

United States Naval Academy

STEM Center for Education and Outreach

Fall 2015



UNITED STATES NAVAL ACADEMY

USNA STEM Center

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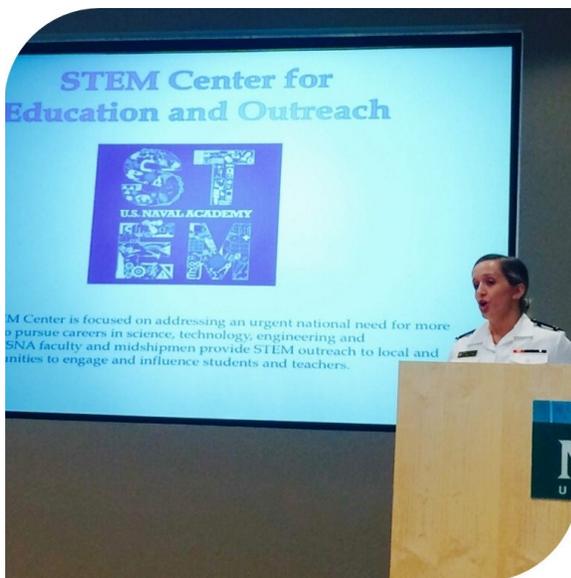
MIDSHIPMEN INVOLVEMENT IN STEM

MIDN 1/C Aldrin Racelis was selected as an awardee for the Great Minds in STEM (GMiS) Military Cadet Role Models Leadership Award. Aldrin was chosen for his leadership as a STEM role model during his years as a midshipman at USNA. He is a Systems Engineering (honors) major with a 3.9 cumulative GPA and has volunteered over 400 hours promoting STEM education for youth in underserved populations. Recently, Aldrin was accepted into the University of Maryland's Master of Engineering in Robotics program.



MIDN 1/C Aldrin Racelis, GMiS Military Cadet Role Model Leadership Award

Pasadena, CA Oct 15, 2015



MIDN 1/C Rachel Busiek, SENCER-ISE National Meeting

Arlington, VA Sept 28, 2015

On September 28, MIDN 1/C Rachel Busiek gave a presentation at the 2015 Washington Symposium and SENCER-ISE National Meeting at George Mason University's Arlington campus. Rachel presented *Facilitating Informal STEM Outreach: Gains and Challenges*, a talk about her experience as a female midshipman and engineering major at USNA. Rachel discussed her gains made as a result of doing STEM outreach. She has volunteered over 500 hours with the STEM Center in her years as a midshipman. Rachel also served as president of the USNA Midshipmen STEM (M-STEM) extracurricular activity.

MIDSHIPMEN STEM OUTREACH

M-STEM Extra-Curricular Activity

In Fall 2015, 172 midshipmen volunteered at STEM events during the semester. Midshipmen logged over 2000 volunteer hours over the course of 16 events during the semester.

EX481S STEM Class

Midshipmen with a strong commitment to STEM outreach can enroll in the EX481S STEM class. In Fall 2015, 59 midshipmen enrolled in the class; meeting once a week, and volunteering for at least 15 hours during the semester. EX 482S is offered in the spring semester.

STEM OUTREACH IN THE COMMUNITY

Midshipmen presented STEM activities to over 480 elementary school students from 20 Maryland public schools in Baltimore, Calvert, Charles, Howard and Montgomery County, over two event days in November and December. MESA Day, held twice a year at Johns Hopkins Applied Physics Lab, is a partnership between the USNA STEM Center and Maryland MESA (Mathematics, Engineering, and Science Achievement). About forty midshipmen supported each event day, presenting hands-on activities in Navy-relevant topic areas. “Personal motivation will inspire similar motivation in the kids being taught,” shared volunteer MIDN 4/C Jack Whalen.



