Keys: As soon as you receive your rocket number, keys can be ordered for you with Shirley's assistance. Generally, you can expect to receive a key to your office, your research lab, and a lab key that opens teaching labs depending upon your TA assignment. Keys can also be ordered for the loading dock/sample prep area, and other facilities upon demonstrated need. Note that your Rocket ID card should get you into Wolfe Hall using the outside door scanners. If not, ask Shirley to arrange access.

Printing: Laser printers for your teaching/administrative activities are available in the office suites on the south side of Bowman Oddy 2nd and 3rd floors. For assistance connecting to them contact Shirley who will prepare a work order request with IT. Printers are also available in the computer room, BO1010. Printing for research activity is also most likely available in your advisor's research area.

Poster Plotter: A plotter is available in BO3030. Drafts should be printed on a laser printer and only the final product plotted. Steve (DES machinist) can help you use the plotter if you encounter difficulties. A simple way to print is to insert a USB drive directly to the printer and follow instructions posted in the room. Shirley has a key for the room that you can borrow.

Vehicle Use Policies: The UT Driver and Fleet Safety Program applies to all university employees, as described at <https://www.utoledo.edu/depts/safety/docs/S-08-008.pdf>. In addition to university policies, using DES vehicles are subject to the following restrictions and requirements.

- Only DES faculty, staff, graduate assistants, and other UT approved drivers can use DES vehicles. See Shirley for how to be an approved driver.
- All drivers need to have a valid U.S. driver's license and complete UT driver training.
- Vehicle use is restricted to official University or DES business.
- Reservations should be made at the DES link: <https://teamup.com/ksbc1b282c1f4af2d6>
- Reservations for more than a week is discouraged unless the department secretary receives early notification through email or in person, of such plans and after consultation with the department chair and there are no conflicts.
- Regularly scheduled laboratory field trips have priority over other uses.
- Cancellations should be done in a timely manner so that others can reserve the vehicle.
- Insurance documentation and the blue safety kit must remain in vehicles at all times.
- Normal safety procedures should be followed when operating DES vehicles:
 - For example, talking on a cell phone while driving and/or consuming alcoholic beverages in the vehicles are prohibited.
 - Wearing seatbelts is mandatory and the number of passengers is limited by the number of seatbelts.
 - The vehicle must be turned off, locked, and the keys removed anytime it is left unattended.
- Immediately after each trip, vehicles need to be cleaned, all removed seats replaced, refueled when returned with half a tank or less showing on the gauge, and parked in their designated area.
 - If a designated area is blocked, contact UT police for ticketing (419-530-2601), report to Shirley, and then re-park the vehicle when the designated area is available.
 - The vehicle log needs to be completed (i.e., mileage, time in/time out, and user name) and keys/credit card need to be returned promptly to Shirley.
 - If someone has reserved the vehicle after you, and needs the keys before they can be exchanged with Shirley, arrange ahead of time how the keys will be transferred (faculty mailboxes are a good solution).
- Mechanical problems should be reported immediately to Shirley.
- DES should be reimbursed at the rate of \$0.25 per mile or gasoline paid for when using vehicles for grant-funded research.
 - Use of vehicles for faculty or student research is prohibited without reimbursement except when needed to transport large research equipment.
 - No reimbursement is required when vehicles are used for department courses and labs or for all other departmental business excluding research.

Emergency Contacts

Campus Police: 419-530-2600, 2601 is the non-emergency number

University Counseling Center: 419-530-2426 for anyone under duress. Rocket Hall 1810.

Title IX Office: 419-530-4191, Snyder Memorial Building 1120, for cases of sexual misconduct.

Office of Student Advocacy and Support: 419-530-2471, if you are concerned about a student but unsure of the problem.

