

# United States Naval Academy STEM Center for Education and Outreach

Spring 2017

USNA STEM Center

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# STEM

UNITED STATES NAVAL ACADEMY



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# MIDSHIPMEN AND FACULTY IMPACT: STEM OUTREACH IN THE COMMUNITY

The United States Naval Academy STEM Center for Education and Outreach is focused on addressing an urgent national need for more young people to pursue careers in science, technology, engineering, and math. USNA midshipmen and faculty lead STEM events and workshops for local and national communities to engage and positively influence students and educators.

Faculty serve as subject matter experts, developing hands-on STEM activities that promote active learning and understanding of real world applications. STEM outreach is a challenging leadership opportunity for midshipmen. Midshipmen strengthen skills in communicating complex ideas to diverse audiences, gain experience in event planning and logistics, learn how to adapt to unexpected situations in the classroom, and serve as near-peer mentors for youth.

## STEM Center Impact (annual)

**60** Faculty and Staff  
**300** Midshipmen  
**70** Events  
**24,000** Midshipmen Hours  
**13,000** Students  
**900** Teachers  
**150** Informal Educators



## STEM Merit Badge Jamboree USNA, Jan 14, 2017

USNA National Eagle Scouts Association hosted a STEM Merit Badge Jamboree at USNA for 800 Boy Scouts. Sessions were led by 30 midshipmen in topics such as Nuclear Sciences, Electronics, Space Exploration, and Oceanography. Ten faculty and staff facilitated preparation for merit badge activities.



## FIRST Robotics Events USNA, Jan 21-22, 2017

Seven hundred and thirty elementary, middle, and high school students competed in the FIRST Tech Challenge and FIRST LEGO League robotics events at USNA's Dahlgren Hall. Sixty midshipmen participated in the events as judges and facilitators.



## STEM Night at Oxon Hill Middle School January 26, 2017

STEM Center staff and eight midshipmen presented hands-on STEM activities to 50 students at Oxon Hill Middle School in Prince George's County, MD. Students enjoyed activities demonstrating fluids and chemistry principles, aerodynamics, robotics and programming, cryptography, and logic.

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# MIDSHIPMEN AND FACULTY IMPACT: STEM OUTREACH IN THE COMMUNITY



## **Girls Only STEM Day USNA, Mar 4, 2017**

Two hundred and forty middle school girls participated in hands-on activities in a wide range of STEM fields led by 51 midshipmen and 26 faculty. Students rotated through STEM modules, learning the engineering design process and real-world applications of science, technology, engineering and math.



## **Mini-STEM Event for Chicago Students USNA, Mar 24, 2017**

Forty two students from Chicago's Phoenix Military Academy and David Speer School visited USNA as guests of the Office of Admissions. They participated in a Mission to Mars adventure in the planetarium, hands-on activities relating to wind energy, and an engineering challenge to design and build a Martian Rover. Activities were presented by USNA STEM faculty and 13 midshipmen.



## **Maryland Regional SeaPerch Challenge USNA, April 8, 2017**

Over 450 middle schoolers from Maryland, Virginia, and Washington, D.C. designed, built, and modified their SeaPerch underwater remotely operated vehicles to compete in the challenge. Each team was evaluated in three categories: Maneuverability, Design and Teamwork, and Creativity and Engineering. Teams competed for a place in the National SeaPerch Challenge held on May 20 at Georgia Tech in Atlanta, GA. Six teams were selected for the national competition.



## **SeaPerch Showcase USNA, May 5, 2017**

Following months of building SeaPerch underwater remotely operated vehicles at their schools, over 100 fifth graders from five Talbot County Public Schools launched their SeaPerch in the Hydro lab tow tanks. Other activities included straw rockets and buoyancy experiments.

# STEM OUTREACH AROUND THE NATION

Midshipmen volunteers share their passion for STEM with youth in our community and around the nation. Midshipmen can participate in MSTEM, an extracurricular activity which includes STEM outreach as well as 17 additional STEM-related

clubs. Midshipmen can also enroll in a STEM Education and Outreach course which provides academic credit for serving 15 leadership hours per semester dedicated to developing and implementing academic year STEM activities.



## San Diego Festival of Science and Engineering San Diego, CA March 4, 2017

Prof Mark Murray, along with six midshipmen, Dominique Adams, Harold Mantilla, Jocelyn Rodriguez, Jacob Santiago, Joshua Shamrakov and Erik Sutton, manned booths featuring hands-on STEM activities presented to over 1,200 students who attended the San Diego Festival of Science and Engineering Expo.



## Navy League Sea-Air-Space Exposition Washington, D.C., Apr 2, 2017

Navy League's Sea-Air-Space Expo is now the largest maritime exposition in the U.S., displaying the most current information and technology relevant to maritime policy. Prof Mark Murray and CDR Janice Rice, along with 10 midshipmen, presented Naval-relevant STEM activities to over 500 students at the Expo.



