

Undergraduate Research Opportunities For Environmental Majors – 2019/2020

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 (or other individual listed) to learn more about project expectations and qualifications (if any) that are needed. **Mark your subject line of your email as “Undergrad 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) **Priority deadline for applications is Friday, September 6th.** Faculty will contact qualified students to arrange for interviews as appropriate. Selection of interns (for most projects) will occur by Friday, September 13th.
- 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.

~ Environmental Research Opportunities ~ Fall 2019~

Forrest Bowlick, Lecturer
Geosciences & Environmental Conservation
Morrill Science Center IV Room #260, (413)-577-3816

Geographic Information Science
fbowlick@umass.edu

Project Description: I'm looking for students to help discover, organize, test, and convert GIS course materials for open access storage and presentation. This may entail self-guided practice and review of various GIS activities and topics; construction of simple data organization schemes; collaboration with web designers; searching of online class materials and resources; and other tasks.

Qualifications/Prereqs: Some knowledge and experience in GIS (Intro to GIS would be fine).

Time Commitment: flexible, varies based on student ability.

Compensation: For now, Independent Study or Practicum credits only (3 hours per week = 1 credit). However, there is a chance for funding (work study preferred but not required).

To Apply: Email me (fbowlick@umass.edu) and indicate your interest in working on this project.

Bethany Bradley, Associate Professor
Environmental Conservation
318 Holdsworth Hall, 413-545-1764

Spatial Ecology & Invasive Species
bbradley@eco.umass.edu

Title: Global Invaders Project

Project Description: Invasive species reduce biodiversity and are considered a major threat to ecosystems worldwide. Despite general knowledge of their widespread impacts, we still lack a consistent list of which species are invasive, where they have been studied, and what sorts of specific impacts have been identified. This information is critical for understanding the conditions that lead to invasion and informing effective monitoring and management. Students joining this project will have the opportunity to contribute to a multi-year effort in the Spatial Ecology Lab, which is compiling a comprehensive global database of invasive plants ("the Global Invaders Project"). Students will gain experience reading scientific literature in invasion ecology and will participate in weekly lab group meetings to learn about cutting edge research on invasive plants.

Supervisors: Brittany Laginhas (PhD student) and Prof. Bethany Bradley

Duties/Qualifications: For the fall 2019 semester, we seek 2 students to join our ongoing project. Duties will include reading peer-reviewed literature and extracting information outlined in an existing database. No previous experience is needed, but good organization skills and attention to detail are important.

Students participating in this project will gain experience in efficiently reviewing scientific literature, as well as data collection – skills that are invaluable for those looking to continue scientific research beyond their undergraduate academic career. Participants will also acquire knowledge in invasive species ecology.

Compensation: This is a 2 or 3-credit independent study position (6 or 9 hours/week). Opportunities to continue with this project for academic credit in subsequent semesters.

To Apply: Interested students should email a transcript (unofficial), a resume, and a brief description (<100 words) on why they would like to join the project to Brittany Laginhas (blaginhas@cns.umass.edu).

Brett Butler, Adjunct Professor
US Forest Service, Family Forest Center, Co-Director
Environmental Conservation
201 Holdsworth Hall, 413-545-1387

Forest Inventory & Analysis
bbutler@eco.umass.edu

Position Description: The Family Forest Research Center is seeking up to three assistants for implementing the next iteration of the National Woodland Owner Survey. The USDA Forest Service, Forest Inventory and Analysis program, through the Family Forest Research Center at the University of Massachusetts (www.familyforestresearchcenter.org), conducts the National Woodland Owner Survey to better understand: who owns the woodlands, why they own it, what they have done with it, and what do they intend to do with it.

In the coming year, we will employ the next iteration of the survey to approximately 20,000 landowners across the United States. We are hiring undergraduate students to help us to prepare for the next iteration of the National Woodland Owner Survey implementation. This position entails prepping materials for survey mailing this fall and processing surveys in the spring after the mailing. Ideal candidates will work well with others and independently and have good organizational skills.

Supervisors: Amanda Robillard and Emma Sass (research fellows)

Qualifications: No prerequisites, but student must have Federal work study funding

Time Commitment: We typically ask that our undergrads work 6 hrs/week. We like to hire for the entirety of the academic year and often have students return for as many years as they are in school.

Compensation: We pay \$13/hour, but student(s) must have work study funds

To Apply: Email Resume to Family Forest Research Center – contact Amanda Robillard
Email address: arobillard@eco.umass.edu Phone: 413-545-6641

Brian Cheng, Assistant Professor
Environmental Conservation
115 Holdsworth Hall, 413-545-2454

Marine Global Change Ecology
bscheng@umass.edu

Project Description: The impacts of climate change on range shifts and phenology in marine organisms are well recognized, but relatively little research has examined the potential for species to adapt to a changing climate. To examine the potential for evolutionary response, we are conducting experiments with the Atlantic oyster drill (*Urosalpinx cinerea*), a predatory marine snail. The project aims to collect parental snails and field data from multiple populations along the west and east coast of the United States and to quantify the physiological performance of their offspring to varying water temperatures in the laboratory. Understanding patterns of thermal performance across populations may yield insight into the evolutionary potential for species to respond over time (i.e. space for time substitution). Results from these experiments may generate radically different predictions for climate change impacts.

