OUTREACH PROGRAMS

New Research Experiences Offered for K-14 Educators and Undergraduate Students

Several New Hampshire K–14 educators and undergraduate students will get a chance to participate in pioneering science research this summer at campuses around the state.

Website facilitates search for STEM NH opportunities

One of STEM NH's goals is to provide a web-based tool for students, parents, and instructors to discover STEM programs and opportunities in NH.

Teachers bring new research technology into classrooms

On a chilly March afternoon, Newport Middle School teacher Jessica Warkentien and seventh-grader Amethyst Piland hike over crusty snow to the bank of the Sugar River.

Learn GIS at Summer Institute for Teachers

The entire world is within your students' reach. Learn how to access a variety of thematic data supporting social studies and science content.

Volunteer Science

EPSCoR's Ecosystem and Society project offers opportunities for community members to get involved in science first-hand.

Science Camp Scholarship Opportunities

NH EPSCoR provides scholarships to support students and youth participating in summer camps that engage them in science, technology, engineering, and math.

Upcoming Events

NEW HAMPSHIRE EPSCoR

Linking Education, Research and Economic Development

Spring 2013 NEWSLETTER

New Research Experiences Offered for Educators and Undergraduate Students

Several New Hampshire K-14 educators and undergraduates will get a chance to participate in pioneering science research this summer at campuses around the state.

After a competitive application process, six teachers and six college students will be selected to spend 7–10 weeks conducting research alongside professional scientists. They will work with mentors on activities that relate to NH EPSCoR's ongoing "Ecosystems and Society" project, which aims to better understand how people affect the environment. Most of the participants will partner with faculty members or graduate students at colleges and universities in New Hampshire, though some may find mentors at businesses and nonprofit organizations.

Financed with a $20 million grant from the National Science Foundation, this new program aims to help educators develop the skills they need to introduce their own students to the experience of conducting research. During the school year following their participation, teachers will work with the NH EPSCoR education coordinators to develop lesson plans that draw on their research experience.

"What's exciting is that the program brings the culture of research and discovery more formally into high school and middle school classrooms," says Steve Hale, who is coordinating the program for EPSCoR along with Sally Jean of Keene State College. "We need to reach young learners as early as possible, so they come to understand that they can participate in, and prepare for, careers in science, technology, engineering and math."

For undergraduates, the program will provide an up-close look at what it's like to work in a particular science discipline. This unique perspective will help students decide if, and how, they want to pursue careers in the sciences, shaping their post-college plans for education and training. Hale is trying to reach out especially to students at two-year colleges, as well as to under-represented minorities and to undergraduates who lack access to major research institutions.

The initiative, modeled on the NSF's Research Experiences for Teachers and Research Experiences for Undergraduates programs, addresses NH EPSCoR's goal of boosting the state's research competitiveness. "We need to prepare the future workforce for the jobs of tomorrow, which will require literacy and expertise in science, technology, engineering and math," Hale says. "Having this workforce will attract industries and businesses to New Hampshire."

The program will support more research opportunities for teachers and undergraduates in future years. This summer, participants will receive a stipend of $500 per week, support for room and board, and $500 for research costs and supplies. Mentors will receive $1,000.

Editor's note: For more information about the program and the application process, contact Steve Hale at steve.hale@unh.edu or Sally Jean at sjean@keene.edu

Benefits of Participating in a Research Opportunities Program

- Placement with a mentor investigating some aspect of current, NH EPSCoR-related research
- Conducting authentic research as part of team of faculty and graduate students
- Access to state-of-the-art research facilities
- $500/week stipend
- Room and board for residential campus experience; lunch and mileage reimbursement for commuting participants

Additionally, educators will:

- Participate in a community of educators eager to enhance the offering of science research and training to NH students.

Additionally, undergraduates will:

- Gain support to present your results in at least one meeting or symposium
- Research experience from which to grow your professional career in a STEM or STEM-related field

