



# STEM Ed



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from **THE DIRECTOR** MORTON STERNHEIM

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## Three New Programs

I am pleased to report that we have three new National Science Foundation funded programs underway. These include STEM RAYS, an out-of-school science program for Franklin County students in grades 4 - 8; a Nanotechnology Summer Institute for teachers offered in partnership with the UMass Center for Hierarchical Manufacturing; and IPY STEM Polar Connections: A three region initiative to integrate the study of Polar Regions and activities associated with the International Polar Year into the middle and high school curriculum.

STEM RAYS, a joint UMass-Greenfield Community College undertaking, is one of 16 new programs designed to test the idea that involving children in out-of-school science (after-school, Saturdays, summers) will increase their interest in STEM courses and careers. Eleven schools and over 100 children took part in the spring semester pilot, and ten more schools are expected to participate this fall. Forty students attended a one-week summer academy at GCC. The unique feature of our model is the involvement of the students and teachers in environmental research programs on the campuses. The response to date from the teachers and students has been very positive. More details are in an article inside this newsletter and on the web site at [www.umassk12.net/rays](http://www.umassk12.net/rays).

Twenty area STEM teachers attended the first one week Nanotechnology Summer Institute held in July. It explored the basic science and engineering concepts of this exciting new field and illustrated how they may be integrated into the usual math, science and technology courses in middle schools and high schools. The Institute presented two challenges: it is hard to visualize and manipulate objects on this scale, and because the field is so new, very few curriculum materials exist and we had to create much of what we presented. Nevertheless, the Institute was well received. We are looking at more feedback at two Fall recall sessions. Again, more information is inside and on the web at [www.umassk12.net/nano](http://www.umassk12.net/nano).

The International Polar Year is a large scientific program focused on the Arctic and the Antarctic from March 2007 to March 2009. In order to have full and equal coverage of both the Arctic and the Antarctic, IPY covers two full annual cycles from March 2007 to March 2009 and involves over 200 projects, with thousands of scientists from over 60 nations examining a wide range of physical, biological and social research topics. NSF is funding educational projects as a part of this program. IPY STEM Polar Connections will build on the experience of STEM Ed and faculty at UMass as it promotes the teaching of polar science in the New England, Mid-Atlantic, and Great Lakes Regions. It is a curriculum development and professional development program that includes residential 2008-09 Summer Institutes at UMass and academic year online communication for teachers involved in the professional development of colleagues.

As the program develops, information will be available at [www.umassk12.net/IPY](http://www.umassk12.net/IPY). ■

*...because the field is so new, very few curriculum materials exist and we had to create much of what we presented.*

# STEM RAYS

## COMPLETES PILOT PHASE, GOES INTO FULL OPERATION BY MARIE SILVER

Staff and faculty of the STEM Ed Institute geared up quickly last fall when NSF awarded the first round of funding for the new National Academies for Young Scientists (AYS). Informed in August that the funding would be forthcoming, the project needed to get underway by spring of 2007 in order to keep to its proposed schedule. In the ensuing three months, principals and superintendents from all over Franklin County were invited to information sessions, teachers were recruited for a pilot phase to begin in November, and students were invited to apply to join the 11 clubs.

AYS program funding was awarded to 16 sites around the country, each with its own unique plan for reaching out to young students to test the idea that exposing children to out-of-school science (after school, Saturdays, summers) will increase their interest in STEM courses and careers.

Here at the STEM Ed Institute, the approach has been to team fourth to eighth grade teachers with college faculty to engage in authentic science research (projects are tied to research that faculty are currently pursuing in their own careers). Teachers then work with these young students in an after school setting.

The pilot phase involved 11 schools from around the county and research threads included Arsenic in the Environment led by UMass Chemistry Professor Julian Tyson and Pioneer Valley Watersheds led by GCC Environmental Science Professor Brian Adams (Brian is also a co-PI on the Project).



