

Undergraduate Research Opportunities For Environmental Majors

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. **Students must provide the following information with their inquiry:**

***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 ON NEXT PAGE.

~ Environmental Research Opportunities ~ Spring 2013~

**David Boutt, Associate Professor
GeoSciences**

233 Morrill Science Center, 413-545-2724

Hydrogeology/Watershed Hydrology
dboutt@geo.umass.edu

- Laboratory measurements of soil/sediment/rock hydraulic properties
- Field sampling and measurements of water level in wells, soil lysimeters
- Time-series and statistical analyses of hydro-climatic datasets from the NorthEast (Must have good background in Statistics)
- Modeling of Hydrologic systems with emphasis on ground water/surface water interactions (Must be computationally oriented)

**Touria Eaton, Senior Research Fellow
Stockbridge School of Agriculture**

107B Bowditch Hall, 413-687-1044

Nutrient Management
eaton@umext.umass.edu

Effects of Biochar on nitrogen leaching in soil.

**Michele DaCosta, Associate Professor
Stockbridge School of Agriculture**

17 Stockbridge Hall , 413-545-2547

Plant Stress Physiology
mdacosta@umass.edu

Research projects in plant stress physiology: students will have the opportunity to gain experience in both lab and greenhouse environments. In the spring, there may also be some field research conducted. Most of our studies are focused on understanding responses of plants to environmental stresses, with an emphasis on drought and low temperature. The undergrad student will be supervised by graduate students in my lab, or myself directly in the case of a special lab project. Some lab experience beneficial but not necessary (we can train). However, we need someone that is responsible, organized, and pays attention to detail. Projects require anywhere from 5 to 15 hours per week (flexible). Independent study credits (graded project) and practicum credits (Pass/Fail) available. It would be great to find student willing to extend the project through Fall 2013 semester (or possibly even the summer 2013 might be an option).

**Masoud Hashemi, UMASS Extension
Stockbridge School of Agriculture**

207 Bowditch Hall , 413-545-1843

Sustainable Farming Systems / Cover Crops
Masoud@psis.umass.edu

Researching how cover crops improve environmental soil quality by fixing nitrogen, recycling nutrients, and providing food for soil microorganisms. In these research projects we are studying the contribution of cover crops to provide nitrogen to crops as well as their impact on soil microorganisms activities with an emphasis on mycorrhizae and Rhizobium. Experience in soil science and practical agriculture is preferable but not required. Students can participate either as graded independent study or as practicum credits (pass/fail). Students can work 3-6 hours weekly and it includes working in the field, lab and greenhouse.

Michael Jones, Postdoc Biologist
USGS Coop. Fish & Wildlife Research Unit

Wildlife Biology
mtjones@bio.umass.edu

Alpine amphibian study

Using battery-powered acoustic recorders, we have conducted three years of amphibian monitoring at alpine ponds in the White Mountains, NH and Monts Groulx, Québec. Research duties would include tabulating frog calls from spectrograms and analyzing the calling intensity of different frog species. Project contact - Mike Jones / Liz Willey, USGS Coop Unit, Dept. ECO, UMass (mtjones@bio.umass.edu / lwilley@cns.umass.edu) *Academic credit only - 3 hr per week, 1 credit*

David King, Adjunct Assistant Professor
US Forest Service, 201 Holdsworth Hall

Wildlife Biology
dking@fs.fed.us

The student would be participating in a study on bird abundance and nesting success in Amherst conservation areas from mid-May through July. The student would be maintaining trail cameras put out for surveying nest predators, and checking bird nests located by paid technicians to establish if they are active or have been depredated or parasitized by cowbirds. Students should have good observation skills, be able to make careful observations and record them accurately, and be comfortable walking off of trail in woodlands. The anticipated hours per week would be 10 or more, and a 4-week minimum commitment is requested. Compensation would be training in standard bird field research techniques, as well as independent study or practicum credits. Students would have the option of participating in data entry and analyses during Fall 2013.

