

Undergraduate Research Opportunities For Environmental Majors – 2015/2016

Students are encouraged to seek out research experience while pursuing their undergraduate degree. Students desiring a research experience should review the list of faculty research projects provided below and see what opportunities are available. Students must contact faculty directly to express their interest and get more information. Students may earn academic credit for their research experience.

The following faculty members are eager to work with undergraduate students majoring in environmental disciplines who want practical research experience, integrating basic and applied science working towards solutions to real world problems facing our environment.

Basic Instructions:

- 1) Student should review list of available projects below, and then contact faculty members directly to learn more about project expectations and qualifications (if any) that are needed. **Mark your subject line of your email as “Research Inquiry” and in your email provide the following information:**

***Student name, class year, GPA, list of any relevant course work completed, number of hours available to work on project each week; specific skills/experience/training required for the project.**
- 2) To earn academic credit, an ENVSCI Independent Study contract must be completed and signed by both the student and the sponsoring faculty member. This form is available on-line at http://eco.umass.edu/wpcontent/uploads/2011/11/ENVSCI_IndepStudyForm_fields.pdf
- 3) Instructions for completing the form are provided on-line within the same document link. Be sure to indicate the number of credits being earned for the research experience.
- 4) Please note that all Independent Study projects (ENVIRSCI 296, 396, 496) **must be letter graded**. Student can choose to enroll in Internship/Practicum credits (ENVIRSCI 298, 398, 498), but these courses are mandatory Pass/Fail.
- 5) **The completed Independent Study Contract must be delivered to the ENVSCI Program Office at 310 Holdsworth Hall prior to the close of the Add/Drop period.** (If form is received after the end of the Add/Drop period, the ENVSCI Office will initiate the paperwork for a Late Add request, and the student will be required to hand-carry this paperwork across campus for the necessary approval signatures.)

SEE LIST OF FACULTY RESEARCH INTERESTS BEGINS ON NEXT PAGE.

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~ Environmental Research Opportunities ~ Fall 2015~

Masoud Hashemi, Assoc. Professor
Stockbridge School of Agriculture
207 Bowditch Hall, 413-545-1843

Soil & Crop Management
masoud@umass.edu

Webpage: <https://stockbridge.cns.umass.edu/masoud-hashemi>

I can accept up to 4 undergrad students in my lab. I will assign each student to one of my 4 graduate students who are working on different aspects of cover cropping: These four students will be accepted either for independent study credits (graded project) or practicum credits (Pass/Fail). Students willing to extend the project through the Spring 2016 semester are preferable.

A brief description of each project follows:

a) Fertility management of brewing barley and enhancing malting barley by using various cover crops (**Caroline Wise**).

b) Nutrient recycling capability of forage radish as affected by planting dates. Forage radish roots may as grow deep as 4 feet in the soil and remove residual nutrients that are already below the root zone of almost all crops and after being killed in winter release the nutrient in surface soil. Planting date may have a significant influence on the effectiveness of forage radish in nutrient recycling (**Julie Stultz-Fine**).

c) Dual purpose cover crops for grazing season extension, nematode management, and improved resiliency on dairy farms. In this project we are looking at the feasibility of growing winter grain cover crops that not only recover nutrients that otherwise will be lost to the environment but also can be harvested as emergency forage which will enhance the resiliency and sustainability of dairy farming (**Samantha Glaze-Corcoran**).

d) Mineralization trend of fava beans residues and the synchrony of its nutrient release with crops nutrient uptake (**Fatemeh Etemadi**).

Adrian Jordaan, Assistant Professor
Environmental Conservation

Phenology Changes in Coastal Ecology
ajordaan@eco.umass.edu

309 Holdsworth Hall, 413-545-2758

Climate change induced shifts in phenology of coastal fish and wildlife

We are seeking motivated undergraduates to aid in a project investigating how climate change is influencing shifts in phenology (also known as the timing of recurring life history events) in: marine mammals, seabirds and coastal fish species along the Atlantic coast.

Assistance on this project includes helping investigators:

- 1) compile existing and historical datasets from National Park, State, and other sources;
- 2) run statistical and exploratory analyses related to species-specific case-studies (e.g., help evaluate whether phenological shifts are occurring and what environmental variables phenological shifts are associated with);
- 3) conduct literature searches on species related to the student's interests (e.g., bluefish, river herring, grey seals, piping plover), and

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4) draft reports for specific species or phenological datasets. Students selected to work on this project will discuss their research interests and goals with the project investigators (Adrian Jordaan and Michelle Staudinger) and tailor their project to include one or more of the tasks listed above.)