Maryland-MESA Day

Johns Hopkins Applied Physics Lab
Laurel, MD Nov 18 & Dec 2, 2015



Family STEM Night at Oxon Hill Middle School

Fort Washington, MD Nov 12, 2015

Midshipmen 1/C Rachel Busiek, Whitney Heer, Shane Phillips, and Laura Stromback, ran seven STEM stations for over 100 students and their parents at the Oxon Hill Middle School’s Family STEM Night in Prince George’s County. The event was held during the 2015 Maryland STEM Festival, a week-long collection of STEM events hosted throughout the state. The midshipmen spoke to the group about challenges they faced in their STEM majors and gave advice to students about how to succeed in STEM fields. Event coordinator Tameka Woodruff commented that the midshipmen helped to “change the students’ perspective of STEM from ‘too hard and too boring’ to ‘cool and challenging but worth it’.”

STEM OUTREACH IN THE COMMUNITY

Approximately fifty-five midshipmen, mostly women, assisted in Girls Only STEM Day on October 17. The midshipmen were responsible for assisting fifteen Naval Academy faculty in the classroom by providing hands-on activities to a diverse group of approximately 200 middle school girls from Maryland, Virginia, and Washington, DC. During lunch, female midshipmen held a panel where they answered questions from the audience about what they've learned in their STEM major and how they chose their career path. Throughout the day's activities, the girls learned that, with the right education and motivations, they could become anything they wanted to be.



Girls Only STEM Day

USNA Oct 17, 2015



USNA STEM Family Day

USNA Oct 24, 2015

On October 24, forty midshipmen hosted a crowd of over 150 people on the lab deck of Rickover Hall. The event was open to USNA faculty/staff and their families, so that they could experience interactive STEM activities. The midshipmen led a number of activities including controlling SeaPerch underwater remotely operated vehicles (ROV), navigating mazes with calculator robots, engineering aluminum foil boats, launching rockets, exploring electrical circuits with conductive play dough, making artistic lather prints, and more. LT Bryan Beyer commented that “the [midshipmen] were without exception great at explaining the concepts at the right level.”

STEM OUTREACH AROUND THE NATION

The USNA STEM Center presents hands-on STEM activities to visiting school groups at Mini-STEM events throughout the year. On October 30, twenty-six high school students from Dallas, TX, hosted by the Office of Admissions, participated in STEM modules including bioengineering, robotics, fluid mechanics and applied math. On November 20, high school students from the School for Legal Studies in Brooklyn, NY, hosted by the USNA Diversity Office, participated in STEM modules including platonic solids, robotics, and oceaneering. Mini-STEM modules were led by faculty members, Hite Spencer, Mark Murray, Tom Lusby, Jill Richards, and Beth Waitkus. STEM midshipmen met with the students to talk about their majors.



Mini-STEM Events

Dallas, TX students at USNA Oct 30, 2015

Brooklyn, NY students at USNA Nov 20, 2015



STEM Day at GM Tech Center

Warren, MI Oct 16, 2015

Partnering with General Motors (GM) and the United Way, seven midshipmen and three STEM faculty members helped the USNA Office of Admissions host a STEM outreach event for over 150 Detroit high school students at the GM Tech Center. The day consisted of an engineering design challenge, tours through the GM battery and fuel cells testing labs, and hands-on activities led by faculty and midshipmen in collaboration with GM scientists and engineers. Modules focused on thermodynamics, hydraulics, fluid dynamics, electrical engineering, and chemistry. MIDN 1/C Rachel Busiek commented that “the students were particularly inquisitive and interactive. The fun learning environment that was set by those hosting the event made the day enjoyable and educational for all those involved.”

ENHANCING NAVAL STEM OUTREACH



**Best Practices in STEM Outreach
Workshop for Naval Scientists & Engineers**
San Diego, CA Sept 1-3, 2015

Promoting science and engineering is part of the mission for many scientists and engineers at Naval commands around the nation. Many of these dedicated individuals came together at the Best Practices in STEM Outreach Workshop, held at SPAWAR in San Diego, CA on September 2 and 3, 2015.

The workshop, the third in a series presented by the USNA STEM Center and sponsored by the Office of Naval Research, provided a forum to explore hands-on activities for STEM outreach across a range of Naval-relevant topic areas.