Susannah Lerman, Post-doctoral Researcher
US Forest Service, Holdsworth Hall

Urban ecology
slerman@cns.umass.edu

Field technician needed for a NSF-funded project. The field work won't begin until mid April and will run throughout the summer, but there will be plenty to do to get ready for the field season. The project will test how different lawn mowing regimes impact pollinator diversity in private yards. Primary duties include lawn mowing, setting up pollinator collection traps, collecting pollinators, vegetation sampling, and soil sampling. The student will gain a lot of experience collecting data for different taxa. Must have personal vehicle but will be reimbursed for mileage. Plant ID skills a plus, ability to lift heavy equipment (e.g., lawn mower), strong work ethic. Hours per week: ranges between 15 and 30 (depending on season). This is an hourly position, \$8-10 per hour, depending on experience.

Brian Kane, Associate Professor
Environmental Conservation
126 Holdsworth Hall, 413-545-6637

Arboriculture
bkane@eco.umass.edu

Current projects include: 1) entering data in a field notebook as I and/or another student measure trees on campus. The project itself entails measuring branches to create a 3-D model of the tree crown. 2) The second project is basically a literature review on tree damage due to ice and snow accretion. Number of credits available will depend on time availability of student.

William J. Manning, Professor
Stockbridge School of Agriculture
Fernald Hall

Plant Environmental Biology
wmanning@microbio.umass.edu
Website: www.bio.umass.edu/plantbio/faculty/manning.html

Plant effects to ozone and elevated carbon dioxide. Academic year lab work; summer field and lab research. Email professor for more information. No phone calls or drop-ins.

Charlie Schweik, Associate Professor
Info Tech. & Environmental Mgt
Environmental Conserv. & Center for Public Policy & Admin. cshweik@eco.umass.edu
217 Holdsworth Hall, 413-545-1824,

Volunteer research assistant(s) interested in participating in a Smartphone-based invasive species control project during spring and summer. Possible opportunities to meet people working in MA DCR Service Forestry, Fish and Wildlife Service, and Trustees of Reservations nonprofit.

Robert Smith, Postdoctoral researcher
MASS Cooperative Fish and Wildlife Research Unit
323 Draper Hall; http://www.coopunits.org/Massachusetts/People/Bob_Smith/index.html

Aquatic Ecology & Urban Stream Ecology
rfsmith@eco.umass.edu

Research on how urban land-use affects dispersal by stream fish and insects, and if constrained dispersal partially controls the composition of stream communities along a rural to urban gradient. Students should have some combination of the following skills: GIS experience (ArcGIS10), experience working with stream macroinvertebrates and/or fish (research, sampling, and or identification), and abilities to use microsoft excel and/or access (use formulas, generate queries, etc.). Some training is available for certain tasks if deficiencies exist. Work can be done for credit or as a paid position.

The nature of the work, student preference, and student qualifications will determine if the position is paid or for credit. GIS work can potentially be designed to function as an individual project for a GIS course. The number of hours worked will be flexible but are not expected to exceed 10 hours per week for either paid or for-credit positions. Extensions through the summer and/or into the fall semester are possible. Potential types of work are as follows:

1. Cataloging and summarizing GIS data available on the web for use in aquatic ecology.
2. Assist with basic to somewhat advanced GIS work to determine error in datasets.
3. Assist with basic to somewhat advanced GIS work examining land-use patterns.
4. Assist with advanced GIS work on model predicting light pollution along rural to urban gradient.
5. Occasional sampling of adult or larval stream insects.
6. Research (most likely literature review) on stream insect and fish life histories.

Depending on the position, students may be asked to do a variety of other tasks related to my research program. Some basic clerical duties (e.g., organizing an endnote library) would be the sort of thing a paid position would have to do in addition to research duties. Students may have opportunities for additional experiences as an occasional "helper" on other projects currently in progress in Dr. Allison Roy's lab (http://www.coopunits.org/Massachusetts/People/Allison_Roy/index.html). Students performing work on the computer will be provided access to Dr. Roy's computer lab.

