

United States Naval Academy STEM Center for Education and Outreach

Fall 2018

STEM

UNITED STATES NAVAL ACADEMY

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Focus on Our Faculty

Inside this Issue:

- STEM Outreach In the Community
- STEM Outreach Around the Nation
- STEM Educator Training
- Upcoming Events

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GIRLS ONLY STEM DAY

Over 210 middle school girls attended Girls Only STEM Day held on October 13 at USNA. Participants came from the region and included school groups from Maryland, New York, New Jersey, Delaware, and Virginia. Activities were developed and presented by faculty including CDR Janice Rice, LCDR Lori Goodenough, LCDR Melissa Szurovy, Christine Maceo, Professors Brad Barrett, Adina Crainiceanu, Gina Henderson, Michelle Koul, Aurelia Minut, as well as Navy Medical personnel. The event was supported by over 70 midshipmen. In an engineering design challenge, students worked in teams to design and build a catapult launch-and-capture system to simulate delivering humanitarian aid. A career panel presented by midshipmen highlighted STEM majors. A program for parents, led by LCDR Larry Ungar, was supported by Fleet and Family Services and Naval Health Clinic Annapolis.

“STEM Girls Day is my favorite USNA STEM event to present. Seeing young women truly exercise their minds in the STEM field and outwardly HAVE FUN while doing so are the most rewarding parts of the program. I believe these events open the aperture for the attendees to fields of study that they have never been exposed to prior to attendance.” - LCDR Melissa Szurovy, Mathematics

“As an instructor, I really enjoyed seeing the girls’ excitement as they created their first web pages and they discovered a little bit of what they can create with a computer. The experience opens up for them a world of possibilities, and I believe this experience has the potential to change their lives.” - Prof Adina Crainiceanu, Computer Science

STEM OUTREACH IN THE COMMUNITY

BALTIMORE STEM-DAY EXTRAVAGANZA

On September 8, USNA was one of 22 exhibitors who presented hands-on STEM activities to about 600 participants at the 7th Annual STEM Day held at Morgan State University in Baltimore. STEM instructor Rachel Fees and ENS Jackson Cotney provided activities where participants tried a robotic arm challenge, comparing hydraulic, electronic, and mechanical arms. Attendees also built a robotic arm end effector.

“We were delighted to be one of so many Maryland partners and agencies invested in bringing STEM education to Baltimore City. The students and their families were motivated and excited to learn about STEM topics being applied throughout our local area. It was great to work with students to show them real-world applications of robotics in the Navy and to challenge them to make their own robotic arms.” - Rachel Fees, STEM Center



FAMILY STEM NIGHT

Each fall, the STEM Center presents a Family STEM event for faculty, staff, and their families to share fun, interactive STEM activities and to show appreciation for their support throughout the year. The event was held this year on Friday evening, October 19, in Luce Hall and featured a planetarium show and many space-related activities. Demonstrating their STEM outreach skills, over 30 midshipmen supported the event, which was attended by over 120 guests. STEM Center faculty and staff, Rachel Fees, Christine Maceo, Professors Sarah Durkin, Angela Moran, and Patrick Moran, also staffed the event. Midshipmen led planetarium shows highlighting stars and planets in the evening sky. Stations included sound activities, robotics and actuation projects, electrical circuits, straw rockets, and a penny press.

“Family STEM Night was a great time for my five year old son and me! It was great to see his eyes light up as he explored the numerous activities. As a parent, I enjoyed being able to take activities and ideas back home for continued exploration and learning with my son.” - LCDR Chris Hoffmeister, Cyber Science



STEM OUTREACH IN THE COMMUNITY



Mini-STEM Events

Each semester, the Office of Admissions partners with the STEM Center to host student groups for a Mini-STEM event. Students tour the Naval Academy and participate in academic STEM modules. Groups this fall included 8th graders from D.C.'s Howard University Middle School of Science and Mathematics on September 28, students from BEST Academy and Douglass High School in Atlanta on October 26, and Detroit students from Wayne State Upward Bound on November 30. STEM modules were designed to show students real-world applications of STEM topics, and were led by faculty with support from midshipmen. Modules this fall included cryptography highlighting applications of math, operations research involving developing algorithms for efficient delivery of humanitarian aid, engineering design of structures to withstand extreme weather events, building hydraulic actuators, and exploring electrochemical disinfection as technology to design a better toilet. Faculty and staff included Rachel Fees, Christine Maceo, LCDR Casey Rayburg, Prof Brad Barrett, and Prof Sarah Durkin.