## Science Fair Judging Baltimore, MD, Mar 25, 2017 JSHS, San Diego, CA, Apr 27, 2017 ISEF, Los Angeles, CA, May 14-19, 2017

USNA faculty and six midshipmen served as judges at the Baltimore Science Fair in Towson, MD. USNA faculty participated as judges at the National Junior Science and Humanities Symposium sponsored by U.S. Army, Navy and Air Force, and at the International Science and Engineering Fair.



## Tulsa STEM Outreach Tulsa, OK, Feb 8, 2017

STEM faculty and midshipmen, in partnership with the Tulsa Regional STEM Alliance, presented a STEM day for 170 students from six schools in Osage County, OK including a large Native American population. Activities included robotics, bridge building, and rocket launching.

# STEM EDUCATOR TRAINING

The USNA STEM Center is dedicated to promoting quality STEM education for all youth. To achieve and sustain this aim, the STEM Center is committed to training teachers in methods for implementing quality STEM education. Training is focused on project-based learning methodology with an emphasis on a hands-on approach, connections to real-world applications, and techniques for student engagement.

Programs supported by the Office of the Secretary of Defense

(OSD) and the Office of Naval Research (ONR) are offered year-round to meet the needs of educators and range from several hours to week-long sessions.

Educators include K-16 teachers from public, private, and DoDEA schools around the nation and abroad as well as informal educators from museums, after-school programs, and more. Workshops are held both on-site at the U.S. Naval Academy in Annapolis, MD, and at remote locations.

## STEM Educator Training Miami-Dade, FL, Jan 23, 2017

Prof Angela and Patrick Moran presented workshops on project-based learning to 25 teachers. Topics included wave engineering, corrosion, and chemical and physical properties of water. The workshop “helped me understand how I can effectively implement projects that are inexpensive and are easily applied to real life,” commented one participant.



## STEM Educator Training Tulsa, OK, Feb 9, 2017

Forty eight educators from the Tulsa region explored methods for student engagement in STEM. Activities were presented in robotics and programming, chemistry and physics, mechanics, and aerodynamics. One teacher shared, “I learned Robotics is not scary. There are things our STEM club students can do without many supplies.”



## STEM Educator SeaPerch Training Dayton, OH, Feb 17-18, 2017 Baltimore, MD, May 5-6, 2017

USNA STEM held workshops for local K-12 educators at Univ of Dayton and at Morgan State Univ. Training included underwater exploration and design of a SeaPerch underwater remotely operated vehicle, as well as hands-on activities in related science, engineering, and math topic areas.



## SET Sail Workshop USNA, Feb 25, 2017

Each fall and spring, USNA hosts a one-day workshop for K-16 STEM educators. This spring, 145 teachers from 91 schools in the region explored activities and methodology for effective STEM education. Topics presented by STEM faculty and midshipmen focused on applied math concepts as found in optics, energy, electricity and circuits, fluids, geometry, mechanics, operations analysis, and engineering design.



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# SUPPORTING DoD STEM OUTREACH

Promoting science and engineering is part of the mission for the Department of Defense (DoD) which plays an important role in engaging and inspiring youth and educators around the nation. The USNA STEM Center supports STEM outreach efforts in the Naval STEM and broader DoD STEM communities through trainings and partnerships.

With support from the Office of Naval Research (ONR), USNA presents an ongoing series of workshops on Best Practices in STEM Outreach. Workshops provide training for participants involved in STEM outreach at Naval commands around the nation, including research labs, warfare centers, recruit commands, medical commands, and more. Attendees learn methods and techniques for student engagement using hands-on activities in a range of DoD relevant topic areas.

Workshops have been extended to other DoD STEM partner agencies. Ongoing support is also provided to DoDEA educators who serve military-connected students at DoD schools around the nation and across the world. USNA STEM offers professional development focused on effective methods of bringing project-based learning to the classroom with an emphasis on STEM applications in the real world.

Additionally, training in STEM education has been extended to Navy Museum educators through a collaboration supported by ONR. Trainings have been offered to teachers and museum educators in DoD relevant topic areas to enhance STEM education and build community STEM awareness.



## Best Practices in Naval STEM Workshop Great Lakes, IL, March 15, 2017

USNA conducted STEM outreach training at Naval Station Great Lakes for 15 educators and 17 Navy personnel. The focus was on methods for student engagement with hands-on activities. Topics included mechanics and materials, corrosion, fluid power, electricity and circuits, and engineering design.



## DoDEA STEM Educator Workshops Okinawa and Yokosuka, Japan April 20-22 and 24, 2017



STEM faculty, Angela Moran and Sarah Durkin, traveled to Japan to offer professional development to 100 DoDEA educators. Workshops, held at Kadena Air Base in Okinawa and at U.S. Naval Base Yokosuka, promoted hands-on, project-based learning methodology in K-12 classrooms supporting military children.



