Inside this Issue:

- Summer STEM Program
- Summer Heroes Youth Program
- Girls Tech Camp
- SET Sail STEM Educator Training
- DoD STEM Outreach Workshop
- Midshipmen Internships
- Space Technology Internships
- USNA Star Parties
- Upcoming Events
In June, the USNA Office of Admissions and the STEM Center presented the eleventh annual Summer STEM Program, a week-long residential program for high school students from around the country, held at the U.S. Naval Academy.

Students attended hands-on academic modules covering a diverse range of Navy-relevant STEM topics. The modules, designed and led by USNA STEM faculty with support from midshipmen, introduced students to STEM career fields and real-world applications, while developing their technical and problem solving skills.

Academic modules exposed students to advanced applications in a wide scope of subject areas with topics including corrosion, light waves, operations research, weather and climate, cyber security, electronics and circuits, flight, materials characterization, ocean engineering, helicopter technology, oceanography, math applications, robotics, bioterrorism, engineering design, and more.

### Impact

*In an exit survey of USNA Summer STEM Program 2018 participants:*

- **92%** said the program helped me better understand what scientists/engineers do.
- **92%** said the program taught me how STEM applies to real-world problems.
- **88%** said the program increased my interest in studying STEM.
- **84%** said the program helped me to better understand my own career goals.
- **98%** would recommend the program to their friends.
The third annual Summer Heroes Youth Program was held at the U.S. Naval Academy in June. This week-long summer day camp included boys and girls from Baltimore City middle schools: Waverly, Harlem Park, Franklin Square, and AFYA Public Charter. The program was led by midshipmen mentors who engaged the students in hands-on, sports-related STEM activities, exposing them to college and career possibilities. Students practiced teamwork and developed problem-solving skills while exploring real world applications of STEM topics. For example, students designed optimal blades for a wind turbine, learning about wind energy, motors, and electricity. Other topics included engineering design, robotics, materials properties, projectile motion, and more.

“Participating in SHYP was a great experience in developing my leadership skills. Not only did I have the opportunity to work with some great young students and give back to the community, but I also learned how to be flexible and adapt when things didn’t go according to plan, how to communicate effectively with different groups of people, and how to lead by example so everyone can be engaged.”
- MIDN 2/C Annie Dunigan

“SHYP was a very eye opening experience. Spending time with kids and helping them learn really felt like I was making a difference in their lives. Interacting with the kids and the professors showed me how small group leadership works, and how I can adapt to an ever changing environment.”
- MIDN 3/C Vincent Potente

“The [SHYP] scholars spoke each day of their hands-on activities, friends made and plain old fun they had.”
- Terry Patton, Principal, Franklin Square Middle School
“STEM Around the World” was the theme of the eleventh annual Girls Tech Camp, a week-long day camp for middle school girls held at USNA in June. Midshipmen mentors led students in hands-on STEM activities related to a different continent and sport each day. For example, one day the theme was the Americas and baseball. Students rotated through sports and STEM activities at the USNA Baseball Stadium, including batting cage practice, running the bases, and rotations in statistics and bioengineering. Later in the day, girls assumed the role of storm chasers, engineering structures to withstand tornado force winds. Other topics included robotics, circuits, programming, motors and turbines, and engineering design. Female engineers and scientists were introduced as heroes each day. The week culminated in a Tech Fair where students demonstrated what they learned to their family and friends. Exit surveys show that the program positively impacted student interest in STEM fields and confidence in their own abilities.

In an exit survey, 74% of students expressed an interest in pursuing a STEM career or major.

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<tr>
<th>Interest in Career/Major</th>
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<td>Military</td>
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<td>Science</td>
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<td>Engineering</td>
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<td>Computers/Robotics</td>
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<td>Math</td>
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<td>Education</td>
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<td>Other</td>
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Scale of 1 to 4 is "A Great Deal"
Educators from 24 states and 12 overseas countries attended the eighth annual SET Sail STEM Educator Training during two week-long, residential sessions held at the U.S. Naval Academy. K-12 teachers were included, with one session devoted to teachers from Department of Defense Education Activity (DoDEA) schools in the U.S. and abroad. Using easy to implement, hands-on projects, teachers learned methodology for student engagement highlighting real-world applications. Topics included chemistry, circuits and electronics, electrochemistry and corrosion, applied math, bioterrorism, energy transformations, hydraulics, materials engineering, principles of flight and rotorcraft, fluids, physics and space, engineering design challenges and more.

How did this training help you as an educator?

“I enjoyed every aspect of the [SET Sail] program. I am excited to go back to school in a few weeks and implementing activities and teaching techniques in my classroom. This was the best Science workshop I have attended. I had to step outside my comfort zone. The teachers and assistants were so helpful. This experience will alter the way I teach.”

- Theresa Roh, SET Sail teacher
On August 14-15, USNA hosted the second “Best Practices in DoD STEM Outreach” workshop on behalf of the DoD STEM Programs Office. The first workshop was held in March. Representatives from commands across the country attended, including Army, Air Force, Navy, National Security Agency, Missile Defense Agency, and more. This unique effort is the first joint approach to provide support and training to members of the DoD STEM community nationwide who are committed to promoting a growing workforce in engineering and science. With a focus on project-based learning methodology and techniques for engaging all audiences, participants explored interactive activities across a range of DoD-relevant topic areas including materials characterization and failure, energy transformation, space technology, fluids and flight, engineering design, electrochemistry and corrosion, and more. This effort aligns with the DoD STEM Strategic Plan goals, providing educational programs for the current workforce to strengthen recruiting of the next generation of scientists and engineers.