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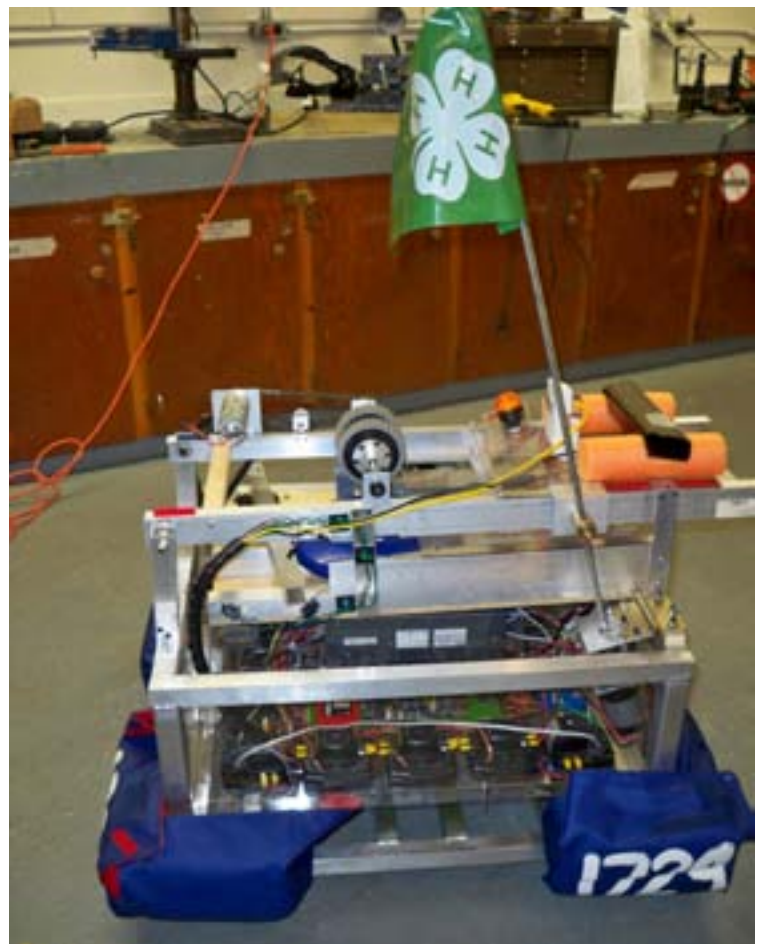

One of STEM NH's goals is to provide a web-based tool for students, parents, and instructors to discover programs and opportunities in science, technology, engineering and mathematics (STEM) in New Hampshire.

There are numerous opportunities for formal and informal learning available on the website. The goal is to connect students, parents and instructors to opportunities that promote critical and creative thinking through the application of problem solving, hands-on learning, career development, and experiences at New Hampshire's institutes of higher education.

Another goal is to involve K-12 teachers in the planning and development of these learning experiences. By collaborating with faculty and staff from institutions of higher education and developing curriculum that meets state standards, these educators become part of communities focused on enhancing STEM content and effective teaching strategies.

New Hampshire is a small state that has many corporations devoted to engineering and engineering technology occupations. There are numerous opportunities for formal and informal learning available to students: US FIRST, Technology Students Association (TSA), Real World Design Challenge, and many others. Several schools are beginning to offer engineering camps and informal learning groups. Currently numerous grant opportunities create a competitive situation where cooperation and collaboration would better serve our goals.

Through participating in these opportunities, more students would be seeking STEM related careers in higher education and more graduates would enter those fields.

Go to our searchable database at http://nhepscor.org/stem/programs to find a program, or submit your own program to be included in the STEM NH database.

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Learn GIS at Summer Institute for Teachers

Graduate, undergraduate and continuing education credit available

The entire world is within your students' reach. Learn how to access a variety of thematic data supporting social studies and science content. See how GIS can be used to foster critical thinking and inquiry skills required in the new Common Core State Standards. The summer series of workshops held at Hopkinton Middle/High School in Contoocook will take you from beginning skills through the more advanced skills analyzing local data.

Spatial Institute 101 –June 25-27 (1 credit)*

The event will provide an introduction to geospatial tools such as GPS, GIS and remote sensing. The institute will also introduce participants to local data collection projects and local data sets. Teachers will be provided with ready-made lessons that promote spatial literacy and use GIS technology in the classroom.

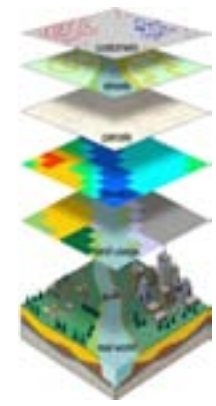
Intermediate Institute–July 9-11 (1 credit)*

This advanced institute will focus primarily on geospatial data which includes acquiring, managing and importing the data into the GIS software in a desktop environment instead of online.

Advanced Institute–July 22-24 (1 credit)*

(previous knowledge of GIS will be helpful)

A second advanced institute that focuses on GIS skills for gathering, mapping and analyzing the geospatial data collected by EPSCoR partners.