With a focus on project-based learning methodology, attendees explored topics including transportation and navigation, corrosion, bioengineering, cybersecurity, and engineering design. Later, participants put into practice the



**STEM Outreach Workshop
for Naval Scientists & Engineers**
PAX River, MD Nov 10, 2015

lessons learned about STEM outreach facilitation by holding an event for military children at the local Youth Center in base housing.

An additional day-long workshop was held at PAX River on November 10 for Naval scientists and engineers in the Maryland and Virginia region.

These workshops present methods to implement effective STEM outreach and promote engagement in Naval STEM topics in an effort to enhance the Naval STEM community and the Naval workforce.

Workshops have been provided for ONR with support from USNA faculty including Scott Davids, Sarah Durkin, Rachel Hetlyn, Angela Moran, Patrick Moran, Mark Murray, Jenn da Rosa, Janice Rice, and Beth Waitkus.

ENGINEERING TO EXPLORE THE OCEAN



SeaPerch/NOAA Workshop

Albuquerque, NM Sept 11-12, 2015

What can teachers do with PVC pipe cutters, soldering irons, and power drills? They can make educational ROVs, incorporate engineering design into their classrooms, and explore real-world underwater robot applications!

This fall the STEM Center provided two *Engineering to Explore the Ocean* teacher workshops in partnership with NOAA's Office of Exploration and Research. The first workshop was hosted by Albuquerque BioPark on September 11 and 12 in New Mexico. Thirty educators from surrounding schools participated, and the event was facilitated by STEM Center faculty.

The second workshop took place at the University of Tulsa on October 26 and 27 in Oklahoma. Hosted by the Tulsa Regional STEM Alliance, the event was attended by 35 educators from neighboring school districts and



SeaPerch/NOAA Workshop

Tulsa, OK Oct 26-27, 2015

was facilitated by STEM Center faculty and five midshipmen.

Both workshops were sponsored by the Office of Naval Research, the Office of Secretary of Defense STEM Diversity Campaign, NOAA, and SeaPerch.org. Each workshop featured NOAA's "How Do We Explore?" curriculum as well as a complete SeaPerch ROV design and build session. Teachers were trained on additional project-based learning activities such as sensor building and hands-on hydraulics.

All workshop participants were provided with curriculum, supplies, resources, and tools to introduce their students to ocean exploration, SeaPerch, and other hands-on STEM activities. A Tulsa teacher remarked, "we are implementing SeaPerch in our engineering class. This training is just what I needed. I am much more confident in starting a program at school."

STEM EDUCATOR TRAINING

Over 90 educators from 60+ schools (in Anne Arundel, Charles, Prince Georges and St. Mary's Counties in Maryland; Fairfax County in Virginia, as well as Baltimore, Washington DC, Norfolk, and Philadelphia) attended USNA's STEM Educator Training on September 26. Modules were facilitated by USNA faculty and midshipmen and offered in applied math, bioengineering, astronomy and optics, corrosion, programming with Alice, and engineering design.

Teacher Elizabeth Southworth commented, "this training allowed me to see multiple STEM concepts delivered in creative and new ways that will enable me to utilize cross curricular connections to build students STEM competence and interest."



STEM Educator Training

USNA Sept 26, 2015



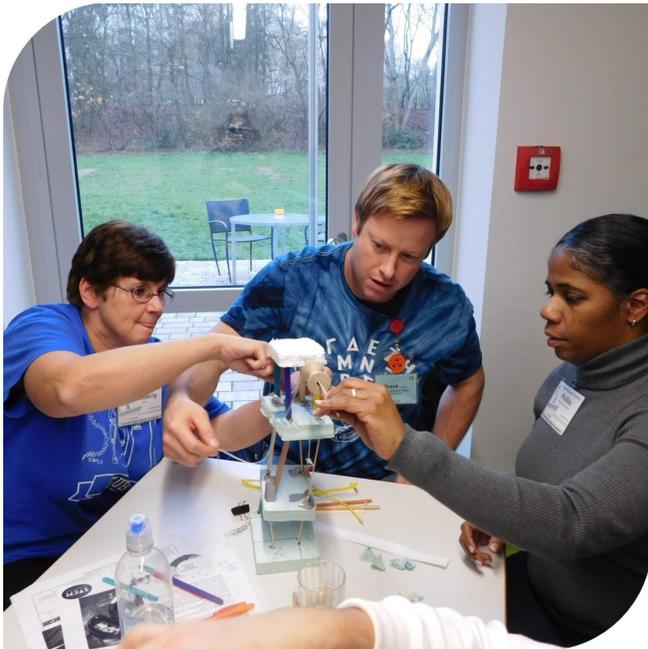
West Virginia Science Teacher Conference, Workshop

