The STEM Office Midshipmen Heroes:

Providing support for STEM activities

- Blake Stout
- Quinton Calmus
- Michael McPherson
- Kelly McNamee
- Bryan Heasty
- Nicholas J. Peskosky
- Ariel Coreth
- Eric Emerling
- Jason Metzger
- Lee Dam
- Jordan Armstrong
- Jonathan Monti
- Jon Williams
- Julie Stabile
- Robert Detchon
- Daniel Johnson
- Christopher Stevens
- Jennifer Jones
- Drew Shaut
- Hannah Yun
- Darryl Lindie
- Matt Disher
- Jenn Underhill
- Angela Cole
- Brad Schieve
- Kevin Lees
- Britney Conkell
- Jamel Dobbs
- Lorna Ceaser
- Dyanna Cuevas
- Katherine Castro
- Kristin Smith
- Kia Logan
- Catherine Drake
- Kelly Ranz
- Claire Fletcher
- Rhyan Lange
- Colin Bogdan
- Justin Chock
- Andrew Pfau
- Joyce Kim
- Victoria Cannon
- Corinne Landis
- Lyndsey Peters
- Sergio Logan
- Kia Logan
- Kristin Smith
- Emani Decquir
- David Fernandez
- Terrie Williams
- Tiera Daniels
- Camille Ross
- Christina Johns
- Jennifer Eikenberg
- Michelle Maddox
- Jessica Ridgway
- Arabia Littlejohn
- Dorinda Pintos

STEM STATS…

***Only 32% of fourth-graders, 31% of eighth-graders, and 21% of twelfth-graders scored “proficient” in science.**
***One-third of US students, who intend to major in engineering, switch majors before graduating.**
***Overall, the United States ranks 27th among developed nations in the proportion of college students receiving undergraduate degrees in science or engineering.**

Sources: SAE Foundation News, Winter 2011 .
2009 Nation’s Report Card, National Assessment of Education Progress
Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future, page 16
Organization for Economic Cooperation and Development, Education at a Glance 2009, OECD Indicators, Table A-3,5.

The STEM Office is supported by:
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The National Defense Education Program
and **The Office of Naval Research**

STEM

At the United States Naval Academy

Science * Technology * Engineering * Mathematics

The USNA STEM office is focused on addressing an urgent national priority—persuading more young people to pursue careers in science, technology, engineering, and mathematics while engaging our own midshipmen in quality STEM programs and outreach to the community.

The Odgers Professorship was established in 2010 by a private testamentary gift to the US Naval Academy Foundation from the Carol and Ralph E. Odgers Family Trust.

STEM OFFICE

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590 Holloway Road
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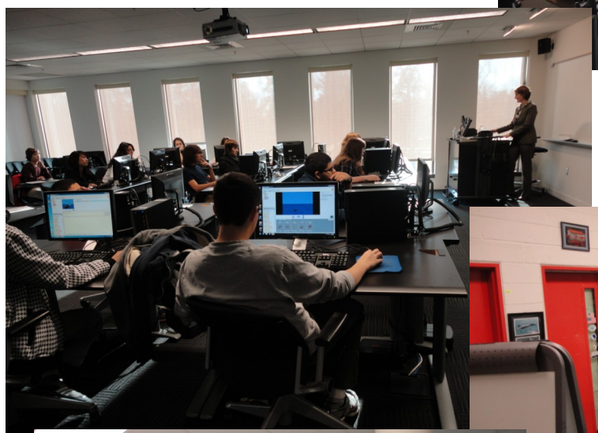
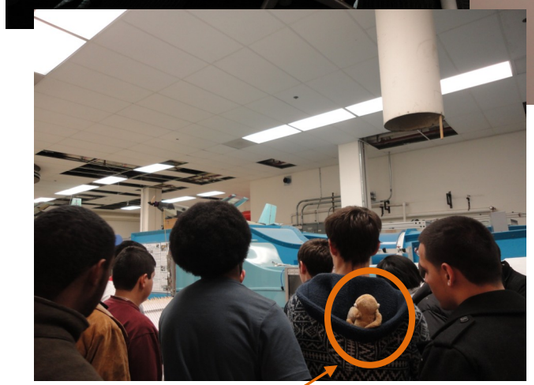
Coming Next Semester:

- High School Engineering Days
- Boy Scout Jamboree STEM Day
- Teacher Training Days
- Nifty Fifty presentation
- SeaPerch Regional Competitions
- FIRST Robotics Maryland Challenge
- USA Science and Engineering Festival
- Army Navy Bridge Building Contest

Mini-STEM
Oklahoma City High Schools

(*Below and right):* Professor Adina Crainiceanu of the Computer Science Department demonstrates how to create 3D animations with ALICE software and then checks to see that all the students are making progress towards the completion of their own custom animation. Midshipman Bryan Heasty facilitated the sessions.