More information on this project can be found at:

<http://necsc.umass.edu/projects/ecological-and-management-implications-climate-change-induced-shifts-phenology-coastal-fish>

The position is based out of the [Northeast Climate Science Center](#) at UMass Amherst. Applicants with a strong background and interest marine and coastal ecosystems, use of spreadsheets and analytical skills are especially encouraged to apply. Dependability, attention to detail, initiative, and independence will also be considered. The project runs from September 2015 to May 2016.

Paid positions are available for strong candidates; workstudy students are encouraged to apply; work may also be done for Independent Study or Practicum credits.

Marco Keiluweit, Assistant Professor
Stockbridge School of Agriculture

411 Paige Hall, 413-545-

Soil Carbon Cycling
keiluweit@umass.edu

Project Description: Root-soil interactions controlling greenhouse gas emissions and soil carbon storage (experimental work to begin Spring 2016; Literature Review project available for Fall 2015)

Soils play a critical role in the global carbon (C) cycle, having a C stock that is greater than the amount stored in biosphere and atmosphere combined. Of prime importance for future climate predictions is understanding the factors that control the rate at which soil C is metabolized by microbes and subsequently released to the atmosphere as climate-active greenhouse gases (e.g., carbon dioxide or methane). What remains unclear is how root-soil interactions affect overall rates of microbial C oxidation and associated greenhouse gas-release in upland soils. We propose a project for an undergraduate researcher to determine the impact of plant roots on soil C storage across a soil age gradient (chronosequence) in Californian coastal grasslands.

Soil samples will be collected at the field site in Santa Cruz, CA, and examined using a combination of wet-chemical and density fractionation techniques to determine the impact of root-promoted weathering on C transformation over time. The project may involve further analyses of abundance and activity of soil microbes depending on the student interest and initiative. Experience in soil and/or environmental science and related laboratory work would be helpful.

Experience in soil and/or environmental science and related laboratory work would be helpful. Ten (10) to Twenty (20) hours of effort per week. Independent study or practicum credits and/or paid hourly position available depending on the student's interest. Field work for this project will begin in Spring 2016, so it is preferred that the student be prepared to extend his/her commitment through Spring 2016.

Susannah Lerman, Research Ecologist
Environmental Conservation (Adjunct Faculty)

USDA Forest Service, Northern Research Station
201 Holdsworth Hall, 413-545-5447

Urban Ecology & Sustainability
slerman@cns.umass.edu

The research project goals include identifying management regimes for improving urban biodiversity and sustainability. The study investigates how lawn mowing frequency in private yards influences pollinator and ground arthropod diversity, and soil conditions. Primary duties include sorting arthropod specimens and entering into project database, prepare bee reference collections, data entry.

This is a lab-based project and provides great opportunities to learn about the insect diversity in urban environments. Student must have an enthusiasm for urban wildlife and a keen attention to detail. Approximately 3-5 hours will be needed each week. Independent study or practicum credits available. Possible extension into Spring semester depending on progress.

Toni Lyn Morelli, USGS Research Ecologist
Environmental Conservation (Adjunct Faculty)

Northeast Climate Science Center, 134 Morrill Science Center, 413-545-2515

Climate Change Impacts/Outreach
tmorelli@usgs.gov

Two projects/positions are available.

Project 1. Looking for a highly motivated student research assistant who will help with the outreach efforts associated with a Climate Change Impact project. Outreach efforts to include creating a video describing our research to the general public using existing video footage, and helping to design an interactive website. Preference for candidates with web development experience, especially with WordPress.

Project description: Native American tribes have collected and boiled down sap for centuries, and the tapping of maple trees is a cultural touchstone for many people in the northeast and Midwest. Our research addresses the impact of climate on the quality of maple sap used to make maple syrup. We are examining the chemical composition of sap collected throughout the northeast and relating this to variation in climate across the region. We are also engaging a range of stakeholders, from conservation and governmental organizations to Native American tribes and other individual producers to understand the concerns of those who manage lands with maple resources. Ultimately this project will make projections of maple syrup quality under future climate conditions and under a variety of management strategies. Project supervisor: Dr. Joshua Rapp. Student sought for 10-15 hours/week (flexible); and this is a paid hourly position (preference for work study). Project can extend into Spring if student is willing and successful

Project 2. The Northeast Climate Science Center is partnered with federal and local natural resource agencies to study how climate change is shifting wildlife distributions in north-central New England. Since 2014, project cooperators have been conducting surveys to understand these relationships. One aspect of this research involves snow track surveys and camera trapping in NH and VT to record carnivore (lynx, marten, bobcat, coyote, fisher, and red fox) and snowshoe hare occurrences. We plan to continue this research for at least three more years and would like to have you involved! We need help processing the gigabytes of photographic data from last year's surveys, as well as developing a new method to streamline data management and analysis (think cloud-based systems, automated extraction of data imbedded in photos, etc.). There is potential for a field visit at the end of the semester to check cameras and possibly conduct a snow track survey, if of interest. Project supervisor: Alexej Siren and Dr. Morelli.

