CULTIVATE THE FUTURE
“K-Grey” STEM Educator Training includes professional development for pre-service, in-service, and informal teachers, with focus on hands-on classrooms, extending STEM communities, and meeting the educational standards.

INCLUSION & DIVERSITY
Girls Only STEM Days for regional high school and middle school students highlight emerging technologies. Engineering Days for underserved populations promote career and college readiness through community organizations.

INSPIRE & ENGAGE
Competitions and STEM Days inspire student engagement in STEM fields.
Naval and DoD STEM commands around the nation engage in community outreach in an effort to develop the future technical defense workforce. Since 2014, USNA has supported these efforts by providing “Best Practices in STEM Outreach” workshops for scientists, engineers and STEM practitioners, sponsored by ONR and DoD STEM.

The 18th workshop in the series was held at USNA in March. Thirty-two participants attended from commands around the nation including NAVAIR, NAVSEA, SPAWAR, MCSC, SSP, and Navy Medicine. Attendees immersed themselves in project-based learning sessions across a range of defense topics and career areas including robotics, operations research, cybersecurity, physics, chemistry, fluids and flight, electricity and circuits, corrosion, biomedical applications, and engineering design, led by eight USNA faculty and staff members. After learning hands-on strategies and facilitation techniques to engage all audiences, attendees put their skills into practice by implementing a culminating STEM event for visiting students from a local high school.

The workshop provided a valuable opportunity to build the DoD STEM community. Participants exchanged ideas concerning educational outreach methods and challenges, assessment practices, and community partnerships. Such interactions across commands and sites promotes collaboration and sharing of resources.

Attendees took home ideas, supplies, and curriculum, and were provided access to the online Naval STEM group where they can find additional USNA STEM activities. USNA will continue to act as a resource for workshop participants as they build their own STEM community.
Midshipmen Involvement

Midshipmen involvement in STEM outreach contributes to workforce development through meaningful opportunities for midshipmen to gain experience in leadership and near-peer mentorship. Over 400 midshipmen support USNA STEM outreach activities each year, with 70 plus enrolled each semester in a STEM Educational Outreach course and commit to 15 hours or more per semester.

Midshipmen who dedicated their time to support STEM events were recognized at award ceremonies at the end of the academic year. Thirty-nine midshipmen went above and beyond the 15 volunteer-hour requirement, each contributing 40 hours or more towards STEM events. Representing all class ranks, these midshipmen were recognized at the USNA Community Service Awards.

Exceptional graduating midshipmen were recognized for their ongoing support of STEM outreach at the Engineering and Weapons Division Awards and the Math and Science Division Awards. These nineteen midshipmen exemplified the meaning of service throughout their time at USNA.

Graduating midshipmen Dante Daniels, Andrew Lee, Harold Mantilla, and Natalie Stahl earned the Military Outstanding Volunteer Service Medal for 500 hours of volunteer service in support of STEM education and outreach to underserved populations.

MidN 1/C Andrew Lee was also awarded the annual Service and Leadership Award in STEM Education and Outreach provided by USAA. In addition to volunteering over 600 hours since his plebe year, MidN 1/C Lee served as president of the MSTEM extracurricular activity, demonstrating leadership ability and dedication to service.

MidN 1/C Dante Daniels was selected as the Student Leadership Award recipient at the 2019 Black Engineer of the Year Award (BEYA) Conference. He was recognized for his outstanding leadership in STEM outreach.
CULTIVATE THE FUTURE

The USNA STEM Center provides STEM Educator Training and professional development as part of a sustainable effort to improve STEM education for all students. Programs include semi-annual, day-long workshops and week-long summer sessions held at USNA, as well as programs at other sites across the country and throughout the world. Professional development credits are awarded to qualified participants.

In February, 128 educators attended the SET Sail spring session, “Mapping the Standards”, showing teachers how hands-on learning supports educational standards across subject areas and grade levels. Modules were led by thirteen faculty and staff members with support from 30 midshipmen. Sessions included optics, weather and climate, separation science, industrial engineering, sailing and fluids, platonic solids, and a soil erosion engineering challenge. The focus was on ease of activity implementation, effective utilization of resources, and connections to new science and math standards.

USNA launched a new initiative aimed at pre-service (undergraduate education majors) and early service (less than 5 years of teaching) teachers, promoting project-based learning methodology early in the teaching career. In February, a workshop was held at Morgan State University in Baltimore, MD for 36 pre-service teachers from Morgan State, Coppin State, Bowie State, and University of Maryland Eastern Shore. In March, a workshop was held at St. Joseph’s University in Philadelphia, PA, in collaboration with the regional Noyce Partnership which includes math and science undergraduates from area schools (including Drexel, Temple, Bryn Mawr, Swarthmore, and St. Joseph’s) earning education degrees, as well as current classroom teachers serving as mentors. STEM topics included cyber and coding, properties of water, circuits and sensors, acoustics and optics, and engineering design. Workshops were led by STEM faculty, Sarah Durkin, Christine Maceo, Angela Moran, and Patrick Moran.
In addition to SET Sail workshops offered at the Academy, USNA STEM Educator Training programs are offered at remote sites in order to build sustained STEM communities.

USNA STEM faculty and staff provided workshops for D.C. Public Schools Professional Development Day in January at Woodrow Wilson High School in Washington, D.C. Teachers leaned how to implement practical, hands-on, engaging chemistry and physics activities in their daily classroom lessons.

In March, USNA faculty provided “Engineering to Explore the Ocean”, an educator workshop held in West Dayton, OH, in partnership with NOAA’s Office of Ocean Exploration and Research. Teachers investigated underwater exploration strategies and technology, and built SeaPerch underwater remotely operated vehicles.