Supervisors: Brian Cheng and Andrew Villeneuve (Graduate Student)

Responsibilities/Duties: We are looking for a detail-oriented student to assist in photo analysis and possibly thermal tolerance experimentation. Students may also assist in performing experiments to determine the thermal tolerance of hatchling snails. Responsibilities may include:

- Basic aquatic husbandry of a recirculating seawater system
- Analysis of embryonic development and hatchling snail growth using photo analysis software
- Assist in setting up and running "heatbar" experiments to determine the thermal tolerance of snails from different populations
- Keeping track of daily observations in a detailed manner
- Data entry into Excel
- Measurement of water quality

Our research aims to answer many unknowns of climate change impacts on marine ecology and evolution. You will be part of an exciting research program, with opportunities to work on your own questions, at the nexus of marine ecology, evolution, and conservation. You will become familiar with aquatic organism husbandry, morphological trait analysis using photo analysis software, and performing thermal tolerance experiments. There may be opportunities to work on other research opportunities within the Marine Global Change Ecology lab as the semester progresses.

Qualifications/Skills: Excellent organizational skills and an eye for detail; Experience with data entry in excel; Flexibility and good problem solving skills are great assets as well!

Time Commitment: Work hours per week will vary, and we anticipate the bulk of photo analysis and experimentation to occur in September and October. Therefore, hours per week may start around 6-8 for the first part of the semester, with fewer hours needed afterwards. Some of the analysis work can be completed outside of the lab, with the expectation that the quality of work is consistent.

Compensation: Academic Credit. (3 hours/week = 1 credit). Graded project requires

To Apply: Email Drew Villeneuve (avilleneuve@umass.edu) with a brief statement of why you are interested in this project, along with an unofficial transcript and resume.

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

Plant Biotechnology
parkash@umass.edu

Three Projects available:

1. **Engineering oilseed crops for enhanced oil contents for biofuels and health:** In this project, we are doing the metabolic engineering oilseed crops (Brassica, camelina, soybean) using the gene overexpression and genome editing technologies for genes related to the lipid biosynthesis pathways for enhancing the oil and seed yields for both biofuels as well as improving the health quality of edible oils for human consumption. Students working on this project will learn the molecular biotechnology techniques such as gene expression, gene cloning, CRISPR-Cas9 genome editing as well as plant tissue culture techniques and generating and evaluating the engineered crops. Seriously committed students are needed to apply. Preference will be given to Commonwealth College honors students with honor thesis choice.

- 2. Developing Climate-Resilient Crops via genetic engineering and genome editing approaches:** Climate change is severely impacting crop productivity and the arable land for food, fiber, and biofuel production is declining. By 2050, to feed 9.7 billion people, we need to almost double the food production. In this project, we are developing climate-resilient crops with enhanced tolerance to drought, salinity, and oxidative stress via modulating the expression of several stress-related genes using the genetic engineering and genome editing technologies. Students will work under the supervision of senior graduate students and professor to develop such crops and will learn the molecular and plant tissue culture skills. Seriously committed students are needed to apply. Preference will be given to Commonwealth College honors students with honor thesis choice.
- 3. Developing arsenic free rice:** Environmental contamination of Arsenic is a serious problem. Apart from arsenic being a problem in drinking water, paddy rice accumulates the significantly higher amount of arsenic in seed grains. In this project, we are developing rice cultivars with decreased arsenic accumulation via manipulating the members of aquaporin membrane transporters using genome editing approaches. Students will help in the gene cloning and gene expression studies and evaluating the rice cultivars for total arsenic and other nutrient elements in seeds and rice straw. Students will work under the guidance of senior graduate students and will learn the molecular biology and plant tissue culture techniques. Seriously committed students are needed to apply. Preference will be given to Commonwealth College honors students with honor thesis choice.

Time Commitment: 10 hours/week. Students must be willing to commit to at least two semesters. Preference will be given to CHC students interested in pursuing a thesis.

Compensation: Minimum of 3 academic credits per semester. Graded independent study only.

To Apply: Send unofficial transcript, resume and a short statement of interest to parkash@umass.edu

Joseph Elkinton, Professor
Environmental Conservation
310 Agricultural Engineering, 413-545-4816

Entomology & Forest Pest Ecology
elkinton@ent.umass.edu

Project #1: Hemlock Woolly Adelgid Population Monitoring

Project Description: Hemlock woolly adelgid (*Adelges tsugae*; HWA) is one of the most important forest pests in the eastern United States, where it is responsible for the widespread mortality of eastern and Carolina hemlock trees. Since its introduction in the 1950's HWA has expanded rapidly and can be found in >90% of the regions where hemlock trees are located, including western Massachusetts, and continues to expand northward on a yearly basis. This past year, however, we have seen a dramatic decline in the abundance of HWA in western Massachusetts and believe that a fungal pathogen may be responsible for this decline. We are looking for a highly motivated work study student interested in gaining laboratory experience to aid in the documentation of HWA population densities from sites collected across New England.