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We are looking for a highly motivated and detail-oriented candidate, preferably with some data management experience, proficiency with data management/analysis software (e.g., R, MS Excel), and cloud-based computing. Student should be able to work 5-15 hours/week (flexible). Independent study/practicum credits are available, or it could be a paid hourly position for the right candidate. Project can extend into Spring if student is willing and successful

Om Parkash, Associate Professor
Stockbridge School of Agriculture
413-545-0062 Paige Lab

Biofuels & Plant Biotechnology
parkash@umass.edu

Long-term projects available for students interested in developing dedicated biofuel crops through biotechnology. Project involves analysis of transgenic plants for biofuel suitability. Fall work would be mostly reading related scientific literature to gain a working knowledge of the science involved, with actual lab work beginning in Spring 2016. Honors students encouraged to apply (possible thesis option). Academic credit available. Students must have strong interest in biotechnology.

Allison Roy, Research Assistant Professor
Environmental Conservation/US Geological Survey
317 Holdsworth Hall, 413-545-4895

Aquatic Ecology
aroy@eco.umass.edu

Several positions are available in aquatic ecology:

- 1) Field assistance for graduate project examining the effects of low head dams and dam removal on stream temperature and dissolved oxygen levels (with Peter Zaidel, MS student). Field work involves maintaining a statewide network of continuous temperature and dissolved oxygen data loggers (training provided). Applicants should be comfortable working in wadeable streams, canoeing impoundments behind dams, and in variable field conditions. Work will require full days either on Friday, Saturday, or Sunday. No experience necessary.
- 2) Field and laboratory assistance for graduate project investigating effects of winter lake drawdowns on food webs, macroinvertebrates, and mussels (with Jason Carmignani, PhD student). Field work involves mussel surveys and setting up water level loggers in lakes. Lab work involves sorting macroinvertebrate samples, dissecting fish stomachs, and preparing specimens for stable isotope analysis. Applicants should be comfortable working in water (snorkeling, canoeing), and have whole (or nearly whole) days available on Tuesday, Thursday, and Friday in September and October for field work. No experience necessary.
- 3) Laboratory assistance for graduate project examining age and growth of juvenile alewives (with Matt Devine, MS student). Work involves extracting otoliths (fish ear bones) and counting growth lines under a dissecting microscope. Students comfortable using microscopes preferred.
- 4) Laboratory assistance for graduate project assessing reproductive patterns in alewives using genetic samples from juvenile and adult fish to conduct pedigrees (with Meghna Marjadi, MS student). Duties include sample organization, genetic processing of juvenile fish samples, and some general lab tasks. No experience necessary.

All positions are available for academic credit (2-3 credits, 6-9 hours/week), with possible extension into Spring 2016. Students will work directly with graduate student mentors, and have the opportunity to participate in weekly lab meetings with the entire Roy lab group. Honor's students interested in conducting aquatic research in 2016 or 2017 are encouraged to apply. Compensation for work study students is possible. More information about Dr. Roy's research can be found at: http://www.coopunits.org/Massachusetts/People/Allison_Roy/index.html

Michelle Staudinger **Climate Change Science Communication**
Northeast Climate Science Center , Science Coordinator
Environmental Conservation, Adjunct Faculty mstaudinger@usgs.gov
126B Morrill Science Center, 413-577-1318

Communicating science to a wide range of audiences both technical and non-technical is a valuable skill that is growing in demand. I am seeking a creative and independent undergraduate student with good writing and presentation skills to assist in reviewing, writing, and compiling stories about Northeast Climate Science Center and related climate science projects.

This will include 1) preparing short, engaging summaries of project findings on a variety of topics ranging from climate change impacts on fish and wildlife, ecosystems, cultural resources, and new management tools to be used in newsletters and other communication outlets; 2) preparing blog posts for the [Early Career Climate Forum](#); 3) conduct literature searches and draft reports on species or systems related to the student's interests.

The position is based out of the [Northeast Climate Science Center](#) at UMass Amherst. Applicants with an interest in climate change impacts on ecological systems and strong creative writing skills encouraged to apply. Dependability, attention to detail, initiative, and independence will also be considered. September 2015 to December 2015 with possibility to extend until May 2016
This position is for Independent Study or Practicum credits only

Kristina Stinson, Assistant Professor **Plant Ecology & Global Change**
Environmental Conservation kstinson@eco.umass.edu
217 Holdsworth Hall, 413-577-3304

Two projects are available.