“ I loved sharing the intersection of meteorology and engineering with the students. They were an attentive, engaged group! ” - Prof Brad Barrett, Oceanography

MESA Day

On November 28, in partnership with Maryland MESA, USNA STEM presented a day of fun STEM activities at Johns Hopkins Applied Physics Laboratory in Laurel, MD. Over 200 4th and 5th graders from 9 schools in Anne Arundel, Calvert, Charles, Prince George's and Baltimore County participated. Thirty-four midshipmen led interactive sessions in 13 topic areas including robotics, chemistry, physics, and engineering. Teachers from participating schools attended an educators' workshop in cyber and coding led by Prof Angela Moran and Rachel Fees. STEM Center faculty and staff also included Prof Sarah Durkin and Patricia Meinhold.

“ MESA Day is a great opportunity for midshipmen to lead in the classroom and serve as role models for youth. While doing short, engaging activities with students, mids are able to convey their own passion for science, math and engineering. They show kids how an interest in STEM can be a path to success. ”
- Prof Sarah Durkin, STEM Center



Maryland STEM Fest at the Library

As part of the Maryland STEM Festival, USNA collaborated with Anne Arundel County Public Library to present “Challenge the STEM Mids” on November 7 at the Library at Annapolis Mall. Eight midshipmen, along with STEM faculty Prof Angela Moran and Christine Maceo, presented an evening of interactive robotics and hydraulics challenges, engineering design competitions, logic puzzles, and strategy games for about 175 student and adult visitors.



STEM OUTREACH AROUND THE NATION



GM Tech Center STEM Event

On October 8-9, Prof Mark Murray and LT Chris Kaminsky, along with ten midshipmen, traveled to the Detroit area to participate in a STEM outreach event at the General Motors Tech Center, in collaboration with General Motors (GM) and the USNA Office of Admissions.

About 100 local high school students attended the event where midshipmen provided hands-on sessions on hydraulics, fluid dynamics, rockets and flight. Midshipmen also had an opportunity to tour the facility and talk with GM engineers about the latest automotive technology and the opportunities and experiences of young engineers in the civilian sector.

“ This event is a wonderful way to expose these high school students not only to GM’s Technology Center, but also inspire and motivate them to continue their studies in the areas of math and science. I am sure that the near-peer interactions with the midshipmen helped inspire more than a few to investigate future opportunities. ” - Prof Mark Murray, Mechanical Engineering

San Diego Fleet Week

USNA faculty, Prof Angela Moran, Prof Patrick Moran, Prof Mark Murray, Capt P.J. Moran, and five midshipmen traveled to San Diego for Fleet Week October 25-27. The STEM Center presented hands-on activities for over 1200 Innovation Zone attendees including school groups, families, veterans, and dignitaries. Visitors had an opportunity to try short, interactive STEM activities such as building a coin battery, creating a model of a heart valve, investigating properties of hydrophobic sand, designing a hydraulic actuator, launching a straw rocket or a hoop glider, exploring Bernoulli’s principle of flight, making a spoon catapult, and testing Ozobot or Cubelet robotics.

“ It’s amazing to see how much preparation and hard work goes into a big demo like what we did at Fleet Week... but it’s totally worth all of it to see the smiles on kids’ faces (and parents’ too!). ”
- Capt P.J. Moran

STEM Outreach Trips

The USNA STEM Center, in collaboration with the Office of Admissions, sent midshipmen on STEM outreach trips this fall to Newark, NJ and Pensacola, FL. On October 20, four midshipmen participated in a STEM event at New Jersey Institute of Technology, providing hands-on STEM activities for about 100 high school students in the Upward Bound and Talent Search programs. Activities led by midshipmen included aerospace engineering design, hydraulics, and operations research challenges. On November 2-3, two midshipmen traveled to Pensacola to work with students from Pascagoula-Gautier School District at a STEM event held at the National Flight Academy at Naval Air Station Pensacola.