Below is a first hand account from a participating teacher from the spring, Anne Bussler of Conway Grammar School. Beginning in the Fall of 2007, 10 additional teachers and school sites will be added and three more research threads will be explored: Weather and Climate with Professors Paul Siqueira, Engineering and Ray Bradley, Geosciences of UMass; Air Quality with Professor Paul Voss, Engineering of Smith College, David Greenberg of Pax Analytics and Barry Rock of University of New Hampshire; and Birds with Professor Curtice Griffin,



Natural Resources, UMass. The Principal Investigators are Mort Sternheim (STEM Ed), Allan Feldman (Education), and Brian Adams (GCC Environmental Science). ■

### **From My Perspective: Anne Bussler talks about her experience as a pilot teacher with STEM RAYS**

*“Science is easy now,” stated a fifth grader who had just finished the STEM RAYS program at Conway Grammar School. The STEM RAYS hypothesis is that students who are exposed to exciting hands-on science experiments have a greater likelihood of growing up to be scientists. This is a STEM RAYS theory that has been a theory of mine for my entire teaching career. I work very hard to make sure that there are many hands-on experiments in my classroom. The more that students are engaged in a science activity, the more likely that science will become more important to them.*

*Each STEM RAYS school site held an after-school class in a Franklin County elementary or middle school. Each teacher had the choice of water studies or arsenic with three Saturdays of training. Applications were distributed to all fourth through eighth graders in the site schools. There were field trips, guest appearances, and a healthy supply budget.*

*I introduced my topic, arsenic, with a slide show prepared by UMass Professor Julian Tyson. When the children learned about arsenic related deaths in Bangladesh, they were appalled. The presence of arsenic in pressure treated wood used to build decks, docks, benches, and raised beds in western Massachusetts coupled with the knowledge that arsenic has been found in wells as close as New Hampshire, galvanized them into action. Once the students realized the local danger, they became diligent in note taking and scientific observation and thoroughly enjoyed the experiments. The Science Fair, as a culminating activity, provided the children with a showcase for their experiments and a chance to view the research by other STEM RAYS middle school students. Overall, both I as a teacher and my students were excited with the opportunity to learn about arsenic in this manner and thought that this was an incredible experience. ■*

# NANOTECHNOLOGY Summer 2007 Institute

BY HOLLY HARGRAVES AND ROB SNYDER



Twenty middle school and high school teachers attended a one-week Nanotechnology Summer Institute on the UMass Amherst campus in July. Sponsored by the STEM Education Institute and the Center for Hierarchical Manufacturing and funded by the National Science Foundation, this institute explored a variety of ways in which nanoscale science and engineering can be integrated into middle school and high school classes.

Coordinated by Morton Sternheim, STEM Director, and Mark Tuominen, Director of the Center for Hierarchical Manufacturing, the Institute was held July 23rd to July 27th. Each day of the institute included brief lectures by the Nanotechnology staff followed by a number of hands-on activities. Time was provided to discuss the teaching implications of each activity, and connections were made to both state and national standards.

During the first day of the Institute, teachers formed a very dilute solution of oleic acid so that one drop of oleic acid in that solution spread across the surface of a container of water to form a nanoscale thin film. This was an example of a nanoscale self-assembly process.

Another example of a nanoscale self-assembly occurred later during the institute as teachers electroplated a very thin layer of zinc metal onto a strip of copper metal. Teachers also had an opportunity to synthesize nanoscale ferrofluid structures in a chemistry laboratory. These three activities demonstrated that, while nanoscale manufacturing sometimes requires the use of very sophisticated instrumentation, there are activities appropriate for middle school and high school STEM programs that result in the production of nanoscale structures.

Other activities included investigations that explored the medical applications of nanoscale structures, the design of structures that detect and map nanoscale structures, and the influence of surface area to volume ratios on the properties of matter.

Teachers also had many opportunities to interact with researchers at UMass Amherst who are investigating the many aspects of nanoscale science and engineering.

Presentations by UMass researchers included discussions of the delivery of nanoscale medicines to cancerous tumors, the range of useful applications of nanoscale manufacturing, and the assessment of the risks and benefits of nanoscale science and engineering. Discussions that followed presentations by UMass researchers provided opportunities for teachers to gain a better understanding of the concepts and processes associated with nanoscale science and engineering.



Teachers also viewed several video and 3-D animation modules that are under development at the Center for Hierarchical Manufacturing. These multi-media modules have the capacity to provide a link between the classroom activities that are common to middle school and high school STEM programs and sophisticated and complex nanoscale science and engineering processes. The feedback that teachers provided after these viewings will be utilized as the process of producing multimedia modules is refined. Teachers also had an opportunity to suggest strategies for utilizing the modules in middle school and high school STEM programs.