WEI Intro to GIS–July 19, 22-26 (3 credits including Advanced Institute)*

What is a watershed, how do you locate it, and how do you study what lives there? Join fellow teachers and natural resource specialists for a journey into the wonders of the aquatic world. The Watershed Ecology Institute is a dynamic partnership between NH Fish & Game, NH Department of Education, EPSCoR, UNH, NHEdGIS, Plymouth Regional High School and Hopkinton Middle/High School.

WEI Provides a unique professional development opportunity to:

- Explore marine, stream and wetland aquatic ecosystems
- Experience field investigation activities
- Explore the use of GIS to locate, map and analyze data
- Learn how to use natural resources data
- Experience teachers teaching teachers how to use GIS
- **Obtain free GIS software for your own classroom!**

There is a $100 stipend for teachers who attend each institute. Teachers who attend the first institute will also receive a GPS unit.

For more information, please go to

http://extension.unh.edu/Summer-Spatial-Institutes-2013

This project is funded, in whole or in part, by a grant from the National Geographic Society Education Foundation.

* It is not required to purchase credit in order to attend any of these institutes. All institutes are entirely free unless credit is desired.

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Teachers bring new research technology into classrooms

Students Kennedy Pysz, Hailey Perry and Kendall Hamilton pose at the Sugar River South Branch site.

Newport Middle School teacher Jessica Warkentien checks to see that the sensor data uploaded correctly as her student Seth Patno looks on. They are at the Sugar River South Branch site in Newport.

On a chilly March afternoon, Newport Middle School teacher Jessica Warkentien and seventh-grader Amethyst Piland hike over crusty snow to the bank of the Sugar River. They wear black rubber boots that nearly reach their knees and carry a large binder, a cell phone equipped with a camera, and a handheld instrument called a conductivity meter. Their plan: to collect data — recorded by two aquatic sensors submerged several feet from shore — that will tell them about the health of the river flowing through their community.

They're not the only ones wading into ice-cold water for the sake of science. Across New Hampshire, educators, researchers, government agencies, nonprofit groups and interested citizens are monitoring a state-of-the-art network of 100 water-quality sensors in the state's rivers and streams. Financed by the National Science Foundation through its NH EPSCoR program, NH LoVoTECS (Lotic [moving water] Volunteer Network) has a two-part goal: to better understand the impact of human activity on New Hampshire's water resources, and to provide educational experiences for the state's young people.

"We're trying to give students the opportunity to do hands-on research," says Errin Volitis, a research technician at Plymouth State University's Center for the Environment, which is coordinating LoVoTECS. "We want to reach the next generation of science and technology professionals and to help children see how their activities can affect the world around them."

The network is part of NH EPSCoR's Ecosystems and Society project. The sensors, made by Onset, were installed last year in 53 unique water systems throughout New Hampshire. They capture data on water temperature, water height (related to flow rate), and water electrical conductance (related to the amount of salt in the water, both naturally and from pollution).

"By measuring these things in three-minute intervals (15-minute intervals in winter) for four years, we will be able to characterize how different watersheds behave and compare different watersheds across the state," explains Mark Green, assistant professor of hydrology at Plymouth State University.

The 34 LoVoTECS volunteers include four college professors and nine K-12 educators, most of whom involve their students in the project. Participants off-load data from the sensors and send them to the project coordinators, who are compiling information from all the sensors throughout the state.

"Such a large data set — maybe 100 million data points by the end of the project — is a good entry-level data set for educating students on how to extract information from so much data," Green says. "It takes certain skills with computer programming to be able to interact with large data sets like this, so we will be developing educational modules for students to gain experience working with our data. This skill would apply well beyond environmental science, and into fields like the financial industry, business, engineering and other sciences."

In Newport, Warkentien, who teaches seventh-grade science, and Amethyst, who has accompanied her teacher on this after-school trip to check the sensors, reach the shore of the Sugar River's North Branch — only to find that the water is a couple of feet higher than usual. Warkentien decides it's unsafe to collect data from the sensors today, since they would have to wade thigh-deep into the swiftly flowing water. Still, Amethyst gets to try out the conductivity meter (used to check the accuracy of the sensors) at the water's edge, where she finds that the water temperature is just above freezing. Warkentien records the information in the binder and uses her phone to take pictures of the site that she'll send to Volitis and her colleagues.

It's Amethyst's first time going to the sites — Warkentien monitors a second site on the Sugar River's South Branch — and the seventh-grader says she likes seeing new parts of the Sugar River and taking part in real-life research. She's also inspired by the fact that women, including her teacher, set up the sensors last summer at the Sugar River sites. "I want to be a scientist when I'm older," she says. "I like to do experiments and figure out how I can help" the world through science.

