

# United States Naval Academy STEM Center for Education and Outreach

Summer 2017

USNA STEM Center

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# STEM

## UNITED STATES NAVAL ACADEMY



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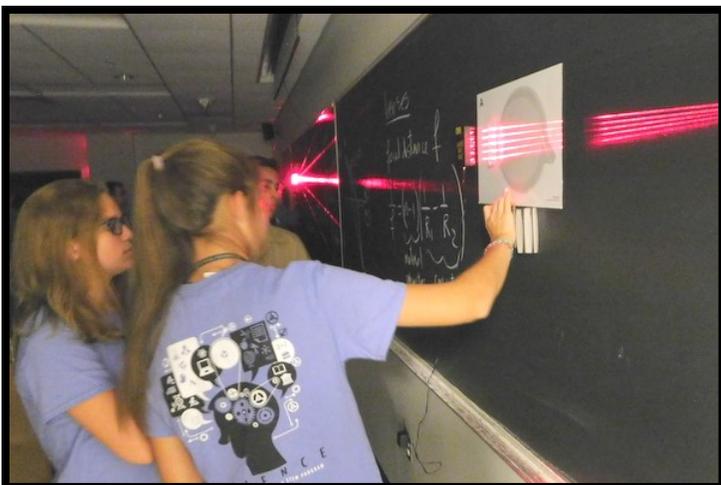
# Summer STEM Program



Summer 2017 included the annual Summer STEM Program at the U.S. Naval Academy, presented by the Office of Admissions and the STEM Center for Education and Outreach. Over 860 rising 9<sup>th</sup> to 11<sup>th</sup> graders attended the week-long residential program held over the course of three weeks in June. Campers explored 18 different STEM modules with engaging, hands-on activities used to introduce students to STEM career fields and real world applications, while developing their technical and problem-solving skills. Each of the modules and activities were designed and led by USNA faculty and staff with support from midshipmen who facilitated the academic sessions and supervised students.

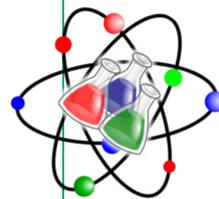
*The Summer STEM Program “showed me exactly how many options there are for STEM and opened my eyes to a lot of fields that I didn’t know existed.”*

*- Camp Attendee*



## MODULES

- Corrosion
- Making Waves
- Autonomous Aid
- Weather and Climate
- Cyber Attack
- Build Your Own
- RoboSense
- Engineering Design
- Spinning Wings
- Bioloids
- Struck by Math
- Platonic Solids
- Searching for Unobtainium
- Aquaculture Engineering
- Countdown to Launch
- 3D Programming
- Storm Chasing
- Bioterrorism



# Summer Heroes Youth Program (SHYP)

The USNA STEM Center presented the annual Summer Heroes Youth Program (SHYP) from June 12-16 and 19-21 at the U.S. Naval Academy in Annapolis, MD. Fifty-six middle school students from 11 different public and charter schools in Baltimore City attended the eight-day program.

The aim of the program was to promote positive attributes of leadership, self-esteem, confidence, and team building through various academic and athletic activities. Curriculum was STEM-based, using a sports theme to make learning science, math, engineering, literature, and life skills dynamic and engaging to the students.

Thirty-two midshipmen STEM majors planned, staged, facilitated, and mentored the students through all activities which included designing a bionic hand, using computer skills to create their own baseball cards, building impact-resistant helmets for water balloon "brains", and learning about projectiles while launching footballs.

The midshipmen served as role models, sharing their excitement about science and engineering, the importance of an active and athletic lifestyle, as well as key life skills such as teamwork, persistence, and integrity.



*"SHYP broadened my mind and made me want to learn more."  
"[The program] showed me that science and math is fun."  
"It allowed me to do amazing things I thought I would never do."  
"[I learned] to trust and believe in myself."*

*- SHYP Campers*



# Girls Tech Camp 'Game On'



The USNA STEM Center hosted the annual Girls Tech Camp at the U.S. Naval Academy from June 26-29, with the theme 'Game On.' The girls were led in hands-on, science and engineering activities related to sports and games. Forty-eight middle school girls attended the week-long day camp, led by U.S. Naval Academy faculty and staff along with seven high school age counselors.

The campers competed in outdoor races to include a Space Race, Tic Tac Toe strategy relay, and the Balance of Forces Dash. They learned about the functions of a heart while dissecting sheep hearts to identify valves and then create their own replacement valves. They explored materials used in creating sports balls, and experimented with catalytic reactions to create polymers for bouncy balls. Students designed and built their own pin ball games out of household supplies.

The girls learned teamwork, self-confidence and critical thinking skills. They met many female role models active in a range of science, engineering, and math fields.

The week culminated with the girls presenting a Tech Fair where they demonstrated what they learned during the week to their family and friends.

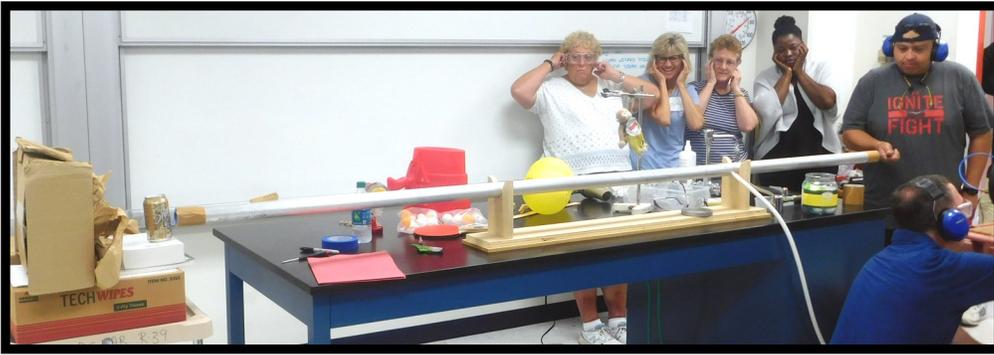
*"I liked learning about new things and building things."*

*"I liked being able to experience so many different things."*

*"[I learned] I really love engineering."*

*– Girls Tech Campers*





# SET Sail Educator Training

In July, the USNA STEM Center completed two week-long sessions of the annual "SET Sail" STEM Educator Training. This year, 86 K-12 teachers attended the professional development focused on using Project Based Learning (PBL) in the classroom.