The student will work with a team of researchers in the Elkinton lab to document the numbers of HWA individuals of different life stages from collected hemlock clippings. They will also work with an independent research student to identify fungal pathogens associated with the HWA populations.

Faculty Research Interests. Updated September 2019.

Supervisors: Dr. Joseph S. Elkinton and Dr. Jeremy C. Andersen (postdoc)

Qualifications: Experience with basic lab techniques and experience working with insects is desirable but not necessary.

Time Commitment: 10 hours/week. Ideal candidate will be able to extend the project through the Spring 2020 semester.

Compensation: Paid hourly position (applicant must have federal work-study).

To apply: Interested students should send a brief statement (1-2 paragraphs) that includes a summary of your research/career interests, and a copy of your C.V. (resume) to Dr. Andersen - jcandersen@umass.edu

Project #2: Hemlock Woolly Adelgid Fungal Virulence Testing

Project Description: Hemlock woolly adelgid (*Adelges tsugae*; HWA) is one of the most important forest pests in the eastern United States, where it is responsible for the widespread mortality of eastern and Carolina hemlock trees. Since its introduction in the 1950's HWA has expanded rapidly and can be found in >90% of the regions where hemlock trees are located, including western Massachusetts, and continues to expand northward on a yearly basis. This past year, however, we have seen a dramatic decline in the abundance of HWA in western Massachusetts and believe that a fungal pathogen may be responsible for this decline. We are looking for a highly motivated student interested in an independent research project aimed at identifying which of multiple fungal species collected in the field is the causative agent for this decline. The selected student will establish colonies of HWA in the laboratory, conduct virulence testing with different fungal isolates, and assist in the documentation of HWA fungal related mortality in western Massachusetts and the New England regions.

Supervisors: Dr. Joseph S. Elkinton and Dr. Jeremy C. Andersen (postdoc)

Qualifications: Experience with basic molecular lab techniques and experience working with insects is desirable but not necessary.

Time Commitment: 9 hours/week (3 credits). Ideal candidate will be able to extend the project through the Spring 2020 semester.

Compensation: Independent study credits (graded project) or practicum credits (Pass/Fail)

To Apply: Interested students should send a brief statement (1-2 paragraphs) that includes a summary of your research/career interests, and a copy of your C.V. (resume) to Dr. Andersen - jcandersen@umass.edu

Christine Hatch, Extension Assoc. Professor Water Resources & Climate Change
Department of Geosciences chatch@geo.umass.edu
233 Morrill Science Center, 413-577-2245

Project Title: Lot 52 Ex-Hills Demonstration Project Site Assessment, Feasibility and Design of a Sustainable, Aesthetically-pleasing and Functional Stormwater-catchment Space designed by UMass students for the UMass community

Project Description: For this project, we would like to enhance the aesthetics of UMass campus, effectively harnessing the natural beauty and water availability present in a natural rain garden, and sustainably manage stormwater runoff while also generating a meaningful, implementable educational experience for landscape architecture students. There is a ~1.5-acre area of land where Hills Hall once stood between Butterfield Terrace, Clark Hill Road, Thatcher Way and Parking Lot 52 that was very quickly “finished” during the construction of Lot 52 where a natural water ponding expresses on the surface. This water surfaces here both because of the natural change in slope as well as due to seasonal stormwater flows over land that can pool in this natural depression. This area was intended to be developed for the benefit and recreational desires of students, but there has yet to be any formal student involvement. We envision a student researched-and-designed rain garden park that will naturally capture and filter both surface stormflows and groundwater upwelling, while also providing a beautiful green area for students to enjoy.

For this research opportunity, we need several students to conduct initial site assessment and feasibility studies. Specifically, we would like students who are interested in (one or more of) the following: (1) site slope and hydrologic assessment (drone-derived and/or LiDAR-based elevation models, in-situ water and piezometer measurements), (2) development of a tool (survey or similar), technique, and/or focus groups to gauge student interest and desired outcomes for this location, (3) soils, landscape and construction feasibility site assessment, and (4) research on technical best practices for green infrastructure that may be appropriate to lot 52 site conditions.

Responsibilities/qualifications: The student(s) must have the ability to work independently and be responsible. Enthusiasm for a novel project and ability to work in a diverse team are also a plus!

Supervisors: Students will be primarily advised by Christine Hatch and Mark Hamin (Landscape Architecture & Regional Planning), with consultation and additional advising provided by Michael Davidsohn (Landscape Architecture and Regional Planning).

Time Commitment: Depending on the number of credits desired, this will require an average of 3, 6, or 9 hours per week (corresponding to 1, 2, or 3 credits), but may be irregularly distributed throughout the semester, and are flexible by arrangement. The student(s) will be expected to contribute proportionately to the team site assessment report.

Duration: This project may have the possibility for extension into the Spring Semester.

Compensation: This will be a 1-, 2-, or 3-credit independent study (or practicum if desired), and the students will be expected to submit a collective site assessment report with the group by the end of the semester.

To Apply: Contact Christine Hatch, chatch@geo.umass.edu, (413) 577-2245 or Mark Hamin, mhamin@larp.umass.edu, 413 545-6608. Please send a brief statement of interest and resume to be considered for these positions.