Project 1. investigates how a changing global nitrogen cycle will interact with climate change to impact human health through its effects on allergenic pollen production in Timothy Grass (*Phleum pratense* L.). Previous work shows that rising levels of carbon dioxide effects pollen and could increase production by 50%. It is unknown how rising levels of nitrogen will impact pollen production on grasses, but it has been shown to increase production in other allergenic species, such as ragweed (*Ambrosia artemisiifolia* L.). We have an ongoing experiment in the greenhouse, to test how nitrogen concentration impacts phenology, biomass allocation and pollen production of Timothy grass.

Students working on this project will help apply nitrogen treatments three times per week and do a bi-weekly assessment on growth and phenological stage. Upon flowering students will be responsible for installing pollen collection bags around the flowers to collect the pollen. This requires attention to detail as pollen is small and the bag needs to be applied carefully as to not

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lose pollen and monitored frequently for collection quality. Upon completion of the life cycle, the plants will need to be destructively harvested, dried and weighed to determine above and below ground biomass allocation. The student will process and count the pollen collected to assess pollen production in flowers. The student will also be responsible for weekly data entry into the computer.

Mentors will help the students analyze the data and interpret results. The student will be responsible for making measurements independently, and should be comfortable working alone as well as in a team. Student will be working under the direction of post-doctoral researchers Jennifer Albertine and Julia Wheeler.

Any interested student should anticipate working a minimum of 8 hours per week on this project. This project would be a great choice for an honors thesis project or for a student who wants to participate in the spring Undergraduate Research Conference; a commitment for the spring semester would be necessary for this level of interest. Contact Jennifer Albertine, **Post-doctoral Associate with your interest.** jalberti@umass.edu

Project 2 seeks to understand how plant communities will respond to warming temperatures, increasing soil nitrogen, invasive species and other factors related to global climate change. This work is particularly focused on garlic mustard (*Alliaria petiolata*), an invasive species, and how this species interacts with climate change to influence native forests. We are looking for students interested in these subjects and in gaining real-world experience in plant ecological research.

The position will include work in the greenhouse, lab and office, with some potential fieldwork depending on student availability. Field work may entail such tasks as transplanting plants at the Harvard Forest in Petersham. Greenhouse work may include transplanting, monitoring and taking care of plants. Lab work may include weighing samples, biological staining and microscope work. Office work may include computer data entry and quality control, and maintenance of bibliographic reference databases. Student Qualifications: Introductory biology, experience using light microscope. Independent study credits and/or practicum credits available. Contact **Julia Wheeler, Post-doctoral Associate with your interest.** juliawheeler@umass.edu

Ben Warner, Post-doctoral Researcher
Department of Geosciences
250 Morrill Science Center, 413-577-

Hydrogeology and Fluvial Processes
bpwarner@umass.edu

Two semester position as undergraduate research assistant for the project: "Farms, Floods, and Fluvial Geomorphology: Making the Most of Our Natural Resources" with a possible reappointment through Fall 2016.

Applications are being actively reviewed for this position starting September 1st. If you are interested and qualified for this project, **please contact Professor Ben Warner by email to see if the position is still available;**

Under the supervision of Dr. Christine Hatch and Dr. Benjamin Warner, the primary work will involve geographical data management, hydrologic data management, meeting and workshop logistical management, and literature review development. Assume regular travel throughout Western Massachusetts. Perform outdoor fieldwork including travel to field sites over potentially difficult terrain. Work outdoors in inclement weather under hot, cold, or wet conditions, and work in and around rivers; applicants must be able to swim and manage swift moving river water.

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PRIMARY DUTIES/ESSENTIAL JOB FUNCTIONS:

- Field data collection and management (approximately 40%)
- GIS map creation and management (approximately 20%)
- Literature review (approximately 10%)
- Meeting and workshop logistics management (approximately 20%)
- Other duties as requested by the project leaders (approximately 10%)

QUALIFICATIONS: BA or BS student, currently enrolled at UMass or in another college in the five-college consortium. Field of study must be geology, geography, environmental science, or related field. Excellent writing and communication skills are required. Must have knowledge and skills to effectively interact with people from different cultural backgrounds, including those associated with race, ethnicity, national origin, religion, socioeconomic status, age, gender, disability, sexual orientation, and other aspects of human diversity.