In support of Department of Defense Education Activity (DoDEA) schools abroad, USNA faculty, Patrick Moran, Sarah Durkin, Larry Ungar, and Angela Moran provided workshops at DoDEA Europe West sites in April and May. Workshops held at SHAPE in Belgium, Lakenheath in England, and Spangdahlem in Germany were attended by 89 teachers from 18 schools in Europe West and Europe East Districts. Hands-on STEM lessons emphasized connections to real-world phenomena, technical careers, and updated educational standards. Teachers collaborated to explore cross-curricular concepts with activities scalable to multiple grade levels. Topics included aspects of mechanical engineering, electrical engineering, cyber science, applied math, physics, and engineering design. The training “helped reinforce just how important hands-on activities are for our students,” commented a teacher at the SHAPE workshop. Teachers were provided with curriculum and materials to use the activities and engagement strategies in their classrooms. Dan Wilson, AFNORTH Middle High School, noted, “I love how the activities can be immediately implemented.” Alan Campbell, Lakenheath High School, commented, “I have a collection of activities that match the standards and will energize my classroom.”
Astrophysicist, pharmaceutical scientist, aerospace engineer, forensic chemist, electrical engineer—these are a few of the careers students said they were interested in pursuing after attending the “Space Technology” High School Girls Only STEM Day at the U.S. Naval Academy in February.

The USNA STEM Center aims to encourage underserved populations, including women, to enter engineering and applied science fields. The inaugural high school event was held in collaboration with the Maryland Space Grant Consortium (MDSGC) and the Office of Naval Research, reaching 86 high school girls from diverse backgrounds in the Maryland region.

Led by faculty and midshipmen, students explored science and engineering concepts focusing on real world applications, gaining exposure to career possibilities, practicing teamwork, and developing problem solving and engineering skills. College intern, Emma Houck, University of Maryland, developed an astrobiology investigation as part of the MDSGC grant for this event. Highlights of the day included a planetarium show, an optics lab, space satellite tessellations, robotics and coding, a Martian lander engineering challenge, and a career awareness panel. Activities were led by ten faculty and staff members and twenty two midshipmen.

Space technology was also the theme for the semi-annual Middle School Girls Only STEM Day, held at USNA in March for 175 students. Hands-on sessions included astronomical challenges, space chemistry, weather and climate, engineering design, space technology, and math applications led by 17 faculty and 42 midshipmen. A concurrent parent program included presentations on nutrition, college finances, internet safety, and stress management.
With a mission to inspire the next generation of scientists and engineers, the USNA STEM Center reaches thousands of students each year. STEM competitions and festivals provide an opportunity to engage students and build their STEM confidence and skills.

In January, USNA hosted a regional robotics competition, FIRST® Tech Challenge and FIRST® LEGO League Jr., for over 170 elementary, middle and high school students. Midshipmen volunteers supported the event as judges.

Each year, the USNA National Eagle Scouts Association (NESA) hosts a Merit Badge Jamboree. Also in January, over 550 scouts attended the event. Over 140 midshipmen volunteers led merit badge classes, presented hands-on activities, showcased research projects, and facilitated leadership sessions.

The annual Maryland Regional SeaPerch Challenge was held in April at USNA for about 400 middle and high school students. Teams designed and built underwater remotely operated vehicles (ROVs) which were tested at the competition in the Hydromechanics tow tank for speed, maneuverability, and completion of a retrieval mission. Teams were also judged on creativity, engineering, teamwork, and a math challenge. The top teams were selected for the advanced challenge which required activating a magnetic sensor and mechanical switch to earn a place at the International SeaPerch Challenge. Five teams secured a place for the upcoming event to be held in June at the University of Maryland.

USNA STEM faculty and midshipmen hosted a booth at the San Diego Science and Engineering Festival in March. Activities to engage the public included engineering challenges, programmable robots, and logic puzzles.
Mini-STEM events are an opportunity to inspire and engage students on site and at other sites.

Through collaboration with the Office of Admissions and outside organizations, school and community groups were invited to participate in Mini-STEM events, an afternoon of hands-on STEM activities at USNA. In the spring semester, groups included students from Alaska, New York City, San Antonio, Baltimore, and U.S. Naval Sea Cadets. Faculty and midshipmen facilitated high energy modules in encryption and programming, fluids and flight, logic and spatial reasoning, materials properties, structural design, and extreme weather events.

In March, the Annapolis Library at the Mall hosted an afternoon event, “Challenge the STEM Mids”. Fifteen midshipmen, along with STEM faculty, led activities in engineering design, chemistry and physics, circuits, programming and sensors, and cryptoanalysis.

Midshipmen worked with students at the Seeds for Success after-school program at the Eastport Community Center over the course of the spring semester. They introduced students to engineering principles and applied science concepts by experimenting with hydraulics models, gears and pulleys, batteries assembled from dissimilar metals, straw rockets, and catapults.

The USNA STEM Center, the Astronomy Club, and the Northern Virginia Astronomy Club hosted an Astronomy Night in February for the Naval Academy community. Attended by over 150 people, the event included planetarium shows, cosmic activities, and a visit to the Observatory on campus. Attendees viewed the night sky through a series of high powered telescopes.
# UPComing Events

## Summer 2019

### June
- Summer STEM Program, USNA, June 3-21
- Summer Heroes Youth Program, DC, Baltimore, Prince George’s County, June 3-21
- Fort McHenry National Park Collaboration, June 11
- STEM Educator Training, Hawaii, May 31–June 11
- STEM Educator Training, USNA, June 25

### July
- SET Sail DoDEA STEM Educator Training, USNA, July 8-11
- SET Sail STEM Educator Training, USNA, July 14-18

### August
- STEM Educator Training, Iowa, August 2