Marco Keiluweit, Assistant Professor
Stockbridge School of Agriculture
411 Paige Lab, 413-545-6798

Soil-Microbe Interactions
keiluweit@umass.edu

Measuring Microbial Biomass and Activity in Northeastern Forest Soils

Description: This project aims to determine the microbial activity and biomass in forest soils. As part of a larger project investigating carbon cycling in temperate forest soils, the student will be tasked with determining the amount of microbial biomass found in different soil horizons across a moisture gradient. In addition, the student will have the opportunity to run bioassays that quantify the enzymatic activity of these microbes. The student will be trained in advanced wet-chemical techniques to perform these tasks.

Qualifications: Potential candidates should have a keen interest in soil science and laboratory work. The ideal candidate has taken introductory soil science classes and basic chemistry labs.

Time Commitment: We anticipate this project to amount to 9 hours a week (= 3 Credits).

Compensation: Independent study or practicum credits are available. If the candidate shows enthusiasm and productivity for this project, there is a possibility to extend it into a paid position in spring.

To Apply: Email Professor Keiluweit (keiluweit@umass.edu) with an unofficial copy of your transcripts and a brief explanation of why you'd like to work on this project.

Lisa Komoroske, Assistant Professor
Environmental Conservation
127 Holdsworth Hall, 413-545-2491

Conservation Genetics
lkomoroske@umass.edu

Title: Effects of dams on freshwater fishes

Project Description: For freshwater fishes, dams are a considerable threat because of the potential isolation of populations and the cascading effects on life history traits. This project uses a meta-analysis approach to examine how freshwater fish populations respond to environmental changes created by the construction of dams. We are interested in understanding the common effects of dams of fish populations globally. The student will be synthesizing and extracting data from published literature, help conclude the results, and potentially help produce figures and tables for a manuscript alongside a PhD student.

Students participating in this project will gain experience in efficiently reviewing scientific literature, in addition to learning how to collect data from these publications. These skills will carry far past their undergraduate academic career and strengthen the skillset of those interested in continuing their career in science. Additionally, students will acquire knowledge in dam effects on aquatic fish species and learn more about the potential impacts of dams.

Project Supervisors: Dr. Lisa Komoroske, Dr. Brian Cheng, Dr. Andy Danylchuk, and Nadia Fernandez (ECo PhD graduate student)

Qualifications: Must have great attention to detail and organizational skills; Must be proficient in using excel; Must have some interest in learning how to code in R (although experience is preferred) Duties will include reading peer-reviewed literature and extracting information from databases using specific protocols. No previous experience needed.

Time Commitment: 6 hours/week = 2 credits. There may be opportunities to continue with this project for academic credit and extend to Spring 2020 semester.

Compensation: Independent study credits (graded project) only

To Apply: Please email Nadia Fernandez at nbfernandez@umass.edu. Be sure to include your resume, transcript, cover letter, and one letter of recommendation.

Susannah Lerman, Research Ecologist
Environmental Conservation (Adjunct Professor)
USDA Forest Service, Northern Research Station
201 Holdsworth Hall, 413-545-5447

Urban Ecology & Sustainability
slerman@umass.edu

Project 1: Urban Bee and Ground Arthropod Project

Description: Student interns needed to assist in preparation of a database of arthropod traits and assistance preparing and organizing insect specimens for identification. Research is part of the "Alternative Futures for the American Residential Macrosystem (ARM)" project, a multi-city integrated assessment of local and regional-scale consequences of residential development. We are investigating how varied land management decisions influence the ecological function and biodiversity of residential yards and other urban green spaces. The interns will gain experience in a variety of techniques including data entry and reading scientific literature as well as pinning bees & wasps, making specimen labels, and basic insect identification skills.

Supervisor: Postdoctoral Researcher, Desiree Narango

Qualifications: No previous experience is needed. Enthusiasm, patience and attention to detail required. Training will be provided.

Time Commitment: 5-10 hours per week

Compensation: Either independent study credits (graded project) or practicum credits (Pass/Fail)

Duration: Initial project duration is Fall 2019, but opportunities for spring may be available for engaged students.

To Apply: Interested students should email a resume, and a brief statement on why they want to work on this project, their research interests and future career goals to dnarango@umass.edu.

Project 2: Wildlife ecology of residential yards and urban green space

Description: We are seeking a student intern to assist with a systematic literature review of urban wildlife papers to determine spatial and temporal trends, the proportion of research that takes place on different types of green space and whether these patterns have changed over time. Duties will

include organizing and compiling relevant literature, reviewing research articles to collect specific information and entering data in excel.

Supervisor: Postdoctoral Researcher, Desiree Narango

Qualifications: No previous experience is needed. Good reading comprehension skills and a willingness to work independently. Training will be provided.

Time Commitment: 5-10 hours per week

Compensation: Either independent study credits (graded project) or practicum credits (Pass/Fail)

Duration: Initial project duration is Fall 2019, but opportunities for spring may be available for engaged students.