During the institute, teachers began the process of developing nanoscale curriculum materials for their middle school and/or high school STEM programs so that their students can develop an understanding of and interest in nanoscale science and engineering processes. Participants will gather again on October 13th and December 1st to share curriculum that they have developed for their schools.

An on-line forum will be used for participating teachers to post lesson plan ideas with each other and to discuss nanotechnology topics.

Participants provided the staff with daily feedback on the content and logistics of the institute which will guide the staff in planning the program for 2008. Comments at the end of the week were very positive about the experience. Our program evaluators, Peterfreund and Assoc., surveyed participants and concurred.

Information about next year's Nanotechnology Summer Institute for middle school and high school teachers that are scheduled for the week of July 7th will be available in January of 2008. See [www.umassk12.net/nano](http://www.umassk12.net/nano) for more information. ■



# IPY STEM

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## POLAR CONNECTIONS

The National Science Foundation has recently awarded STEM Ed a three-year, \$600,000 grant to create IPY STEM Polar Connections: a three region initiative to integrate the study of Polar Regions and activities associated with the International Polar Year into the middle and high school curriculum. As explained briefly on the front page, the International Polar Year (IPY) is an international effort to focus on research and public understanding of these fascinating and environmentally fragile areas. We will develop, test, and disseminate curriculum materials as a part of this IPY program. Although these materials will be designed specifically for the New England, Mid-Atlantic, and Great Lakes Regions because they share common weather and climate connections to the Arctic, many will have widespread usefulness in middle school and high school science classes everywhere.

IPY STEM includes residential summer institutes with academic year online communication for in-service teachers who are involved in professional development of their colleagues. During each summer institute, teachers will be introduced to sets of STEM Polar Connections Modules that will emphasize the process of scientific inquiry and will explore a variety of proven techniques for effective teaching, including inquiry-based teaching, cooperative learning, and methods for formative assessment of student learning. The Summer Institutes at UMass will be designed to advance the knowledge that STEM teachers have of the characteristics of and processes that occur in Polar Regions so that they can effectively field test curriculum modules and disseminate final versions of the modules at the local, regional, and national level.

The activities of the STEM Polar Connections curriculum modules will be aligned with the National Science Education Standards and with state standards for each state in the three participating regions and will emphasize the value of advancing

society's understanding of the nature and possible causes of changes in the physical environment and ecosystems of the Polar Regions and the relationship of those changes with other physical environments and ecosystems. The interdisciplinary activities of STEM Polar Connections Modules will be designed to acquaint middle and high school students with the many avenues of polar research, the extent of international collaborations in polar research, and opportunities they will have to participate in that research. The modules will utilize several formats in order to maximize their use in a wide range of middle and high school STEM programs across the country.

Teachers will be actively engaged in the process of producing final versions of the STEM Polar Connections Modules initially drafted by the STEM Polar Connections staff. A strong educational research component will assess the effectiveness of providing local and regional contexts for conducting research that results in an understanding of Earth's global systems that are influenced by and interact with the physical environments and ecosystems of Polar Regions. ■

***We have assembled a strong staff for this project. STEM Ed Director Mort Sternheim is the Principal Investigator (PI); Julie Brigham-Grette, Professor of Geosciences and a prominent polar scientist, is the co-PI. Other faculty participants include Ray Bradley, Professor of Geosciences and director of the Climate System Research Center (CSRC), and Paul Siqueira, Associate Professor of Electrical and Computer Engineering and an expert on remote sensing. Much of the curriculum development will be done by Rob Snyder (STEM Ed), a retired science teacher; Dr. Catherine Devlin, an expert on Arctic birds; Holly Hargraves, retired English teacher, and Marie Silver, STEM Ed Project Manager, who has developed environmental science curricula.***

## PV STEMNET HAS A VERY PRODUCTIVE YEAR

by Kathy Baker

The Pioneer Valley Science, Technology, Engineering and Mathematics Network (PV STEMNET) has been very busy this past year implementing a variety of mathematics and science professional development programs for middle school teachers and middle school students in the region. Through the efforts of Allan Feldman and Mort Sternheim, the University has received a new "Pipeline Grant" from the Board of Higher Education for three years which began in January '07. Additional grants from the Massachusetts Department of Education funded six graduate level courses for teachers that were offered at several institutes of higher education this summer.