For housekeeping and/or maintenance issues (water leaks, trash, etc.), contact Shirley during regular working hours. For emergencies or after-hours and weekends, call 419-530-1000

Useful Web-links

Department of Environmental Sciences (DES):

Homepage: <https://www.utoledo.edu/nsm/envsciences/>

Graduate Programs: <https://www.utoledo.edu/nsm/envsciences/grad/>

MS Degrees: https://www.utoledo.edu/nsm/envsciences/grad/ms_biology_geology.html

PhD Degree: https://www.utoledo.edu/nsm/envsciences/grad/degereq/phd_bio.html

Graduate Courses: <https://www.utoledo.edu/nsm/envsciences/courses/grad.html>

Graduate Assistantships: <http://www.utoledo.edu/nsm/envsciences/grad/financial.html>

College of Graduate Studies (COGS):

Homepage: <https://www.utoledo.edu/graduate/>

Current Students: <https://www.utoledo.edu/graduate/currentstudents/>

Graduation Information: <https://www.utoledo.edu/graduate/currentstudents/graduation/>

- Includes requirements, checklists and deadlines, which vary by semester

Academic Program Forms are available from several sources (links), but COGS maintain several of the required forms. They are available through the COGS website, under the link labeled “current students”:

<http://www.utoledo.edu/graduate/currentstudents/academicprogramforms/>

- **The Graduate Research Advisory (GRAD) committee approval form:** Students must complete this form and receive the required approvals prior to beginning any research for a project, thesis, or dissertation involving humans, animals, radiation, or biohazardous substances. Federal regulations do not allow retroactive approval.
- **The Plan of Study (POS) form for Master’s degrees and PhD degrees:** Each student working for a degree is required to file a Plan of Study with COGS prior to the completion of 12 credit hours. It is understood that the first “Plan of Study” filed by a student may be subject to change as he/she progresses. However, it is the student’s responsibility to notify COGS of any changes to an approved plan of study. Credit applied towards the master’s degree must be earned within six years immediately preceding the time the degree is awarded and the doctoral degree must be earned within seven years (combined M.D./Ph.D. program limit is ten years).

- **The Plan of Study course substitution form:** This form is to be used to amend coursework listed on an existing approved Plan of Study. If more than three courses need to be changed, a new Plan of Study should be submitted.
- **The Request for Transfer Credit form:** Application for transfer of credit must be made to the student's advisor. The department/college will communicate its recommendation to the Graduate College by completing this form. Please use one form for each institution transfer credit is requested.
- **Acceptance of Thesis or Dissertation for Defense;** Students with a thesis or dissertation requirement must obtain the signature of their Advisor/Committee Chair for approval to present/defend their paper. Forms received less than fifteen (15) business days prior to the defense date will not have the defense information included on the College of Graduate Studies website. If the defense will include any proprietary or potentially patentable subject matter, it should not be open to the public and should not be advertised as such. This form must accompany the Intellectual Protection and Patent Sign-off form.
- **Approval of Thesis:** This form must be submitted in paper copy with all original signatures by the last day of the term in which the degree will be awarded. No exceptions, waivers, or extensions to this deadline will be granted. Please complete the on-line fillable portions, print, and obtain original signatures.
- **Approval of Dissertation:** This form must be submitted in paper copy with all original signatures by the last day of term in which the degree will be awarded. No exceptions, waivers, or extensions to this deadline will be granted. Please complete the on-line fillable portions, print, and obtain original signatures.

Miscellaneous Topics

More Forms: Although there is considerable overlap between COGS and DES, not all information is shared between these offices. Therefore, a couple of additional forms are required by DES (below) and available from the graduate advisor.

- **DES Thesis Defense Request form:** This form must be submitted in paper copy to the DES graduate advisor with either original signatures or email verifications that all committee members agree that the thesis or dissertation is ready to defend, at least one week before the scheduled defense.
 - The defense should be scheduled for BO 1014 or room with similar projection and seating capacities.
 - A notice of the defense must be given to Shirley and a public notice posted in the Bowman-Oddy / Wolfe Hall buildings at least a week ahead of the defense.
- **DES Progress Reporting form:** This form summarizes the progress made by each student in each semester, signed by both student and the student's advisor, and submitted to the DES graduate advisor.

Travel Support: Financial support for graduate students to attend scientific meetings is provided by DES and the graduate student association (GSA) at UT.