To Apply: Interested students should email a resume, and a brief statement on why they want to work on this project, their research interests and future career goals to dnarango@umass.edu.

Joan Milam, Adjunct Research Fellow
Environmental Conservation (Adjunct Faculty)
207A Holdsworth Hall

Pollination Ecology
jmilam@eco.umass.edu

Two projects are available:

Project 1: Bee Collection and Database Management

Project Description: Seeking a student to assist with native bee specimen curation and database management for bees collected as part of The Great Lakes Biodiversity Initiative and a second project, a long-term study to assess the response of native bees to habitat restoration in xeric barrens in western Massachusetts. Bees that were collected during field surveys were brought back to the lab at Umass where they are prepared for identification and museum curation. Bees are washed, dried, pinned, labeled, and entered into a master database.

Responsibilities: We are seeking a student to -

1. Assist with specimen preparation
2. Enter specimen and site data into a master project Excel spreadsheet
3. Organize bee specimens in the collection destined for musuems.

Qualifications: We are looking for a highly motivated student with experience with Excel software, detail oriented and highly organized. Familiarity with invertebrates a plus.

Time Commitment: Estimated at 3 hours/wk for the fall semester.

Compensation: 1 practicum credits (Pass/Fail)

To Apply: Send a resume and brief explanation of your interest to Joan Milam at jmilam@eco.umass.edu. Deadline for application is Sept 12.

Project 2. Non-invasive DNA extractions from pollinators

Project Description: Native pollinators are a critical component to both wild and agricultural ecosystems. With wide spread declines in non-native honey bee colonies being reported, farms and land managers are increasingly turning their attention to the use of native bees to provide pollinator services. Unfortunately, many of these species are in decline due to habitat fragmentation and human-mediated disturbances. Complicating the study of these important bees and their declines is the fact that many of the native bee species cannot be definitively identified using traditional morphological approaches. As a result, DNA based identifications are becoming increasingly popular. For threatened and endangered native bee species, DNA identifications may not be possible due to the fact that for insects, DNA is most commonly collected from individuals that are killed during their collection. However, advances in DNA extraction methods have resulted in the ability to obtain high-quality results from increasingly smaller amounts of DNA. These methods, including environmental DNA (eDNA) sampling, could provide a powerful tool for the study of native pollinators without harming the individuals from which DNA is collected.

Responsibilities: We are looking for a highly motivated student interested in an independent research project aimed at testing different methods for non-invasive DNA extractions and PCRs from native pollinator species. The selected student will use several DNA extraction techniques coupled with standard PCR techniques to sequence target fragments of DNA from field collected pollinators, and then analyze the data to verify the utility of the approach.

Project Supervisors: Joseph S. Elkinton (ECO Professor), Joan Milam (Adjunct Research Fellow), and Jeremy C. Andersen (Postdoctoral Researcher)

Qualifications: Experience with basic DNA extraction techniques and standard PCR techniques is desirable but not necessary.

Time Commitment: Anticipated Number of Hours per week: 9 hours/week (3 credits). Ideal candidate will be able to extend the project through the Spring 2020 semester.

Compensation: Independent study credits (graded project) or practicum credits (Pass/Fail)

How to Apply: Interested students should send a brief statement (1-2 paragraphs) that includes of summary of your research/career interests, and a copy of your C.V. (resume) to Dr. Andersen - jcandersen@umass.edu

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

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

Climate Change Impacts
tmorelli@usgs.gov

Project Description: Dragonfly migration and climate change

The common green darner (*Anax junius*) is a long-distance migratory dragonfly whose nymph development and migratory timing are temperature dependent. We are looking for a highly motivated student to help measure digital specimens and assemble environmental data to determine how climate change is affecting dragonfly morphology, the timing of migration and migration distance. The selected student will measure wing morphology from standardized photographs of specimens spanning over 140 years with ImageJ, as well as collate spatial and environmental data from capture locations.

Faculty Research Interests. Updated September 2019.

Preferred Qualifications: We're looking for an organized, and highly motivated individual who works well as part of a team and independently. Prior experience with GIS and/or program R are preferred but not required.

Time Commitment: 3-6 hours per week.

Compensation: Academic credit (3 hours per week = 1 credit)

Supervisor: Dr. Michael Hallworth (post doctoral researcher)

To Apply: Please send a brief statement (1-2 paragraphs) that includes of summary of your research interests, and a copy of your C.V. (resume) to Dr. Hallworth (mhallworth@umass.edu), who will supervise the candidate.

For more information: <https://necsc.umass.edu/people/toni-lyn-morelli>

Justin Richardson, Assistant Professor
Department of Geoscience
Morrill Science Center, 413-545-4840

Soil Biogeochemistry
jbrichardson@umass.edu

Title: soil trace metal biogeochemistry

Project Description: The Trace Metal Biogeochemistry laboratory has an opening for a motivated undergraduate excited about soil research. Research tasks will be field and laboratory based. In the field, their task will be to help describe soil taxonomy of sample soil profiles in urban forest and gardens across New England. In the laboratory students will characterize basic soil properties (pH, loss-on-ignition, bulk density, water content, field water content) and analyze samples for bulk and trace elemental composition using x-ray fluorescence. Students will meet and share results with state soil scientists from the USDA-NRCS. Multi-year commitments are highly encouraged/sought.