The first Massachusetts Mathematics and Science Partnership (MMSP 1) grant offered two mathematics courses this summer, Calculus and Statistics. Calculus was taught by Professor Ileana Vasu from Holyoke Community College, and Alexander Alvarez, Amherst Public Schools. Statistics was taught by Professor Fides Ushe, Springfield College, and Amy Wolpin, Amherst Public Schools. These last two courses were part of a three-year, six-course program, designed to assist teachers with middle school mathematics certification requirements as well as providing them with the tools to take and pass the MTEL test. Teachers participating in this program receive PDPs from the University and have the opportunity to select the three graduate credit option available through Continuing and Professional Education. Many of the teachers who participated in this first grant currently are graduate students at the UMass School of Education – Teacher Education and Curriculum Development program.

*continued on page 6*

# EARTH CENTRAL 2007: ENDING ON A HIGH NOTE

BY HOLLY HARGRAVES

This summer, STEM Ed hosted the third and final Earth Central Institute, a science teacher education program held on July 30th through August 10th. STEM Director Morton Sternheim and Geoscience Professor Richard Yuretich were the directors of the Earth Central program. Twenty-five participants from 10 states, including California, Colorado, Connecticut, Maryland, Minnesota, Nebraska, New York, Rhode Island, and Texas and 15 from Massachusetts attended the two-week institute.

Before the institute started, teachers were asked to post biographies on Earth Central's online forum, which was developed by STEM staff as a way to generate news and information to participants. Connections were made for both the participants and the staff before everyone officially met on July 30th.

Funded by NASA and UMass Amherst, STEM Earth Central was designed to promote the teaching of concepts and processes articulated in the Earth and Space Science strand of the Massachusetts Science and Technology/Engineering Framework in middle and high school. It featured a variety of proven techniques for effective teaching, including inquiry-based teaching, cooperative learning, and hands-on activities. Participants who live beyond commuting distance were housed in the new campus dormitory, North Residential Area, Building C, and enjoyed the air conditioning during those hot summer weeks.

The first week of the workshop focused on major concepts and skills related to mapping, the geosphere, and the atmosphere. Participants were given GPS instruments for use during the institute and to keep afterwards for use in their classrooms. A brief review of rocks and mineral identification by geology professor Richard Yuretich was followed by an on-campus search of various rock samples. A geological field trip to nearby Mt. Toby was conducted mid-week.



Teachers explored the Carbon Cycle and, led by astronomy professor, Steve Schneider, measured carbon dioxide in various places on the UMass campus. In addition, teachers began work in collaborative groups on their own research about the design and engineering of a solar "home." STEM staff member Rob Snyder assisted the teachers over the two-week session as they worked on these projects.

A catered barbecue for all participants, staff, and their families was hosted by Rob and his wife, Louisa, on the second day of the institute. The movie, *An Inconvenient Truth*, was shown Thursday evening to interested participants and was followed by interesting PowerPoint presentations by both Professors Yuretich and Schneider on Friday morning. Their collaborative presentation, "Global Warming or Climate Hysteria," sparked a lively discussion and debate on the topic.



The second week of the institute began with a guest speaker, Mike Gagnon, from the University of New Hampshire's Forest Watch program. Mike introduced teachers to the concept of ozone impact on white pines and how to measure its effects in a laboratory setting. On Tuesday, Dr. Yuretich provided information on geographic information systems (GIS) and Google Earth at the engineering computer laboratory.

A second field trip was made to the UMass Sunwheel where Professor Schneider discussed the variations of the position of both the sun and moon on the horizon throughout the year. There, teachers participated in the NASA S'Cool program to record the cloud cover at a predetermined time as part of an ongoing national research project.

After a brief review of the hydrologic cycle, participants went on a third field trip on Wednesday to the local Mill River in Amherst to measure stream flow using such simple instruments as pinwheels, oranges, string, and a calculator. This was followed up by a presentation of online data which measures stream flow from a global perspective.



Throughout the week, teachers were asked to collect and record ideas on potential curriculum projects they could take back to their schools. STEM staff member Holly Hargraves assisted the teachers with this lesson planning requirement, and teachers began to outline three lessons which will incorporate concepts taught over the two-week institute. Teachers will post their lessons online using the Earth Central Online Forum and provide follow up feedback later on how the lessons worked in their classrooms.

This Institute reflected great effort by the staff to provide a program where teachers could learn new concepts and skills in a format that would inspire and energize them as educators. Participants evaluated the program with high praise and thanked the staff for their professionalism, creativity, knowledge, and support.