- The application for DES support is available at the following link:
<http://www.utoledo.edu/nsm/envsciences/pdfs/DES%20Grad%20Student%20App%20for%20Travel%20Funds%20-%20PDF%20form.pdf>
- Information about GSA support is provided at the following link:
<https://sites.google.com/site/graduatestudentassociation/travel-reimbursementapplication>

Concurrent Enrollment: Bowling Green State University and The University of Toledo offer graduate students enrolled in degree programs the opportunity to graduate coursework at the cooperating (host) institutions and receive credit on their home institution's official transcript. The application form: http://www.utoledo.edu/graduate/files/Concurrent_Enrollment.pdf

Medical Topics: Information about student medical services including health insurance, is provided through the following link: <https://www.utoledo.edu/healthservices/student/>

Graduate Scholarships, Fellowships, and Awards: Information about- and links to a variety of funding opportunities are provided at: <https://www.utoledo.edu/graduate/scholarships/>

Note: Summer Financial Aid has to be requested/completed before the summer semester for ALL financial support. For example, the University Fellowship stipend is awarded annually and placed on a student account each semester. However, the recipient must still apply for summer aid, by logging into the My UT account, under the student tab, in the section labeled "My Financial Aid", and click on Summer Aid Application. The application will prompt selecting a scholarship only (University Fellowship) or all financial aid (requires FAFSA). Once the application is completed, the Office of Financial Aid will be able to place the stipend in the student account. Please contact the Office of Financial Aid with questions financialaidscholarship@utoledo.edu.

Course Catalogs are available on-line from 1998-2019: <http://www.utoledo.edu/catalog/>

- COGS 2018-2019: <https://catalog.utoledo.edu/pdf/2018-2019-graduate.pdf>
- 2019-2019 catalog: <https://catalog.utoledo.edu>

Course Exemptions: Students may seek exemption from any required course for a DES degree if they can demonstrate mastery of subject material, e.g., by providing a syllabus/schedule of previous graduate level coursework completed at other universities, subject to approvals by student advisor and instructor of the required course. Exemptions do not alter the total course hour requirements for degrees.

Teaching and Research Assistantships: Although basic information about assistantships is provided on the DES website (above), the responsibilities associated with each appointment are defined by the supervisor for the position. Please seek additional information from that source.

Scheduling a Defense: In addition to submitting the COGS' Acceptance of Thesis or Dissertation for Defense form, and the DES' Thesis Defense Request form in preparation for a thesis or dissertation defense (above), an announcement should be sent to Shirley at least a week ahead of the scheduled defense for dissemination to the faculty and students of DES as

well as a flier prepared announcing the defense for posting in the DES wing of the Bowman-Oddy Building.

Degree Requirements 2020

Department of Environmental Sciences: <https://www.utoledo.edu/nsm/envsciences/>

The department of environmental sciences (DES) offers graduate degrees in geology and biology at the master's level and in biology at the doctoral level. Students entering the MS or PhD programs are expected to have an adequate background in the natural sciences and mathematics, but may be admitted on a provisional basis if they lack such a background. Complete program details are available at the department website.

Requirements for the Master of Science Programs

Master of Science in Geology

Option A (Thesis): A minimum of 30 credit hours of approved graduate coursework is required for the master's degree in geology (average 42 hours). This includes 24 hours of formal courses (excluding EEES 6960 Thesis Research and 6990 Independent Study) with a minimum of 19 hours in DES that must include EEES 5200 Quaternary Geology, 5240 Soil Science, 5410 Hydrogeology, 6100 Glacial Stratigraphy & Geophysics, 6250 Graduate Launch, 6930-009 Departmental Seminar (1 hr. each semester) and the remaining courses selected with approval of the student's thesis committee taken at the 5000 level or above; all but EEES 6930 must be taken for a letter grade (A–F). Additional credit hours will include EEES 6960 Thesis Research and/or EEES 6990 Independent Study, a maximum of 6 hours of which may be taken for a letter grade, and may also include other DES or non-DES courses that need not be taken for a letter grade. The student must also prepare a thesis consisting of a written report on original independent research conducted by the student under the supervision of their thesis adviser (or co-advisers) and defend this thesis before their advisory committee.

Option B (Non-thesis): The non-thesis option for a master's degree in geology differs from the thesis option (above) by requiring 27 hours of formal courses and a maximum of 3 hours of EEES 6960 Thesis Research or 6990 Independent Study; all but EEES 6930 (seminars) must be taken for a letter grade (A–F). The student also must write an original report based on library research and defend this report before their advisory committee.