Soon, Warkentien plans to use HOBOware Pro software to create instant graphs that will allow students to compare data over time from the river's north and south branches while looking for patterns and anomalies at each site. Because LoVoTECS will continue for several years, she hopes her students will remain engaged in the project as they enter high school.

"I think it's helped them realize you don't have to be in a lab to be a scientist," she says. "Citizen science lets students see they can have a role in real science and help keep the watershed healthy once they learn more about it."

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Volunteer Science

EPSCoR's Ecosystem and Society project offers opportunities for community members to get involved in science first-hand.

NH LOVOTECS NETWORK

The network is coordinated by a group of researchers, staff and students at Plymouth State University and implemented by a broad group of partners, including educators, researchers, government agencies, nonprofit organizations and citizen scientists. Our goal is to improve our understanding of New Hampshire's water resources and help develop a technically advanced workforce by providing educational opportunities to interact with large data sets.

CoCoRaHS

CoCoRaHS (Community Collaborative Rain, hail, Snow Network) serves as a community-based network of weather observer volunteers and is today the single largest provider of daily precipitation observations in the United States. This program is a joint collaborative with both NOAA and NSF. The New Hampshire network of teachers and students measures important precipitation and snow events and is coordinated by state climatologist Mary Stampone.

CoCoRAHS Albedo Project

This project embraces the CoCoRaHS mission to use low-cost measurement tools, provide training and education, and utilize an interactive website to collect high quality snow albedo, snow depth, and snow density data for research and education applications. Albedo is a measure of surface reflectivity. The volunteer albedo measurement network organized by Elizabeth Burakowski at UNH is a subsidiary group within NH CoCoRaHS and the first of its kind.

Science Camp Scholarship Opportunities

Provided by NH EPSCoR

NH EPSCoR provides scholarships to support students and youth participating in summer camps that engage them in science, technology, engineering, and math. Scholarships are awarded to those with financial need, are minorities, female, disabled and/or part of other underrepresented. Recipients are selected by the director of the camp.

Tech Camp

A career in science can start with a scholarship to Tech Camp's new "Engineeristas" week-long program for middle-school girls or the two-week co-ed pre-engineering program.

Kids on Campus

A program for kids entering 1st-8th grade

Keene State College offers Kids on Campus, a program for kids entering first through eighth grade. Classes provided are a half day, with groupings (1st & 2nd grades, 3rd – 5th grades, and 6th – 8th grades) based on the students' interest and the level of the course's content. There are 10-16 different classes for each group, from "Incredible Insects" to "GPS, Geocaching, and Google Maps."

STEM Camp

Students entering 6th through 8th grades

White Mountains Community College's STEM (Science, Technology, Engineering, and Mathematics) Camp provides opportunities for students to explore the world around them and study how things work. Students entering grades 6 through 8 engage in scientific inquiry, problem-solving, and hands-on activities.

Upcoming Events

April 10 (snowdate April 11)

2013 NHEE Annual Conference–The Inside and Outside of Environmental Education

8:30 am–4:30 pm, Margret & H.A. Rey Center, Waterville Valley, NH

April 10

Portsmouth Science Café: Going Underground–How the Soil Beneath our Feet Affects Climate

Portsmouth Brewery, Jimmy LaPanza Lounge

Door opens 5:00 pm, Discussion starts at 6:00 pm

Serita Frey–Professor of Soil Microbial Ecology at UNH

Alix Contosta–Postdoctoral research scientist at UNH

April 12

Environmental Research Group 2013 Spring Seminar Series

Noon–1:00 pm, UNH, Gregg Hall, Room 320

Speaker: Dr. Alison Watts, UNH/ Topic: Findings from the NH Governor's Commission on Water Sustainability

April 17

What do New Hampshirites know—and believe—about climate change? A tracking poll with new survey research

4:00 pm–5:00 pm, Boyd Science Center at PSU, Room 001

Lawrence Hamilton–Professor of Sociology and Senior Fellow at the Carsey Institute, University of New Hampshire

May 8

Warmer Water, Riskier Coasts: How Climate Change is Affecting Shellfish and Recreation

Portsmouth Brewery, Jimmy LaPanza Lounge

Door opens 5:00 pm, Discussion starts at 6:00 pm

Adam Markham, Director of The Union of Concerned Scientists' Climate Impacts Initiative

Vaughn Cooper, Assoc. Professor of Microbiology and Genetics at UNH

Steve Jones, Research Associate Professor of Marine Sciences and Natural Resources