Flatwoods, WV Nov 6, 2015

The USNA STEM Center hosted a *STEM Spectacular* hands-on activity fair at the West Virginia Science Teachers Association Annual Conference in Flatwoods, West Virginia, on November 6. The fair was attended by approximately 120 teachers eager for project-based learning STEM activities to use in their classrooms. Popular activities included spoon catapults and projectile motion, coin batteries and corrosion, and cryptography.

STEM Center faculty also facilitated a special workshop on *Biomimicry* in order to explore nature's inspiration behind helicopter rotors, drag-reducing materials, and SONAR. Teacher participants were excited to relate technological innovation with the natural world using Navy-relevant examples.

DoDEA STEM Educator Training



DoDEA STEM Educator Workshop

Germany Dec 7-10, 2015

USNA STEM Center faculty Angela Moran, Sarah Durkin, Rachel Hetlyn, and Jenn da Rosa traveled to Germany in December to offer professional development workshops for Department of Defense Education Activity (DoDEA) teachers. 103 teachers from all four districts in the DoDEA Europe region (including teachers from Germany, Belgium, Netherlands, Italy, Spain, England, Turkey, and Bahrain) attended one of four workshops held in Ansbach, Ramstein, and Wiesbaden, Germany. The workshops promoted hands-on, project-based learning methodology in K-12 classrooms supporting military children. Each workshop provided teachers the opportunity to interact and experience cross-curricular activities relating

to water (properties, forces, math, and engineering), cyber operations (coding, hashing, biometrics, and binary), and engineering design. DODEA teacher, Carla Watson, commented that the workshop “renewed my enthusiasm regarding STEM in my classroom. [It] gave me some new activity ideas for my students.” Other teachers indicated that they learned new ideas, classroom methodology, activities, and resources. Many expressed confidence in their ability to further integrate hands-on learning into their classrooms. Another teacher shared that the workshop “opened my eyes to teaching true real world skills through inquiry based lessons.”

UPCOMING EVENTS

SPRING SEMESTER 2016

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STEM
Diversity
Campaign



January

- FIRST Tech Challenge Robotics Tournament: USNA, Jan 9-10
- National Eagle Scouts STEM Merit Badge Jamboree: USNA, Jan 16
- STEM Outreach Workshop, Mission Defense Agency: Ft. Belvoir, VA, Jan 20

February

- SeaPerch/NOAA Educator Workshop: Baltimore, Feb 4 & 6
- STEM Informal Educator Training: USNA, Feb 19
- STEM Educator Training: USNA, Feb 20

March

- SeaPerch/NOAA Educator Workshop: Washington, DC, Mar 2-3
- Girls Only STEM Day: USNA, Mar 5
- Workshop & Outreach Event, USS Hornet: Alameda, CA, Mar 12
- SeaPerch/NOAA Educator Workshop: Atlanta, GA, Mar 16-17
- STEM Educator Workshop: Atlanta, GA, Mar 18
- Girls STEM Event, University of Akron: Akron, OH, Mar 19

April

- Maryland SeaPerch Regional Challenge: USNA, Apr 9
- USA Science & Engineering Festival: Washington, DC, Apr 15-17
- Best Practices in STEM Outreach Workshop for Naval Scientists & Engineers: USNA, Apr 18-19
- STEM Workshop, Navy Museum Ships: San Diego, CA, Apr 27

May

- SeaPerch Showcase: USNA, May 6
- Educator Training, i2 Learning: Newark, NJ, May 14
- Navy League "Sea-Air-Space" Expo: Fort Washington, MD, May 15

* dates subject to change