Master of Science in Biology (Ecology Track)

Option A (Thesis): A minimum of 30 credit hours of approved graduate coursework is required for the master's degree in biology (average 42 hours). This includes 24 hours of formal courses (excluding EEES 6960 Thesis Research and 6990 Independent Study) with a minimum of 19

hours in DES that must include EEES 5160 Advanced Environmental Data Management, 6250 Graduate Launch, 6400 Biostatistics, 6600 Foundation of Ecology, 6930-009 Departmental Seminar (1 hr. each semester) and the remaining courses selected with approval of the student's thesis committee taken at the 5000 level or above; all but EEES 6930 must be taken for a letter grade (A–F). Additional credit hours will include EEES 6960 Thesis Research and/or EEES 6990 Independent Study, a maximum of 6 hours of which may be taken for a letter grade, and may also include other DES or non-DES courses that need not be taken for a letter grade. The student must also prepare a thesis consisting of a written report on original independent research conducted by the student under the supervision of their thesis adviser (or co-advisers) and defend this thesis before their advisory committee.

Option B (Non-thesis): The non-thesis option for a master's degree in biology differs from the thesis option (above) by requiring 27 hours of formal courses and a maximum of 3 hours of EEES 6960 Thesis Research or 6990 Independent Study; all but EEES 6930 (seminars) must be taken for a letter grade (A–F). The student also must write an original report based on library research and defend this report before their advisory committee.

Master of Science and Education in Biology (Ecology Track) and Master of Science and Education in Geology

The master of science and education (MSE) is a degree offered by the Judith Herb College of Education in collaboration with the College of Natural Sciences and Mathematics. Within the degree program, area concentrations are possible in both biology and geology. Students must meet requirements for the degree as stated in the Judith Herb College of Education graduate section of this catalog.

Requirements for the Doctoral Program in Biology (Ecology Track)

The doctoral degree in biology (ecology track) is awarded to a student who has demonstrated mastery in the field of biology and a distinct and superior ability to make substantial contributions to the field. The quality of work and the resourcefulness of the student must be such that the faculty can expect a continuing effort toward the advancement of knowledge and significant achievement in the discipline.

In general, work for the Ph.D. requires a minimum of 90 credit hours of study beyond the bachelor's degree. A substantial portion of this time is spent performing independent research leading to an original thesis that has substantially more depth than a MS thesis. Work performed toward a MS may apply in part to the student's doctoral program.

Each student must complete an individualized program of study in an area of ecology that is approved by the student's advisory committee. This program must include 24 hours of formal courses (excluding EEES 8960 Thesis Research and 8990 Independent Study) with a minimum of

19 hours in DES that must include EEES 5160 Advanced Environmental Data Management, 8250 Graduate Launch, two semesters of statistics (e.g., EEES 8400 Biostatistics and an advanced statistics course such as EEES 8650 Statistical Modeling in Environmental Sciences), EEES 8600 Foundations of Ecology, 8930-009 Departmental Seminar (1 hr. each semester), and the remaining courses selected with approval of the student's thesis committee taken at the 7000 level or above; all but EEES 8930 (seminars) must be taken for a letter grade (A–F). Additional credit hours will include EEES 8960 Thesis Research and/or EEES 8990 Independent Study, a maximum of 6 hours of which may be taken for a letter grade, and may also include other DES or non-DES courses that need not be taken for a letter grade. Within the first two years of study, students must pass a written qualifying examination and an oral comprehensive examination involving a defense of their research proposal.

All graduate students in the Ph.D. program are required to complete at least one semester of formal teaching-assistant experience before graduation. In addition, each student must: (1) submit a manuscript on their research to a scholarly, peer-reviewed journal; (2) give a presentation of their research at a professional conference; and (3) make an oral presentation on their research at a scholarly forum (an oral presentation at a professional conference would satisfy both latter requirements, but a poster presentation would not). Finally, each student must prepare a dissertation consisting of a written report on original independent research conducted by the student under the supervision of their dissertation adviser (or co-advisers) and defend this dissertation before their advisory committee.

DES Graduate courses: <https://www.utoledo.edu/nsm/envsciences/courses/grad.html>

EEES - 5100 ADVANCED GLACIAL GEOLOGY [3 hours]

To understand glaciers and glacial landscapes. Topics include mass balance, ice flow, hydrology, erosion, deposition, landforms, glacial lakes and development of the Ohio glacial landscape. Field trip is mandatory. [Spring, odd years; Fisher] Prerequisite: none.

EEES - 5150/7150 ORGANIC EVOLUTION [3 hours]

The modern theory of evolution presented within a framework of theoretical genetics and population biology. [Spring, every year; Sigler] Prerequisite: consent of instructor.