Om Parkash, Associate Professor
Stockbridge School of Agriculture
202 French Hall, 413-545-0062

Phytoremediation & Plant Biotechnology
parkash@umass.edu

Bio-engineering plants for:

- 1) Phytoremediation of toxic pollutants
- 2) Improvement of food crops
- 3) Bioenergy – enhancing biomass and bio-diesel production

Kristina Stinson, Lecturer
Environmental Conservation
217 Holdsworth Hall, 413-577-3304,

Plant Ecology
kstinson@eco.umass.edu

Project 1: Putting the where & when on wheezing: This project is part of an ongoing study investigating climate change effects on human health, led by Kristina Stinson and Chris Rogers at University of MA School of Public Health. The ragweed pollen season, which typically runs from August 1-October 31, is one of the worst for those who suffer from hay fever allergies. Warming climate, higher atmospheric CO₂ levels and conversion of forest lands to more open disturbed sites are all predicted to exacerbate hay fever symptoms by increasing overall abundance of this species, as well as its pollen output. The participating student/s will help test how future climate scenarios might affect pollen distribution, output and allergen potency. The scope of research may include: a) laboratory processing of wild-collected and experimentally grown plants for analysis of biomass and pollen content; b) possible molecular analysis of ragweed pollen for concentration of the allergen protein Amb-a1; c) GIS analyses and modeling of ragweed distribution under future climate scenarios. Qualifications needed: project 1, lab safety training will be required

Project 2: Geographic variation in toxicity of an invasive plant. Invasion by *A. petiolata* suppresses native plant growth via degradation of native arbuscular mycorrhizal fungi. The phytochemical effects of garlic mustard are broadly anti-microbial across North American habitats and plant communities, but some microbes appear to be more resistant to its allelopathic effects than others. The student/s will work with the PI as well as land managers in Massachusetts and New York State, to test how the toxicity of garlic mustard to the microbial community varies across regional geographic/environmental gradients, and in response to experimental eradication treatments. The student/s will also assist with setting up and monitoring a field experiment at Harvard Forest designed to test the interactive effects of garlic mustard invasion, soil warming, and nitrogen deposition. Requires a driver's license and either own car or 2 years clean driving record. Field work will include travel to research locations in New England, interacting with conservation professionals, the identification and removal of garlic mustard from research plots, vegetation and soil sampling, and laboratory-based soil analysis. Qualifications needed: project 2, botanical experience preferred

Anticipated number of hours to be spent by student each week 10-15; Compensation available as academic credit or paid hourly position possible.

Andrew Whiteley, Associate Professor
Environmental Conservation
107 Holdsworth Hall, 413-577-0204

Conservation Genetics
awhiteley@eco.umass.edu

Gain research experience related to the conservation genetics of brook trout. We are looking for an undergraduate student to help us with one of two brook trout conservation genetic projects. The first project is based in Virginia. We experimentally translocated brook trout into a series of isolated and inbred populations. We are now using genetic markers to determine who bred with whom. Once we have that information in hand, we will be able to test for differences in survival of individuals with different types of parents. The second project involves brook trout from Acadia National Park in Maine. We have been putting tags into individual brook trout since 2006. Now we are using genetic markers to reconstruct a pedigree to understand sibling and parent relationships. Results will help us answer questions related to the genetic basis of "sea-runniness".

Work will take place the UMass Amherst Conservation Genetics Lab. This lab is directed by Andrew Whiteley. You will be directly supervised by a grad student. Zak Robinson is taking a lead on the Virginia project. Morgan Lindemayer is taking a lead on the Acadia National Park project.

You must have very good attention to detail. You must have a strong desire to learn conservation genetics techniques. Prior genetics lab experience is not necessary, you will learn these skills. 9 hours per week anticipated commitment, which will be compensated with 3 academic credits of independent study or practicum. Extension during Fall 2013 possible.

Baoshan Xing, Professor
Stockbridge School of Agriculture
413-545-5212 12B Stockbridge Hall

Environmental & Soil Chemistry
bx@umass.edu

- Environmental fate, behavior and ecotoxicity of engineered nanoparticles
- Sorption mechanisms of organic chemicals in soils and sediments
- Fate and transport of organic chemicals and heavy metals
- Biochar characterization and soil quality
- Risk-assessment and soil remediation

Dr. Xing is looking for minimum of a two semester commitment. See the link: <http://people.umass.edu/bx/> for more information