"This workshop was amazing. I had no idea that I would leave with so many demos/activities/labs that are useful. The food was out of this world. Thanks to all who made this happen. This is the first workshop [where the staff] literally practiced what they preach! They taught us by letting us discover. Not a dull moment!"

More information on this program can be found at [www.umassk12.net/earth](http://www.umassk12.net/earth) ■

# NOYCE SCHOLAR TRAVELS TO WASHINGTON D.C. \_\_\_\_\_ FOR ANNUAL MEETING BY MARIANNE METZGER

As a 2006 recipient of the Noyce Scholar Program at the University of Massachusetts, I was excited to be able to represent UMass at the Noyce Scholarship Conference in Washington, D.C.

I had just finished my Master's Degree in Education at the University's School of Education, and I was hired as a high school biology teacher at Middletown High School in Middletown, CT, a high-needs school district. One of the advantages of the conference was that I was able to get together with other high-needs secondary teachers to discuss strategies, lesson plans, and resources. There were many companies and educational experts present at the conference as well, and I came away with many ideas, particularly for the field biology classes I am teaching. The conference and the Noyce Program as a whole was a wonderful experience for me and has significantly improved my teaching in both theory and teaching practice. ■

## NOYCE SCHOLARS ANNOUNCED BY MARIE SILVER

Named in honor of the "Mayor of Silicon Valley", Robert Noyce (1927-1990), the Noyce Scholarship is funded by the National Science Foundation ([www.umassk12.net/bridge](http://www.umassk12.net/bridge)). Students (both graduate and undergraduate) that major in science or math and have decided to enter the secondary teaching field can apply for up to \$10,000 in funding to support their education (this year, this amount was increased to a cap of \$20,000 under certain circumstances). Now in its third year of awarding scholarships, the STEM ED Institute and STEP program are pleased to announce that the following students were awarded scholarships for this academic year:

**MR. COSMO LAVIOLA** Mr. Laviola received a B.S. in Biology in 2005 and is enrolled in the UMass STEP program. He acquired an interest in teaching through substituting and coaching at the high school level.

**CHRISTINE CROLL** Ms. Croll received an Honors MS in Mathematics from UMass in spring 2007 and began work this fall on her graduate degree in the STEP program. She received a Noyce Scholarship last year as she completed undergraduate work. Her goals for teaching solidified after she spent time as a teaching assistant in the math department. In her own words: "Anyone can teach someone who wants to learn, but it takes a truly dedicated teacher to reach out and teach those that have given up. I learned to love the challenge of helping those who believed themselves to be beyond help. If they hated math, my goal became to make them love it."

**MR. JONAS LAPOINTE** Mr. LaPointe received a B.S. in Wildlife Conservation at UMass in 2001 and enrolled in the STEP program at

UMass in January 2007. He has tutored in the Hadley school system and spent several years doing field work in wildlife conservation.

**MS. JENNIFER SMITH** Ms. Smith recently transferred from Holyoke Community College to UMass to finish her degree in Biology. Her goal is to become a high school biology teacher. She is a first generation college student and was an honors student while attending community college.

**MS. LINDSEY WHITE** Ms. White graduated with a Biology degree from UMass in spring 2007. She has already spent time in the middle school classroom as she assisted a 7th grade science teacher at Amherst Middle School and volunteered in their after school program. She is currently enrolled as a graduate student in the STEP program.

In addition to this year's scholars, the following students were awarded scholarships after this newsletter was published during the 2006-2007 academic year:

**MR. JOHN DANAHER** Mr. Danaher graduated from UMass in 2006 with a degree in Computer Systems Engineering and is in his second year of a graduate degree in the STEP program. His goal is to teach physics, math, or computer science in high school.

**MR. WAYNE KERMENSKI** Mr. Kermenski received a B.S. in Environmental Science from UMass in 2004 and a B.A. in 1998 from UMass in Psychology. He graduated from the STEP program in 2007 and has since obtained a teaching position in Southeastern Massachusetts. Mr. Kermenski worked for the STEM ED Institute as an after school science teacher in the STEM RAYS program at Mohawk Trails Middle School while also student teaching at the Mohawk Trails Regional High School.

**MS. ANGELA LAVOIE** Ms. Lavoie graduated from UMass spring 2007 with a degree in Mathematics and enrolled in the STEP program for fall 2007. She hopes to find a teaching position that will allow her to pass on her love of mathematics.