EEES 5160 ADVANCED ENVIRONMENTAL DATA MANAGEMENT [3 hours]

A course in data management for environmental science graduate students covering the basics of data management practices and the use of Excel and R for data preparation, evaluation, analysis, visualization, and interpretation.

EEES - 5200 ADVANCED QUATERNARY GEOLOGY [3 hours]

To provide understanding of such cyclical events as climate change, sea level fluctuations, vegetation change and ice sheet paleogeography during the Quaternary Period and to explore future changes for planet Earth. [Spring; Fisher] Prerequisite: none.

EEES - 5220 ENVIRONMENTAL GEOCHEMISTRY [3 hours]

Chemical reactions of environmental concern. Water and soil chemistry related to contaminant fate and mobility. Petroleum formation, migration and accumulation in the subsurface. Computer software used. [Spring, even years]. Prerequisite: none.

EEES - 5240 SOIL SCIENCE [3 hours]

Basic principles of soil formation, physics, chemistry and biology with emphasis on their influence on fluid and chemical migration and preservation of soil quality from geological, agricultural and environmental perspectives. [Spring, even years]. Prerequisite: none.

EEES - 5250 SOIL ECOLOGY [3 hours]

Underlying concepts and theory of modern soil ecology will be reviewed including spatial and temporal distributions, sampling methods, biogeochemical cycles and ecological functions of soil. [Fall, odd years; Weintraub] Prerequisite: EEES 3050 and EEES 4240.

EEES – 5260 SOIL ECOLOGY LABORATORY [1 hour]

Laboratory exercises designed to complement the material covered in EEES 5250. [Fall, odd years; Weintraub] Corequisite EEES 5250

EEES – 5350 ECOLOGY AND CONSERVATION OF REPTILES AND AMPHIBIANS [3 hours]

Ecology, diversity, evolution, and conservation of amphibians and reptiles. Lectures will discuss natural history, trait diversity, evolutionary context, and ecological implications of amphibians and reptiles. Hands-on activities will include taxonomy and identification of local species, survey and field methods, and discussions of scientific literature. Throughout this course, the biology of amphibians and reptiles will be emphasized in the context of conservation.

EEES - 5410 HYDROGEOLOGY [3 hours]

Fundamentals of groundwater flow and geological controls including applications to water resource evaluation, utilization, chemical characterization and contaminant transport and geologic processes. Primarily for graduate students in environmental sciences, geology and engineering. [Spring, every year; Martin-Hayden] Prerequisite: MATH 1750 or 1850.

EEES - 5450 HAZARDOUS WASTE MANAGEMENT [3 hours]

Environmental regulations concerning hazardous waste, characteristics of hazardous waste and disposal technologies, toxicology, characteristics of organic chemicals and heavy metals, biodegradation, soil science, groundwater contamination, risk assessment, and site investigation. [Fall, every year]. Prerequisite: none.

EEES - 5480 GIS APPLICATIONS IN ENSC [3 hours]

An applications course focused on using GIS techniques and applications in environmental problems and research.

EEES - 5490 REMOTE SENSING OF THE ENVIRONMENT [4 hours]

Introduction to theory, methods and techniques used to gather and analyze remote sensor data. Topics range from low altitude air photo interpretation through satellite image acquisition. Prerequisite: EEES 2100 for level UG with minimum grade of D-.

EEES – 5510 ENVIRONMENTAL MICROBIOLOGY [3 hours]

Microbial diversity and activities in an applied environmental context. Topics include function of microbial ecosystems in energy and carbon flow, bioremediation, and the detection and control of pathogens. [Taught on demand; Dwyer]. Prerequisite: EEES 2150, CHEM 1210, or consent of instructor.

EEES – 5520 BIOREMEDIATION [3 hours]

The environmental fate and transport of contaminants; their transformation and biodegradation by plants and microorganisms; bioremediation strategies including solid phase, slurry phase, and vapor-phase treatments, and natural attenuation. [Taught on demand; Dwyer]. Prerequisite: consent of instructor.

EEES – 5530 PHYTOREMEDIATION [3 hours]

Course describes the process of phytoremediation with references to both physiological modes of uptake and transformation of contaminants and to field applications. [Taught on demand; Dwyer]. Prerequisite: consent of instructor.