BEST QUALIFIED APPLICANTS MAY ALSO DEMONSTRATE THE FOLLOWING PREFERRED KNOWLEDGE, SKILLS AND ABILITIES: • Experience with ESRI ArcGIS products, Microsoft Word, Excel, and Access; • Ability to organize work and to work productively with indirect supervision • Demonstrated ability to perform as part of a project team

POSITION COMPENSATION AND TIME REQUIREMENT:

Undergraduate researcher will receive \$10 per hour and will be required to work on average 5-10 hours per week. Per week work hours may change based on project needs.

Applications are being actively reviewed for this position starting September 1st. **Please contact Professor Ben Warner by email to see if the position is still available;**

APPLICATION PROCEDURE:

To receive full consideration, you must submit all of the required documents listed below. Any documents, other than those requested, will be deleted from your application. Application materials that do not comply with these instructions are incomplete and will not be considered.

- Cover Letter (up to one page) that summarizes how you meet the MINIMUM qualifications of this position. Please address each of the minimum qualifications. Please also include a paragraph that summarizes the PREFERRED knowledge, skills and abilities which you possess as particular strengths, beyond the minimum qualifications. Your response will be evaluated for content and written communication skills.
- Statement of Interest (up to one page), addressing how you are prepared to perform the primary duties and essential job functions. It is acceptable to describe formal education, research, training, professional work history, related life experiences, multicultural experience, second language, and volunteer work, in your response.
- Professional Resume, including related education, professional work history and volunteer experience.
- CONTACT INFORMATION FOR THREE (3) PROFESSIONAL WORK REFERENCES, including at least one person who has been your immediate supervisor. For each reference, please indicate the nature of your professional relationship and include the person's title, e-mail address and telephone number.

Ben Weil, Extension Asst. Professor
Environmental Conservation
115 Holdsworth Hall, 413-545-1820

Thermal Comfort/Building Energy
bweil@eco.umass.edu

Professors Simi Hoque and Ben Weil are working a project on human thermal comfort and environmental systems in buildings on campus. Some additional help is needed with data collection and analysis. How do environmental variables relate to perceptions of thermal comfort? How does comfort perception relate to job performance in an office setting or learning outcomes in a classroom?

We are pairing synchronous surveys and environmental quantities measurement to develop a more robust understanding of these relationships to inform the way buildings are controlled and allowing for greater comfort with less energy use. Data collection activity consists of using a portable meter and a tablet computer record environmental conditions and conduct a survey of office occupants on campus. Students will be exposed to the use of a variety of statistical tests and regression techniques in data analysis. They will learn something about physiology, psychology, and building science. No experience needed. Anticipate 5 to 10 hours per week. Independent study credits or practicum credits are possible. Project will be ongoing through Spring 2016 if student wishes to continue working on it.

Baoshan Xing, Professor
Stockbridge School of Agriculture
Paige Lab, 413-545-5212

Environmental & Soil Chemistry
bx@umass.edu

- Three project areas:
- Environmental fate, behavior and ecotoxicity of engineered nanoparticles;
- Fate of engineered nanomaterials in consumer products during use;
- Sorption of phosphate by engineered biochars

Students must have basic knowledge of chemistry and willing to work diligently. Six to ten (6 to 10) hours/week anticipated. Graded Independent Study credits only. It is preferred that students can extend their research to Spring 2016 for completion of the project and producing meaningful/publishable data.

On-campus Internship / Job with Environmental Health & Safety

UMASS Environmental Health & Safety

Michael Grover, Environmental Site Assessment Manager
(413) 345-0036, grover@ehs.umass.edu

Looking for a student to work on a part time basis for the 2015/2016 school year. The position is working for the Environmental and Hazardous Materials Program in the Environmental Health & Safety Department (EHS). Hours: 10 – 16 hours per week. Paid hourly position, or Internship Credits or Combination of paid compensation for office work and credits for field work. No prior experience in needed.

There is office work, paper filing and documentation to be completed on a weekly basis. This includes the submission of Department of Environmental Protection (DEP) notifications BWP AQ 06 and ANF 001 forms.

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Student will be working in the Umass Physical Plant Tririga Tracking System for Service Request (SR), Work Task (WT) and the All Hazard Review (AHR) process

There is the opportunity to learn hands-on experience of the environmental oversight that goes into the operation and environmental compliance of a large facility like Umass Amherst, and assist on "in-the-field" inspections, project oversight and opportunity to attend project meetings for various projects throughout the Umass campus.

Preferred Candidate will have OSHA certification*, as this will allow student to do field work/site visits. *OSHA 10 Hour Construction Outreach Training – Construction Safety & Health (EHS can help provide this training) * OSHA 40 Hour Hazardous Waste Operations and Emergency Response Standard (HAZWOPER).