Teachers from throughout the U.S. as well as 10 overseas countries learned and shared best practices for effective STEM education. One session was devoted to teachers from the Department of Defense Education Activity (DoDEA) schools in the U.S. and abroad.

The teachers discovered hands-on projects for demonstrating science, engineering, and math concepts that are easy to implement in the classroom and highlight real-world applications. Topics included energy transformations, hydraulics, the chemistry of photography, bioterrorism, materials properties, corrosion, principles of flight and rotorcraft, fluids principles, engineering design challenges and more.

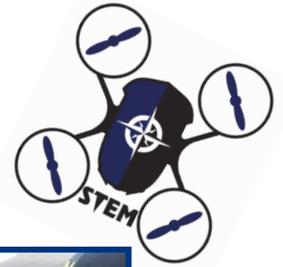


*"The training exceeded my already high expectation. I learned so much this week that I cannot wait to take back to my school and my students."*  
- Teacher Attendee





# SUMMER INTERNS



**Ta'von Johnson**

Ta'Von Johnson is a rising senior at the University of Maryland College Park. His major is in Aerospace Engineering and his minor is in Engineering Leadership. He is originally from Baltimore, MD.



**Emma Houck**

Emma Houck is a rising junior at the University of Maryland College Park. She is a double major in Biology and Secondary Education. She is originally from Columbia, MD.

Ta'Von and Emma, both college students at the University of Maryland College Park, spent ten weeks interning at the USNA STEM Center. During the internship, they learned how to build quadcopter platforms for the elementary, middle, and high school levels. They also developed K-12 activities related to physics, aerodynamics, robotics, and engineering design.

During the summer, the interns supported Girls Tech Camp and SET Sail. At Girls Tech Camp, they led a helicopter module teaching the middle school girls about rotor flight and how to operate remote control helicopters. At SET Sail, they ran a helicopter and quadcopter station at the Fun with Flight Fair and an optics station at the Math & Physics Fair. Additionally, they assisted in the Helicopters, Fluids, and Soldering modules.

As part of their internship, Ta'Von and Emma planned and instructed 18 SET Sail teachers in an eight-hour quadcopter build workshop. The day began with the teachers participating in K-12 activities that Ta'von and Emma developed, touring the aerodynamics lab at USNA, and learning about drone technology. The teachers then worked in pairs to build a middle school Creatrex quadcopter to include design, construction, soldering, and programming.

On July 24, Ta'Von and Emma presented their internship achievements at the Maryland Space Grant Consortium (MDSGC) Intern Symposium. They were awarded fourth place out of 15 intern presenters. This internship was made possible by funding from MDSGC.

# Navy Medicine STEM Outreach Workshop



On August 16, the USNA STEM Center hosted a workshop at the U.S. Naval Academy for 23 members of the Navy medical community from the local region and beyond, focusing on methods and strategies to engage their community in STEM outreach. The workshop was sponsored by the Office of Naval Research with support from the U.S. Navy Bureau of Medicine and Surgery (BUMED).

After morning training, the attendees presented hands-on activities to 100 children from grades K-8 at the Billy the Kid Youth Center, located at NSA Annapolis. The activities were centered around

robotics, electricity, hydraulics, biomechanics, heart and lung function, chemical reactions, optics, and sound. The children used a hydraulic arm to manipulate a wooden block. They waved whirlytubes in the air to explore sound waves. They made their own electric circuits with conductive dough, and tried many more hands-on activities.

In the afternoon, the medical personnel worked on developing new modules in relevant topic areas, including infectious disease, 3D imaging, artificial limbs, gastroenterology, and vision.



# Upcoming Events: Fall 2017

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## Volgenau Chair for Education and Outreach



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## Aug

- STEM Outreach and Educator Workshop, Oahu, HI, Aug 25-26, Hilo, HI, Aug 28-29

## Sept

- “SET Sail” STEM Educator Workshop, USNA, Sept 9
- STEM Educator Workshop, Albuquerque, NM, Sept 23
- SeaPerch/NOAA Educator Workshop, Largo, MD, Sept 27-28

## Oct

- National Science Teacher Association (NSTA) Conference, Baltimore, MD, Oct 5
- STEM Outreach, St. Louis, MO, Oct 13-14
- Girls Only STEM Day, USNA, Oct 14
- Mini-STEM, USNA, Oct 20
- STEM Educator Workshop, Dayton, OH, Oct 20-21
- Family STEM Day, USNA, Oct 21
- STEM Outreach, Detroit, MI, Oct 28

## Nov

- Mini-STEM, USNA, Nov 3
- MESA STEM Day, Laurel, MD, Nov 16
- STEM Outreach, Dallas, TX, Nov 18
- MESA STEM Day, Laurel, MD, Nov 29

## Dec

- SeaPerch Educator Workshop, Baltimore, MD, Dec 2

Schedule subject to change