EEES - 5540 ADVANCED MICROBIAL ECOLOGY [3 hours]

Students will learn the underlying processes that drive microbial population structure and function in the environment and become familiar with classical and current methodology used in microbial community analysis. [Taught on demand; Sigler]. Prerequisite: none.

EEES - 5550 ADVANCED METHODS OF MICROBIAL INVESTIGATION [3 hours]

Student will learn the classical and current methodologies (biochemical and molecular) used in microbial community analysis while developing an understanding of experimental design sample handling and data analysis. [Taught on demand; Sigler] Prerequisite: EEES 5540.

EEES - 5610 SOLID EARTH GEOPHYSICS [3 hours]

Survey of theory, field applications, interpretation principles of solid earth and exploration geophysics. Two hours lecture, three hours methods laboratory. Prerequisite: MATH 1850, 1860 and PHYS 2070, 2080 or equivalents.

EEES - 5630 NUMERICAL METHODS IN GEOPHYSICS [3 hours]

Numerical filters and matrix operations used to process potential field data and wave forms, isolating anomalies and signals of interest; derivative maps, upward and downward continuation; current interpretation software. Term project. Prerequisite: EEES 5610.

EEES - 5730/7730 ADVANCED AQUATIC ECOLOGY [3 hours]

Advanced cross-disciplinary concepts in the structure and functioning of freshwater ecosystems with an emphasis on understanding practical management problems involving water pollution, wetlands, dams, habitat restoration, invasive species, and tropical management of water resources. [Fall; Spanbauer, Hintz] Prerequisite: EEES 3050 or consent of instructor.

EEES - 5740/7740 ADVANCED AQUATIC ECOLOGY LABORATORY [1 hour]

Laboratory and field exercises on the ecology of aquatic populations, communities and ecosystems with a special emphasis on the Lake Erie basin. [Fall; Spanbauer, Hintz] Pre- or co-requisite: EEES 3050, EEES 5730/7730, or consent of instructor.

EEES - 5750/7750 ADVANCED CONSERVATION BIOLOGY [4 hours]

Advanced cross-disciplinary concepts in the application of principles and theory to the study and maintenance of biological diversity in temperate, subtropical, and tropical systems. Lectures, classroom discussion, readings and field activities. [Spring, even years; Refsnider-Streby] Prerequisite or Corequisite: EEES 3050.

EEES – 5760 ADVANCED LANDSCAPE ECOLOGY [3 hours]

This course is for graduate students from a variety of disciplines. Emphasis will be placed on up-to-date knowledge and methods in landscape analysis, pattern-process relationships, and potential management applications at multiple spatial and temporal scales. [Spring, odd years; Bossenbroek] Prerequisite: EEES 3050.

EEES - 5790/7790 ECOLOGY FIELD STUDY [2-4 hours]

Field study of globally significant ecosystem(s), including analysis of structural and functional relationships within and between ecosystems. Opportunities for individual student projects. Prerequisite: EEES 3050 or equivalent.

EEES - 6100 GLACIAL STRATIGRAPHY AND GEOPHYSICS [3 hours]

To integrate glacial sedimentology and stratigraphy, with near-surface, geophysical methodologies. Field work to collect a variety of field data to analyze in the lab is mandatory. Data to be presented as posters. [Fall; Krantz & Doro] Prerequisite: consent of instructor.

EEES — 6250/8250 GRADUATE LAUNCH [1 hour]

This course prepares graduate students for success by preparing individual study plans, research proposals and presentations, and launching bibliographic research.

EEES - 6400/8400 BIostatISTICS [4 hours]

Application of statistical tools to sampling and measurement in biology. Hypothesis testing is stressed. [Spring, every year] Prerequisite: none.

EEES - 6440 CONTAMINANT HYDROGEOLOGY [3 hours]

Groundwater contaminant sources, impacts, transport, geochemistry, and remediation in relation to geological environments with attention to sampling, detection, characterization, modeling and aquifer protection. [Taught on demand; Martin-Hayden] Prerequisite: EEES 5410.

EEES - 6450 ADVANCED APPLIED HYDROLOGY [3 hours]

Applications of hydrogeological monitoring, analyses, and modeling using mathematics, statistics and computers. Subjects include: well field and pump test design, sampling strategies, data presentation and analysis, and modeling fundamentals. [Taught on demand; Martin-Hayden] Prerequisite: EEES 5410.