How did the workshop help you in your STEM outreach role?

- Confidence/Inspiration: 25%
- Activity Ideas: 23%
- Networking/Resources: 24%
- Program Ideas: 11%
- Methodology: 19%

Participant Responses on March & August Workshop Exit Surveys

Rating of Program Attributes:
March and August 2018 DoD STEM Workshops

- Participation in the workshop was worthwhile
- I would recommend this workshop to other colleagues
- The projects/activities were easy to understand
- I learned something of value at the workshop
- I will be able to apply what I learned in my own community

Scale of 1 to 5, 5 is "Strongly Agree"
This summer MIDN 1/C Sami Nourse, a mechanical engineering major, MIDN 2/C Emma Remis, a quantitative economics major, and MIDN 1/C Ike Heinemann, a history major, interned at the Naval Research Laboratory (NRL) in Washington, D.C. As part of an interdisciplinary collaboration, the midshipmen researched declassified satellites developed by NRL and wrote passages for these satellites that will be included in a year-long exhibit titled “The Navy in Space” at the USNA Preble Hall Museum. MIDN 1/C Natalie Stahl, a mechanical engineering major, interned at the Pacific Aviation Museum (PAM) in Honolulu, HI. MIDN Stahl supported museum educators to provide engaging STEM education for Hawaii youth.

“...This experience broadened my perspective in many ways. I was able to learn valuable historical context to many things that we experience in society today... It also made me aware of the many opportunities available at labs such as NRL. As an engineer, I am excited for my future career and look forward to the possibility of working on systems such as the ones at NRL.” - MIDN 1/C Sami Nourse

“I got to read graduate level books about topics I was passionate about and become more knowledgeable on one of the most interesting topics in American scientific history.” - MIDN 2/C Emma Remis

“The internship impacts not just the interns who assisted in the creation of the exhibit, but the US Naval Academy as a whole as it will result in both the physical exhibit in Preble Hall and the opportunity for midshipmen to publish articles on an area of Naval history that is often overlooked in classes and publications.” - MIDN 1/C Ike Heinemann

“Overall, the internship provided me with a lot of management opportunities. The process of being given a task and having to prototype an entire lesson was a new experience and provided me with a lot of knowledge on how to do those types of things moving forward.” - MIDN 1/C Natalie Stahl
Emma Houck, a secondary education major from University of Maryland, and Noelle Ray, a mechanical engineering major from University of Maryland Baltimore County spent 10 weeks at the Naval Academy developing hands-on activities related to space technology in topics such as robotics, programming, orbital mechanics, and engineering design. During the SET Sail camps, the interns presented their activities to teachers from all over the world. Additionally, these activities were used with the USNA community at an event in the Luce Planetarium. This internship was funded by the Maryland Space Grant Consortium and Emma and Noelle presented their summer work at the annual MDSGC intern symposium.

“In my degree I can apply the knowledge I’ve gained about trying to simplify a concept to an understandable example to assist other [students] in their learning. In my future career, I can use the knowledge I’ve gained about thinking outside the box to remain creative in my work. I also know a lot about Space Technology now so if I go into that field I will be fairly knowledgeable.” - Noelle Ray

“As a future STEM educator, I can apply the teaching skills I have picked up or further developed. More importantly, I also think that I have a greater appreciation for teaching content area in unique ways. Instead of just applying biology to a strictly life science application, I now see the value in applying it to something like space exploration. It allows students to have a real-world example, and be exposed to a new domain they may be interested in.” - Emma Houck
Two USNA Observatory and Planetarium Star Parties were hosted as a collaboration between the USNA Physics Department, the Astronomy Club, and the STEM Center on August 6 and August 23 for the USNA community. For the first event, two planetarium shows were offered as well as hands-on activities related to robotics, orbital mechanics, programming, and aerospace engineering. On the second evening, one longer planetarium show was offered. On both evenings, the night ended at the Class of 1941 Observatory where guests had an opportunity to see the moon, Jupiter, Saturn, Venus, and other celestial objects using a number of telescopes including the historic Alvin Clark refracting telescope operated by volunteers from the Northern Virginia Astronomy Club (NOVAC).
# Upcoming Events

## Fall 2018

### Sept
- STEM Extravaganza at Morgan State, Baltimore, Sept 8
- SET Sail STEM Educator Workshop, USNA, Sept 15
- STEM Educator Workshop, Hawaii, Sept 17-22
- Historic Naval Ships Association Conference and Workshop, Bremerton, WA, Sept 25-28
- Mini-STEM Event, USNA, Sept 28

### Oct
- Girls Only STEM Day, USNA, Oct 13
- STEM Family Night, USNA, Oct 19
- Fleet Week, San Diego, CA, Oct 25
- Mini-STEM Event, USNA, Oct 26

### Nov
- Maryland STEM Fest, Annapolis Library, Nov 7
- STEM Day at GM Tech Center, Warren, MI, Nov 8-10
- MESA Day, Laurel, MD, Nov 15 and Nov 28
- Mini-STEM Event, USNA, Nov 30