And Mitch was right there, taking it all in.

(*Above and left):* In the Aerospace Windtunnel Labs, Professor Mark Murray of the Mechanical Engineering Department discusses the basics of supersonic flow and the properties of lift and drag. The students witness a supersonic shock wave and the drag produced by different shapes in the windtunnels and the lifting forces on an airfoil as well as an airfoil in a stall state.

A Walk For Education with NSBE

Pictures courtesy of
MIDN Audrey Stiles

The USNA National Society of Black Engineers (NSBE) Chapter and the STEM Office joined forces to take STEM outreach to Annapolis on October 29, 2011. Wearing bright orange tee-shirts about 15 midshipmen and Professors Oscar Barton, Patrick Moran, and Angie Moran met with students throughout the Eastport region, carrying the message of NSBE's program, A Walk for Education (AWFE), "to increase awareness of the opportunities available through education particularly in the STEM fields and to shatter myths about African-Americans in math, science, engineering and other technologies." AWFE is a grassroots program in which NSBE members go door to door in underserved black communities and hand out information on college preparation, scholarship information, SAT/ACT preparation tools, and NSBE events. For this event, they also share information on the benefits of majoring in STEM fields. The students later all met at the Eastport Recreation Center for pizza and STEM activities, led by the faculty and midshipmen. They were joined by USNA Diversity Officer, Captain Roger Isom and Annapolis Mayor Joshua Cohen.

USNA STEM Trips ... *ABROAD*

During the 1840's, James Joule in Manchester, England developed and performed many experiments that 'brought to light' the intra-convertibility of chemical energy, electricity, heat and work. His relatively simple experiments led to the formulation of the Law of Energy Conservation (also called the 1st Law of Thermodynamics.) This law of nature is one of the most important in the world of science and technology today. James joule was honored with the SI united of energy (the 'Joule') being named for him in 1889.

While on a recent Odgers sponsored trip overseas, Jim Cowart (Associate Professor, Mechanical Engineering, USNA) took a few days to study the lab notebooks and experimental artifacts of James Joule which are located at the University of Manchester in England. Professor Cowart is in the process of recreating some of Joule's experiments for both an improved scholarly understanding of the seminal works as well as to provide STEM outreach activities for young people to experience and learn firsthand about energy conservation. Some of Joule's experiments showed that if machine heat generation is reduced, then machine output work could be increased, thus producing more efficient energy conversion devices. In today's world with such dwindling energy resources, Joule's technical lesson of less heat generation and more work production from energy sources is just as important and relevant as it was when he studied energy conversion over 160 years ago.

USNA Hosts First Annual Expanding Your Horizons Conference
October 15, 2011

October 15th, 2011 marked the first annual Expanding Your Horizons (EYH) event hosted by the United States Naval Academy. EYH is a conference series developed to encourage young women to pursue education and careers in STEM fields. The 2000 Congressional Commission on the Advancement of Women and Minorities in Science, Engineering, and Technology Development (CAWMSET) stated, "Today's U.S. economy depends more than ever on the talents of skilled, high-tech workers. To sustain America's preeminence we must take drastic steps to change the way we develop our workforce. An increasingly large proportion of the workforce consists of women, underrepresented minorities and persons with disabilities – groups not well represented in science, engineering, and technology fields." The EYH conference is designed to be one of those steps.

Knot-tying (mathematics)

Physics Of Waves

Optics

For EYH ANNAPOLIS, 240 middle-school girls, from all over Maryland, Washington D.C., and northern Virginia, came to the academy to participate in the daylong conference. The event began with comments from women, past and present, who were pioneers in their fields. There was a video that introduced Admiral Grace Hopper, the mother of COBOL and one of the most significant persons in the history of the computer. Then followed a talk by Capt. Heidi Stefanyshyn-Piper who elaborated on her experiences in space as an astronaut, as well as her career as a Navy diver and an Engineering Duty Officer. (*continued on next page.)*

Expanding Your Horizons Conference

Biometrics

Boat Building

The girls split into smaller groups to participate in hands-on modules related to topics ranging from Astronomy to Optics to Mathematics to Electrical Engineering to Biometrics. Each session lasted an hour, with each group of girls participating in a total of three different sessions. Each module was staged by faculty, midshipmen, or friends of the STEM office. Student groups were led by Midshipmen volunteers who facilitated the teaching and learning experience. During lunch there was a career chase/scavenger hunt, which encouraged the participants to uncover facts about the different STEM Heroes, those women scientists, engineers, and mathematicians who staffed the event. The girls were encouraged to talk to these leaders, learn about their backgrounds and careers, and experience the exciting paths that a STEM education can provide within the Navy, both civilian and military.