Supervisors: Dr. Justin B. Richardson along with MS/PhD student Corey Palmer.

Qualifications: Coursework in basic soil science is mandatory (STOCKSCH 105, ENVIRSCI 364 or ENVIRSCI 564, or equivalent transfer coursework)

Time Commitment: 5 – 20 hours per week, depending on student availability.

Compensation: independent study credits (for graded project), practicum credits (Pass/Fail project), and paid hourly position are all possible. This project will absolutely extend through the summer 2020 as a full-time, paid position. Preference given to student interested in full year commitment.

To Apply: Students should contact Dr. Justin B. Richardson directly at jrichardson@umass.edu expressing their interest, resume or curriculum vitae, and unofficial transcript/list of soils courses completed.

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

Freshwater & Fish Ecology
aroy@eco.umass.edu

Multiple positions are available in freshwater and fish ecology working with graduate students and Honors students. Students will work directly with graduate student mentors and are invited to participate in weekly lab meetings with the entire Roy lab group. Information about Dr. Roy's research can be found at: http://www.coopunits.org/Massachusetts/People/Allison_Roy/index.html When applying, please indicate which project(s) you would like to be considered for and your general availability. General inquiries about the lab or questions can be directed to Allison Roy at aroy@eco.umass.edu.

Project 1: Effects of Dam Removal on Stream Ecosystems

Description: Multiple students are needed to assist a graduate student (Kate Abbott, PhD student) in a project examining the response of stream ecosystems to small dam removals across Massachusetts. This position presents the opportunity for both field and lab experiences. Lab work will involve sorting macroinvertebrate specimens from debris using a dissecting scope and identifying to order, data entry, and data quality control. Field work will involve deploying dissolved oxygen loggers (September), potentially assisting with stream electrofishing in collaboration with biologists from MassWildlife (September), and downloading temperature loggers (October).

Qualifications: Applicants must have the ability to swim and lift/portage a canoe. Preferred applicants will have a strong interest in stream ecology, as well as dependability, attention to detail, and independence. Full day or weekend availability necessary for field work in September/October.

Time Commitment: 3–12 hours/week, depending on availability (3 hours/week = 1 credit)

Compensation: Practicum credits (pass/fail) or work study

Duration: Fall 2019. Continuation into 2020 is desirable, but not required.

To Apply: Email Kate Abbott (kmabbott@umass.edu) with resume, cover letter (include availability), and unofficial copy of transcripts.

Project 2: Juvenile River Herring Age and Growth

Description: Multiple positions are available for laboratory assistance on graduate project examining age and growth of juvenile river herring (with Matt Devine, PhD student). Work involves extracting and mounting otoliths (fish ear bones) from small fish (< 100 mm) and counting growth rings from otoliths under a dissecting microscope. Students comfortable using microscopes and willing to work alongside others are encouraged to apply.

Qualifications: None, but familiarity with microscopes or database management preferred.

Time Commitment: 3–9 hours/week, depending on availability (3 hours/week = 1 credit)

Compensation: Practicum credits (pass/fail), independent study (if applicant has worked in the lab before and has interest in a research project), or work study

Duration: Fall 2019. Continuation into spring and summer 2020 is possible.

To Apply: Email Matt Devine (mtdevine@umass.edu) with resume and short cover letter detailing your interest and experience.

Faculty Research Interests. Updated September 2019.

Project 3: Juvenile River Herring Emigration

Description: When do baby river herring leave fresh water? These research opportunities are part of a statewide research project of the UMass-River Herring Research Lab to better understand the freshwater portion of the river herring life cycle. River herring are anadromous fishes, meaning they are born in freshwater, migrate to sea as juveniles, mature in the ocean, and return to their natal freshwater ponds to spawn upon maturity. We are evaluating what environmental and biological factors are associated with juvenile productivity, growth rates, and departure from freshwater to the ocean.

There are two opportunities associated with this project (multiple positions are available in each, or a combination possible):

- Zooplankton processing: The assistant will learn how to process and identify different types of zooplankton to assess composition and density in freshwater samples, estuarine samples, and river herring gut contents.
- Video processing: This assistant will watch videos and help manage a citizen science monitoring platform to estimate river herring emigration rates.

Qualifications: Familiarity with microscopes preferred for zooplankton processing.

Time Commitment: 3–9 hours/week, depending on availability (3 hours/week = 1 credit). Because of the learning curve with zooplankton identification, a minimum of 2 credits (6 hrs/week) required for zooplankton process. Video processing is for 1-2 credits (3-6 hours/week).

Compensation: Practicum credits (pass/fail), independent study (if applicant has worked in the lab before and has interest in a research project), or work study

Duration: Fall 2019 with continuation into spring 2020 preferred.

To Apply: Email Meghna Marjadi (mmarjadi@umass.edu) with resume and short cover letter detailing your interest and experience.