## PV STEMNET HAS A VERY PRODUCTIVE YEAR *continued from p. 4*

The more recent MMSP 2 grant, funded for 3 years beginning in September 2006, offered professional development programs to middle school teachers in both mathematics and science. Courses offered for graduate credit under this grant were: Life Science (taught by Professor Karl Sternberg, WNEC, and Janice Wing, Quaboag Regional School System), Algebra/Geometry I (taught by Professor Zenobia Lojewski, Springfield College, and Alexander Alvarez, Amherst Public Schools), Math, Mind and Matter (taught by Professors Andrew Perry, Springfield College and Ileana Vasu, Holyoke Community College, and Pamela Kinn, PV Montessori School), and Engineering: Making It Better (taught by Beth McGinnis-Cavanaugh, STCC, and Richard Pree, Smith Vocational and Agricultural High School). Additional courses of a similar nature will be available in the summer 2008. For additional information on next year's programs, the PV STEMNET website – [www.umassk12.net/pvnet](http://www.umassk12.net/pvnet) should have information posted beginning in March 2008.

The new "Pipeline Grant", currently in its first year, sponsored programs this summer in Mentoring Teachers in Mathematics and Science, which were offered at Westfield State College through the University at Santa Cruz, California, and an Engineering Is Elementary workshop for teachers in the Holyoke Public Schools taught by the Boston Museum of Science. In addition to these workshops, two programs for middle school students were developed and implemented by the Gateway Regional School District. These two summer camps were designed specifically for girls interested in learning more about the field of bio-technology.

# CONFERENCE ON ALTERNATIVE CERTIFICATION FOR SCIENCE TEACHERS: LESSONS LEARNED

As we reported last year, STEM Ed and the School of Education held a national conference entitled "Science, Technology, Engineering and Math—Alternative Certification for Teachers" (STEM-ACT) on May 5-7, 2006 in Arlington, Virginia. This is the third conference STEM Ed has managed for the National Science Foundation (NSF) in Arlington. Funded by a \$200,000 grant from NSF, the conference brought together about 70 researchers, policy-makers and practitioners. It was a working conference, with all the attendees presenting papers or offering prepared responses to the presentations and with everyone taking part in closing sessions designed to extract the main points of the discussions.

It became very clear early on that the term *alternative certification* is ambiguous. To some, alternative certification programs are those designed to respond to teacher shortages by putting career-changers and others into classrooms

more quickly than "traditional" teacher education programs. Others use this designation for anything other than a four-year undergraduate certification program. There is a myriad of alternative teacher certification programs in existence at national, state, and local levels, designed for substantially different population of teacher candidates, and with various programmatic features. The consensus at the conference was that there needs to be a continuum of teacher preparation and support programs to serve the varied needs of schools and of preservice and in-service science teachers.

**...much of what is believed about the quality of teacher certification programs, in general, is not supported by any evidence.**

Another key point that emerged is that much of what is believed about the quality of teacher certification programs,

in general, is not supported by any evidence. It was also noted that both supporters and critics of alternative certification base their opinions on a very thin research base. Clearly much more research is needed.

The highlights of the conference have been reported at annual meetings held by the National Association for Research on Science Teaching (NARST), the Association for Science Teacher Education (ASTE), and the American Association of Colleges of Teacher Education (AACTE). There has also been a report delivered at an NSF Discovery Research K-12 (DR-K12) Principal Investigators meeting and a paper published in the Massachusetts Association for Supervision and Curriculum Development Perspectives.

Three "white papers" addressed to the research, policy making, and practitioner communities have been produced and are available, along with a summary, at [www.stemtec.org/act/whitepapers.htm](http://www.stemtec.org/act/whitepapers.htm) ■

## UMassK12 ENDS DIALUP SERVICE

UMassK12, the pioneering Internet service for teachers, is ending dialup. This marks the end to a program that began in May 1986 with a PC based bulletin board service, and offered Internet service in 1993. At its peak, UMass K12 served thousands of teachers across the state who had no other Internet access.

For many years, user numbers have declined steadily as more convenient and often faster Internet access has become available in schools and in homes. We shut down our under-utilized Holyoke and Franklin County modem pools in January 2006. In March of this year, UMass closed down the campus modem pool we were using, forcing us to install our own modems. We can no longer justify the costs of running this pool for the very limited number of subscribers remaining, and will shut down our modem pool on December 31.