Forensics

The ultimate success of the day lay in the combination of the many engaging and exciting hands on activities, and the sense of purpose and community provided by Navy women who demonstrated they are an important and integral part of the STEM community.

Chemistry

EDO Community Support

Astronomy

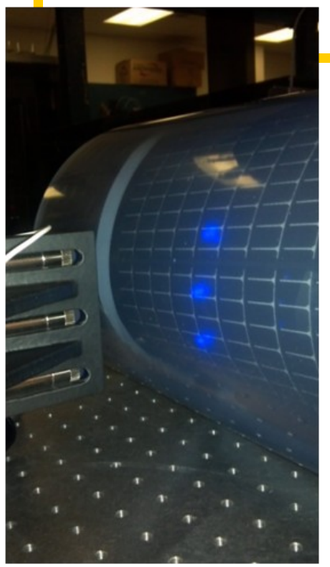
PATRIOTS
Launch at USNA

The Patriots Technology Training Center, held SeaPerch workshops at Walker Middle School for dozens of students and center members. Toby Ratcliffe (NAVSEA) and USNA STEM Office's Professor Angie Moran, along with about a dozen midshipmen, helped the students design and build their SeaPerch. Midshipmen Drew Shaut, Blake Stout, Quinton Calmus, Michael McPherson, Bryan Heasty, Ariel Coreth, Lee Dam, Jonathan Monti, Jon Williams, Robert Detchon, and Daniel Johnson gave up their Saturdays, to support this activity.

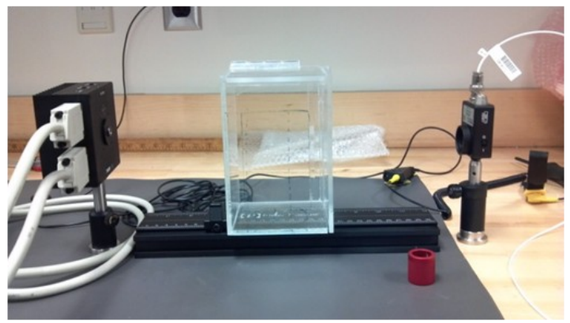
SeaPerch are underwater remote operated vehicles (ROVs). Although very cost effective projects for students, building a SeaPerch teaches many different kinds of engineering skills, from measuring and cutting PVC for the body of the ROV to soldering and connecting circuit boards, to building propulsors. The students at the Patriot event were learning all these things as they prepared for the Sea Perch Challenge that took place on December 3rd at USNA. Successful perch teams completed speed and maneuverability trials as well as "capping the under water oil well" mission simulating the gulf oil crisis. All events took place in the USNA Hydromechanics Lab. Students also built rockets in the Aerospace Lab and learned about Engineering Design by building balloon powered vehicles in the Fluids classroom. Parents and students finished the day with a tour of the engineering labs.

STEM MID PROJECT: The SeaRay

AUTONOMOUS UNDERWATER VEHICLE (AUV) IN-SITU BATTERY CHARGING AND COMMUNICATIONS USING A DIRECTED ENERGY (DE) BEAM.



Photovoltaic Array Test



Optical Link Experiment

As part of a multidisciplinary engineering research project involving MIDN Katherine Bollino, Kevin Lees, Will Peabody, Andrew Haines, and Andrew Flora, a prototype ROV/AUV was defined, designed and built that utilizes a Directed Energy Beam to recharge its batteries and to use as an optical communications link. The Directed Energy Research Center (DERC) in Rickover Hall is being utilized to determine experimentally the capabilities of underwater power beaming and communications and to familiarize students with the concepts. The recharging and communications occur in a specially designed underwater docking station built in one of the hydro tanks at USNA. Results will be utilized in the Naval Academy's STEM outreach program to excite High School students about Directed Energy Technologies. CDR Joe Watkins is the lead for DERC and the primary faculty member advising the midshipmen effort.

USNA SUPPORTS MESA Day

Mathematics Engineering Science Achievement

Enlisting the help of Midshipmen Kelly Ranz, Claire Fletcher, Rhyan Lange, Colin Bogdan, Justin Chock, and Andrew Pfau and faculty, Dr Beth Mutch of the USNA STEM Office arranged an amazing STEM Day for about 300 students from MD MESA at Johns Hopkins Applied Physics Lab on December 8. Maryland MESA, a K-12 STEM program identifies and supports students statewide to prepare them to attend and graduate from two-year and four-year colleges and universities with a degree in science, technology, engineering, or mathematics.

Maryland MESA specifically targets those who are traditionally underrepresented in these fields—specifically minority and female students. Through participation in Maryland MESA, students develop academic and leadership skills, improve their academic performance, and gain confidence in their ability to compete professionally.