Project 4: Algae and Freshwater Mussel Growth

Description: One position is available to work with an undergraduate student (Sarah Endyke, Honor's student) at the USFWS Richard Cronin Aquatic Resource Center in Sunderland, MA (5 min from UMass Amherst and on the bus line). Tasks include preparing and running samples through a Multisizer 4e Beckman Coulter Counter, inputting data into excel sheets, and measuring mussels using Image-Pro Premier. The intern will learn about the process of an honors thesis and gain experience in laboratory skills and complex software.

Qualifications: Applicants must be able to travel to and from Cronin. Previous experience with lab work or imaging software preferred, but not required.

Time Commitment: 3–6 hours/week, depending on availability (3 hours/week = 1 credit)

Compensation: Practicum credits (pass/fail)

To Apply: Email Sarah Endyke (sendyke@umass.edu) with resume and short cover letter detailing your interest and experience.

Michelle Staudinger , Adjunct Asst. Prof.
Northeast Climate Science Center, Science Coordinator
Environmental Conservation
134 Morrill Science Center, 413-577-1318

Climate Change Science

mstaudinger@usgs.gov

Project #1: Seabird Foraging Ecology in a Changing Climate

Project description: This project is investigating how the pre-breeding adult foraging ecology of seabird species varies across regional and local scales using stable-isotopes as ecological tracers and is part of a larger effort to understand how climate change is influencing shifts in phenology (also known as the timing of recurring life history events) in marine systems along the U.S. Atlantic coast. Stable-isotope analysis complements direct observations of what seabirds are consuming by providing integrated information on the habitats and trophic levels seabirds are feeding in. Assistance on this project will include organizing and creating inventories of eggshell samples, preparing samples for stable isotope analyses in the laboratory (cleaning, weighing and packing), and data entry. Students may also conduct species-specific literature searches and help draft reports. There may be additional opportunities to evaluate questions of interest for students working on an Undergraduate Honors Thesis or Five College Coastal and Marine Science Certificate (www.fivecolleges.edu/marine).

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>

Supervisors: NE CASC Science Coordinator Michelle Staudinger (mstaudinger@usgs.gov)

Qualifications: Students with a strong background and interest marine and coastal ecosystems, experience in a laboratory setting, use of spreadsheets and data entry are especially encouraged to apply. Dependability, attention to detail, initiative, and ability to work independently will also be considered.

Time Commitment: Flexible 3-6 hours per week with opportunities to extend into spring 2020.

Compensation: Independent study credits or practicum credit. Paid positions may be available after an initial training period for students that demonstrate skill and competence in techniques.

To Apply: Please send email inquiries to mstaudinger@usgs.gov with a CV/resume and short letter of interest.

Project #2: Assessing Consumer Access to Native Seafood in New England

Description: New England is viewed as a seafood destination yet consumers appear to have an inadequate access to wild-caught, native seafood within New England restaurants. This student will help a graduate student and nonprofit organization assess consumers' access to native and imported seafood within New England restaurants. This work will ultimately help stakeholders such as state agencies, seafood distributors, and Community Supported Fisheries identify current and potential markets for native seafood. This is a great opportunity for a student interested in sustainability, fisheries, food systems, and/or environmental education.

Qualifications: Previous experience with GIS or enrollment in Introduction to GIS is highly desirable, but not essential.

Time Commitment: 3-6 hours/week. There are opportunities to extend this project beyond one semester, but this additional commitment is not required.

Compensation: Independent study credits (3 hours/week = 1 credit).

To Apply: Interested students should send an email to Amanda Davis (amandad@umass.edu) with a brief description of their interest in this research, their GIS experience, and an updated resume.

Matthew Winnick, Assistant Professor
Department of Geosciences
Morrill Science Center

Biogeochemistry
mwinnick@umass.edu

Project Description: The release of CO₂ and N₂O greenhouse gases from streams to the atmosphere has recently been recognized as a major flux within the global carbon cycle. However, little work has addressed the processes that control these fluxes and how they may respond to climate change. This project will seek to characterize the role of upland soil environments in controlling stream geochemistry and fluxes of greenhouse gases to the atmosphere in headwaters streams throughout the Connecticut River watershed. Specifically, we seek an enthusiastic undergraduate researcher interested in helping us address this question through a combination of field characterizations of stream and soil gas concentration/fluxes, laboratory analyses, and/or GIS modeling of stream characteristics across the CT River watershed.

Qualifications: GEOG 110 or equivalent introduction to Environmental/Earth Sciences required. Field geochemical methods experience (measuring pH, temperature, alkalinity, conductivity, etc.), laboratory experience, and/or GIS skills preferred.

Time commitment: Flexible, 3-10 hrs/week. Students interested in extending this work through Spring 2020 and/or interested in turning this into a thesis project are strongly encouraged to apply.

Compensation available: Flexible – able to support independent study, practicum, or paid hourly position (work study preferred)

To Apply: please send a 1-page cover letter describing your interests in this project and relevant experience along with a transcript to Prof. Matthew Winnick (mwinnick@umass.edu)

Jonathan Woodruff, Associate Professor
Timothy Cook, Research Associate Professor
Brian Yellen, Research Assistant Professor
Department of Geosciences
249 Morrill Science Center, 413-577-3831

Sedimentology
Geomorphology, Land-use Analysis
woodruff@geo.umass.edu
byellen@geo.umass.edu

Sedimentary Controls on Tidal Marsh Integrity and Resilience

Project Description: Tidal marshes are bioproductivity hotspots and provide the first line of defense against increasingly destructive storms. Sea level rise and coastal development threaten salt marshes.