However, UMassK12 is not shutting down. We will continue to offer mail services at a nominal cost for those who prefer our interface. We will also continue to host web sites and discussion forums for our projects, to send out announcements of professional development opportunities, and to serve as a resource for the STEM education community. ■

## SMET OR STEM: WHAT'S IN A NAME?

Where did the acronym STEM come from? A UMass group met sometime in 1995 and discussed forming what is now the Science, Technology, Engineering, and Mathematics Education Institute, or STEM Ed. Clearly we needed a name.

The National Science Foundation had been using the phrase Science, Mathematics, Engineering, and Technology Education. The corresponding acronym, SMET, seemed very unappealing, albeit undefined. Somebody in the group – just who is lost to history – suggested rearranging the phrase to read Science, Technology, Engineering, and Mathematics, or STEM. STEM had obvious positive meanings; we unanimously agreed on that name. Before long, our NSF program officer apologized to us for borrowing the term, and STEM largely replaced SMET at NSF.

Every week or two we get a phone call or email from somebody with a question about STEM. What is it, do we have a job opening, how can they get funding? We have wondered how they happened to contact us. It now appears that the answer may be the ubiquitous Google search engine. A recent search on the word STEM returned over 150,000,000 hits, and STEM Ed was the second on the list. The first was a listing for a stock with STEM as its symbol; the third was a Wikipedia entry on a device for smoking cocaine. It's not clear what, if anything, this list suggests. ■

# STEM Ed

Newsletter of the  
**STEM Ed Institute**



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## CALENDAR

### STEM ED TUESDAY SEMINARS

4:15 PM in Hasbrouck Laboratory 138, usually the first and third tuesday of the month. Refreshments, 4:00 PM. No charge; parking is in the Campus Center garage. Information: [www.umassk12.net/calendar](http://www.umassk12.net/calendar)

- September 18** BRINGING DATA AND CHANCE TOGETHER IN THE MIDDLE SCHOOL, Cliff Konold , Scientific Reasoning Research Institute, UMass
- October 2** USING BLOG SOFTWARE TO CREATE A COURSE WEBSITE: A DEMONSTRATION WITH DISCUSSION Frederick C Zinn, Senior Designer, Instructional Technology, OIT Academic Computing, UMass
- October 16** INCLUSIVE PEDAGOGY: TEACHING METHODOLOGIES TO REACH DIVERSE LEARNERS IN SCIENCE INSTRUCTION Mary Moriarty, Assessment Researcher, Picker Engineering Program, Smith College
- November 6** THE UNDERGRADUATE COMPONENT OF THE ARSENIC PROJECT Julian Tyson, Dept of Chemistry, UMass
- November 20** FOUR YEARS OF TEACHING WITH THE TABLET PC: WHAT WORKS AND WHAT DOESN'T Heath Hatch, Dept of Physics, UMass
- December 4** TEACHER LEARNING OF TECHNOLOGY-ENHANCED FORMATIVE ASSESSMENT Ian Beatty, Physics Education Research Group, Scientific Reasoning Research Institute, UMass

### SCIENCE AND ENGINEERING SATURDAY SEMINARS

For K12 teachers, Saturdays 8:30 AM to 1:00 PM. Information: [www.umassk12.net/sess](http://www.umassk12.net/sess)

- September 15** EFFECTIVE TEACHING USING DEMONSTRATIONS Bette Bridges, Chemistry, Bridgewater-Raynham RHS
- September 29** POLYMERS ALL AROUND US Greg Dabkowski, Polymer Science, UMass
- October 20** LEGO® MINDSTORMS® MEETS SCIENCE CLASS Paula Brault, Math, Pioneer Valley RHS
- November 3** PALEOMAGNETIC SIGNATURE OF DEEP-SEA SEDIMENTS: A HANDS-ON AGE DETERMINATION LESSON FROM THE SCHOOL OF ROCK Mark Leckie, UMass Geosciences
- November 17** MORE NANOTECHNOLOGY Mark Tuominen, Physics, UMass
- December 8** Weather cancellation makeup date
- December 15** Recall for those registered for graduate credit

### COMING SUMMER 2008

- June 30 - July 3** STEM RAYS SUMMER ACADEMY
- July 7- 11** NANOTECH SUMMER INSTITUTE
- July 14-18** IPY STEM POLAR CONNECTIONS SUMMER INSTITUTE