## STEM Educator Training at USS Turner Joy Bremerton, WA, May 12-13, 2017

USNA STEM faculty and staff, Angela Moran, Patrick Moran, and Rachel Fees, presented workshops at the USS Turner Joy museum ship for informal STEM educators as well as local K-12 teachers. Methods and activities for implementing project-based learning were presented in topic areas including sensors and circuits, properties of water, sound and light waves, applied math, corrosion, and engineering design.

# FOCUS ON MIDSHIPMEN

Midshipmen volunteer their time and talents in support of education and outreach events offered by the USNA STEM Center. Midshipmen strengthen skills in communicating complex ideas to diverse audiences, gain experience in event planning and logistics, and serve as role models for youth.

Highlighted below are the STEM midshipmen with the most hours for the 2016-2017 academic year, along with two graduating midshipmen who have contributed to the STEM Center meritoriously for four years.

TOP STEM MIDSHIPMEN BY HOURS (AcYear 2016-2017)			
MIDN 3/C Dante Daniels (Electrical Engineering)	72	MIDN 3/C Sharat Nemani (Systems Engineering)	53
MIDN 1/C Frederick Sutton (Quantitative Economics)	67	MIDN 3/C Jacob Santiago (Computer Engineering)	52
MIDN 3/C Andrew Lee (Nuclear Engineering)	62	MIDN 2/C Michelle Tran (Mechanical Engineering)	52
MIDN 1/C Amy Krick (Chemistry)	59	MIDN 2/C Elizabeth Lee (Chemistry)	49
MIDN 3/C Harold Mantilla (Informational Technology)	56	MIDN 2/C Jordan Richardson (Nuclear Engineering)	46



MIDN 1/C Frederick Sutton

MIDN 1/C Frederick Sutton has been awarded the annual Service and Leadership Award in STEM Education and Outreach. He is to be commended for his exemplary service in support of STEM Center activities. He has actively supported the USNA STEM Center for Education and Outreach since February 2014.

Erik's major is Quantitative Economics. He has been awarded the Schwarzman scholarship and, upon graduation from USNA, he will attend graduate school in Beijing, China. He is working towards a Master's Degree in Global Affairs. As a midshipman, Erik participated in an exchange program through the International Programs Office and spent a semester in China. Upon completion of the one-year Master's program, he will serve the U.S. Navy as a nuclear submariner.

As a plebe, Erik received an e-mail inviting him to participate as a volunteer in support of STEM Center education and outreach events. With an interest in promoting education for kids, he signed up. His favorite STEM activities are the Hanoi Tower puzzle and logic games.

Erik shared that he believes hands-on activities are critical in helping people understand concepts more vividly. Leading STEM activities has taught him to refine his ability to convey information and establish a leadership presence.



MIDN 1/C Amy Krick

MIDN 1/C Amy Krick has been recognized for her exemplary service in support of STEM Center activities. She has been awarded the Military Outstanding Volunteer Service Medal for 500 hours of volunteer service. Amy has actively supported the USNA STEM Center for Education and Outreach since October 2013.

Amy's major is Chemistry. Upon graduation, she will serve as a surface warfare officer on the USS Paul Hamilton, an Arleigh-Burke class destroyer ship stationed in San Diego, CA.

Amy previously attended the USNA Summer STEM Program as a high school student. As a midshipman, she served as academic support during two years of the Summer STEM Program and, in 2016, she was the lead academic midshipman.

Amy shared that her favorite STEM activities are the "Mr. Foamy" polymer project and Ozobot programmable robots. She states that her involvement in STEM Center activities has taught her to be a better leader overall.

# UPCOMING EVENTS

## Summer 2017

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#### Volgenau Chair for Education and Outreach



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INVEST WITH CONFIDENCE

## June

- **Summer STEM Program:**

*USNA, June 5-23*

In collaboration with the Office of Admissions, the USNA STEM Center presents “Land, Air, Sea: Annapolis”, a week-long residential camp. Three sessions are held in June for a total of 900 high school students. Students will participate in hands-on modules led by faculty and midshipmen in a range of critical STEM topics.

- **Summer Heroes Youth Program:**

*USNA, June 12-21*

Sixty youth from Baltimore City will participate in this eight-day program held at USNA. Midshipmen will lead middle school students in a sports-themed day camp engaging in STEM topics, literature and arts, health and fitness, leadership and life skills.

- **Girls Tech Camp:**

*USNA, June 26-30*

Fifty middle school girls along with eight high school counselors will attend a week-long day camp held at USNA supported by the Naval Academy Foundation. Girls will explore STEM topics with mentorship from faculty and staff under this year’s theme, “Game On”.

## July

- **SET Sail STEM Educator Training:**

*USNA, July 10-20*

Two residential week-long sessions of STEM professional development are offered to a total of 100 teachers from around the nation and DoDEA schools here and abroad. The focus is on project-based learning to promote hands-on student engagement with an emphasis on real world applications of STEM in a wide range of subject areas.