Faculty Research Interests. Updated September 2019.

We know that salt marshes need to accumulate sediment to keep up with sea level rise, but we don't know exactly how much or where sediment currently is sourced. This project is seeking to better understand how much mineral sediment a salt marsh needs, and what controls the availability of sediment to marshes around the state. We will be collecting and analyzing sediment cores and water samples via a variety of methods to help answer these questions. This project is in Geoscience, but in collaboration with Environmental Conservation professors Scott Jackson and Katie Kahl.

Supervisors: Tim Cook, Jon Woodruff, Brian Yellen (Geosciences)

Qualifications: Students who have taken courses in the following are well suited to the project: geology; hydrology; soils; GIS; wetlands.

Time Commitment: We anticipate 6-10 hr per week depending on the student's academic workload in any given week. Ideally, this student will stay on throughout the academic year and into summer 2020 to assist with field work.

Compensation: This is a paid position, but course credit is also available if that is preferred.

To Apply: Please send a cover letter and resume to byellen@geo.umass.edu. Be sure to include relevant course work, two references whom we can call, and your interest/experience in lab analyses, GIS mapping, and field work

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

Environmental & Soil Chemistry
bx@umass.edu

Project areas:

- Environmental behavior and application of engineered nanoparticles;
- Fate of engineered nanomaterials from nano-enabled products in simulated gastrointestinal systems;
- Interaction between engineered nanomaterials and plants;
- Biochar characterization and use

Qualifications: Students must have basic knowledge of chemistry and willing to work diligently.

Commitment: Nine to twelve (9 to 12) hours/week anticipated.

Compensation available: Graded Independent Study credits only.

Duration: It is preferred that students can extend their research to Spring 2019 (maybe summer 2019 too) for completion of the project and producing meaningful/publishable data. **For the summer of 2019, paid internship is potentially available, depending on the performance of the students during the semesters.**

To apply: Contact Professor Xing (bx@umass.edu) with a resume and a statement of interest

Other campus research opportunities can be found on the Biology Research Site:

BURA (<https://www.bio.umass.edu/bura/content/welcome>)

Off-Campus Internship Opportunities

Town of Palmer, Conservation & Planning Department

Angela Panaccione, Conservation Agent conservation@townofpalmer.com
Town of Palmer, 4417 Main Street, Palmer, MA. 413-283-2687 (cell: 413-222-4934)

Description/Duties: Looking for two interns for this year. The focus would be split between administration and enforcement of the Wetlands Protection Act and Conservation Land Maintenance. This would consist of attending Conservation Commission meetings, recording and typing minutes, attending site visits, reviewing site plans and helping draft permits under the Wetlands Protection Act and the Town Wetlands Ordinance. The Conservation Land Management would include boundary marking and GPS locating survey points in the field from deed descriptions as working with SCA AmeriCorps and local scout troops to administer a recreational trails grant for a universally accessible river walk. There is also an additional internship opportunity working on stormwater mapping and monitoring in coordination with town's Department of Public Works (DPW).

Qualifications/Eligibility: I'm normally looking for Juniors or Seniors, with a focus in either Environmental Policy/Land Use or Environmental Planning/Natural Resources Conservation. Stormwater intern will need valid driver's license and must provide own transportation (but will be reimbursed for mileage).

Time Commitment: Flexible. Time commitment will determine academic credit awarded.

Compensation: Academic credit can be awarded (with campus faculty sponsor). It could either be a graded independent study course, or a pass/fail practicum, or a project could be tailored to meet senior thesis requirements. Three hours per week equates to one academic credit.

Contact: Angela Panaccione about internship position. Successful candidates can coordinate academic credit through Deb Henson (dhenson@eco.umass.edu)

Town of Shutesbury, MA, Conservation Commission

Penny Jaques, Conservation Commissioner jaquespenny@gmail.com

Description: Create a trail map and usage recommendations for the Town Beach/South Brook Conservation Areas in Shutesbury, MA. These two contiguous parcels are located due south of Lake Wyola. Together they comprise 98.5 acres and are managed by the Shutesbury Conservation Commission. Two main trails are well marked.

- Map all existing trails.
- Consider creating new trails in the less sensitive portions of the site.
- Provide usage recommendations for each trail.
- Provide the Commission with digital files suitable for reproduction as an 11" X 17" trail map.
- Present the map and recommendations at a Conservation Commission meeting before the end of the Fall 2019 semester.

Qualifications: Knowledge sufficient to evaluate ecologically sensitive areas; GPS and GIS mapping skills; ability to physically walk the trails

Time Commitment: 2-3 hours per week

Compensation: Independent Study Credit (Curt Griffin as faculty sponsor cgriffin@eco.umass.edu)

To Apply: Email Penny Jaques, jaquespenny@gmail.com

Faculty Research Interests. Updated September 2019.