“ All activities were problem-based, giving students the opportunity to directly experience authentic STEM applications in real-world context. Extending what the students were learning in their classrooms, these activities enabled them to engage deeply with the content, connecting what they see and hear in the media. ” - Leigh McNeil, Office of Admissions



STEM Educator Training



Fall SET Sail STEM Educator Training

SET Sail STEM Educator Training is a one-day professional development workshop offered twice a year at USNA for K-16 educators. Interdisciplinary Integration was the theme for the September 15 workshop, attended by 135 teachers. Faculty presented sessions featuring multidisciplinary topics in weather and thermodynamics, applied physics and hydraulics, operations research and robotics, circuits and programming, applied math and energy transfer, and biomechanics. The engineering design challenge combined math, logic and mechanical engineering. Faculty and staff included Rachel Fees, Christine Maceo, Patricia Meinhold, Beth Waitkus, Capt P.J. Moran, LCDR Casey Rayburg, CDR Larry Ungar, Professors Sarah Durkin, Gina Henderson, Angela Moran, and Patrick Moran

“When I present a module to a teacher that brings their subject alive, it is rewarding to know it will inspire many young STEM minds in their classroom for years to come.”
- Christine Maceo, Mathematics

“I was able to provide the teachers new ideas to incorporate in their math and computer programming classes by introducing them to a Navy optimization and logistics problem they had to solve. At the end of the day, I felt like I learned just as much from the teachers as they learned from me.” - LCDR Casey Rayburg, Mathematics

Hawaii Educator Workshop

In collaboration with the Pacific Aviation Museum, STEM Center faculty and staff Prof Angela Moran, Prof Patrick Moran, Rachel Fees, ENS Jackson Cotney, and Navy reservist Chris Freer traveled to Oahu and the Big Island of Hawaii to present a series of STEM educator workshops to almost 60 teachers during the week of September 17. Workshops were held at Waiakea Intermediate School in Hilo, Kealakehe Intermediate School in Kona, and Ewa Makai Middle School in Ewa Beach. Topics included applied math, electricity and circuits, air and space, sensors and programming, chemistry and corrosion, and mechanical systems.

“It is rewarding to provide professional development for teachers in areas that don't have easy access to programs like those provided by the STEM Center. I am especially pleased to be part of the program when the teachers tell us how many students will be positively affected by their participation.” - Prof Patrick Moran, Mechanical Engineering



DCPS Educator Workshop

STEM Center members Prof Sarah Durkin and Rachel Fees presented sessions for educators at D.C. Public Schools (DCPS) Science Professional Development Day on October 25 in Washington, D.C. About 40 teachers from over 30 schools attended the sessions focused on incorporating real-world applications into the classroom. Activities centered on developing different methods to measure salinity of water including building a hydrometer, devising a conductivity meter, and using Snell's Law of Refraction.



UPCOMING EVENTS SPRING 2019

Thank You to our
Sponsors & Partners

Volgenau Chair
for Education and Outreach



Jan	<ul style="list-style-type: none"> FIRST Tech Challenge Robotics Tournament, USNA, Jan 12-13 Mini-STEM Event, USNA, Jan 18 DCPS STEM Educator Workshop, Washington, DC, Jan 23 NESA STEM Merit Badge Jamboree, USNA, Jan 26
Feb	<ul style="list-style-type: none"> ONR Pre-Service Teacher Workshop, Baltimore, MD, Feb 5 High School Girls Space Tech Day, USNA, Feb 9 ONR Pre-Service Teacher Workshop, Norfolk, VA, Feb 11 Baltimore Building STEPS Mini-STEM, USNA, Feb 13 NYC Mini-STEM Event, USNA, Feb 22 STEM Educator Workshop, USNA, Feb 23
Mar	<ul style="list-style-type: none"> Girls Only STEM Day, USNA, Mar 2 San Diego Festival of Science & Engineering, San Diego, CA, Mar 2 ONR Pre-Service Teacher Workshop, Philadelphia, PA, Mar 9 Best Practices in DoD STEM Outreach Workshop, USNA, Mar 11 San Antonio Mini-STEM Event, USNA, Mar 29 Maryland Science Center Educator Program, USNA, Mar 30
Apr	<ul style="list-style-type: none"> Maryland Regional SeaPerch Challenge, USNA, Apr 6 NYC Mini-STEM Event, USNA, Apr 26 DoDEA STEM Educator Workshop, Europe West
May	<ul style="list-style-type: none"> Junior Science & Humanities Symposia (JSHS), Albuquerque, NM, May 2-5 Intel International Science & Engineering Fair (ISEF), Phoenix, AZ, May 12-17

Schedule subject to change