EEES - 6600/8600 FOUNDATIONS OF ECOLOGY [4 hours]

An overview of the development of ecological concepts for beginning graduate students. Readings and discussion focus on classic papers and historical essays. [Spring, every year; Moorhead] Prerequisite: none.

EEES - 6610/8610 CURRENT TOPICS IN ECOLOGY [4 hours]

Discussions dealing with current problems in the biology of populations, communities and ecosystems. [Taught on demand] Prerequisite: consent of instructor.

EEES - 6650/8650 STATISTICAL MODELING IN ENVIRONMENTAL SCIENCES [4 hours]

Statistical modeling techniques of factorial design and regression applied to environmental problems. [Spring, odd years; Qian]. Prerequisite: EEES 6400/8400.

EEES - 6810/8810 WRITING FOR THE ENVIRONMENTAL SCIENCES [3 hours]

This course will familiarize students with technical and persuasive aspects of scientific text preparation. Writing exercises will focus on basic manuscript formatting for journal submission and grant proposals. [Taught by Drs. Mayer and Weintraub] Prerequisite: none.

EEES - 6930/8930 SEMINAR [1 hour]

Individual presentation and discussion of papers in the environmental sciences. [Fall, every year] Prerequisite: consent of instructor.

EEES - 6960 MASTER'S THESIS RESEARCH [1-15 hours]

Research on a particular problem leading to a written thesis which must be presented and defended before a faculty committee. [Fall, Spring & Summer, every year] Prerequisite: consent of adviser.

EEES - 6980/8980 SPECIAL TOPICS [1-4 hours]

A graduate course covering some aspect of the environmental sciences not covered in the formal graduate curriculum. Students may repeat the course for credit as topics vary. [Taught on demand] Prerequisite: consent of instructor.

EEES - 6990/8990 INDEPENDENT STUDY / ADVANCED READINGS [1 - 4 hours]

Student selects an appropriate approved subject for individualized study and prepares a detailed report or gives equivalent evidence of mastery of the selected subject. [Taught on demand] Prerequisite: consent of instructor.

EEES - 8960 DOCTORAL DISSERTATION RESEARCH [1-15 hours]

Research normally leading to the fulfillment of the Ph.D. dissertation requirement. [Fall, Spring & Summer, every year; staff] Prerequisite: consent of adviser.

Checklists for Graduate Programs

Program Schedules: Degrees have specific requirements that must be met for students to remain eligible to enroll in classes and/or receive financial support. Most have been described above, and at links to DES, NSM, and COGS websites. Simple, incomplete, timelines follow:

MS degrees (by academic year semesters): Note that some requirements are not time-sensitive, such as maintaining at 3.0 GPA and fulfilling course requirements.

Semester 1: Submit POS and GRAD forms (before completing 12 hours of coursework)

Semester 2: Establish an advisory committee

Prepare and defend a research proposal with the advisory committee

Semester 3: Continuing enrollment

Semester 4: Check COGS website for graduation schedule

Run a self-audit

Apply for graduation

Thesis option:

Defend a master's thesis with the advisory committee

Upload thesis to Ohiolink; format defined at the following link:

http://www.utoledo.edu/graduate/currentstudents/thesis_dissertation/

Submit one paper copy and PDF of the thesis to DES Non-thesis option:

Defend a scholarly report with the advisory committee

Submit a paper copy and PDF of the report to DES

PhD degree: Note that some requirements are not time-sensitive, such as submitting manuscripts for publication or completing the teaching requirement for PhD students.

Semester 1: Submit POS and GRAD forms (before completing 12 hours of coursework)

Semester 2: Establish an advisory committee

- Semester 3: Continuing enrollment
- Semester 4: Prepare and defend a PhD research proposal with the advisory committee
Pass a qualifying examination
Apply for candidacy
- Semester 5: Continuing enrollment
- Semester 6: Continuing enrollment
- Semester 7: Continuing enrollment
- Semester 8: Check COGS website for graduation schedule
Run a self-audit
Apply for graduation
Defend a PhD dissertation with the advisory committee
Upload dissertation to Ohiolink; format defined at the following link:
http://www.utoledo.edu/graduate/currentstudents/thesis_dissertation/
Submit a paper copy and PDF of the dissertation to DES