

### **AEROSPACE ENGINEERING AT STEUBENVILLE HIGH SCHOOL**

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#### **Steubenville High School (SHS) Advanced Careers Aerospace Engineering and Aviation**

**Program** is a project-based career pathway program in its first year of implementation. The program recruited 22 ninth grade students interested in exploring these career fields. This program was funded in 2016 by the Ohio Department of Education through the Hight Schools That Work (HSTW) Office, with support from the Southern Regional Education Board (SREB). In this course, students will learn how to use an engineering design process to create prototypes and solve real world problems. Students will work collaboratively in teams to design systems, solve problems, think critically, be creative and communicate with other students and business partners. SHS aviation students will be introduced to the FAA Private Pilot Part 61 curriculum. Guest speakers from the aerospace and aviation community will share information on career opportunities and the latest technologies used in their industry. Students will develop new skills learning the underlying principles of science, technology, engineering, mathematics and literacy (STEM). Jefferson County Airport is home base for this program. Students toured:

- Pittsburgh International Airport, including a tour of the air traffic control facility and the 171st Refueling Wing of the Pennsylvania Air National Guard where they posed with a KC-135 tanker.
- Wheeling Airport museum, where they learned about airport management. The air traffic controller spoke to students about their responsibilities in communicating with pilots, the difference between a class Delta airport and the Pittsburgh International Airport. Students flew an introductory flight at Wheeling Airport, and for many it was the first time in a small airplane.



## Harding Middle School Aviation Program

Harding Middle School joined Making Middle Grades Work (MMGW) in 2015 and is working on successfully transitioning students to a rigorous career technical aerospace engineering and aviation program at the high school. This year, the Harding Middle School Aviation program recruited 35 middle school students for an introductory Aerospace Engineering and Aviation program. The aviation program prepares students for careers in aeronautics, as a professional pilot, or an aviation manager. The program focuses on the general study of aviation and the aviation industry, including in-flight and ground support operations. Program courses include: technical and general aspects of air transportation, aviation law and regulation, air cargo, air traffic control, airport management, aerodynamics, aircraft systems and aviation training. All classes are taught by FAA Certified Flight and Ground Instructors and are designed to be interactive and engaging. All the classroom and flight time earned in the courses are logged in a pilot's logbook and actually count towards the requirements for earning a FAA Pilot's Certificate.



## NASA Aeronautics Program

In 2016, Steubenville City Schools received a grant from NASA for a NASA Out of School Learning Network (NOSL Network) program. This program enhances the in-school aviation program at the middle school and leverages a proven STEM engagement model and evidence-based strategies to build capacity of Youth Serving Organizations, and formal and informal education institutions (such as museums), to implement quality STEM education programming. The curriculum modules will include: engineering design challenges, inquiry-based lessons and resources, and citizen science recommendations. The NOSL Network includes a time-tested model of evidence-based strategies to increase STEM engagement among middle school students.

## Steubenville High School is a nationally recognized award winning STEM site

Steubenville High School (SHS) joined High Schools That Work (HSTW) in 2014. For the past 3 years, the school has focused on increasing student achievement and graduation rates through implementation of the HSTW 10 key practices. SHS success is due to strong leadership and a commitment to implementing a comprehensive school improvement plan, research-based strategies and nationally acclaimed STEM educational programs. SHS recognitions, grants and awards include: a \$10,000, 2015 National Education Foundation CyberSTEM Academy Award; a \$1,500, 2016 High Performing STEM Academy Award; and the 2017 Fly Pittsburg Grant from Pittsburgh International Airport to purchase a flight simulator.



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# CLEAN ENERGY TECHNOLOGY AT NORTHWESTERN HIGH SCHOOL

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**Northwestern High School Advanced Careers (AC) Clean Energy Technology** is a project-based learning career pathway program in its first year of implementation. The program recruited 74 high school students interested in exploring the clean energy career fields, with two sections of the first course offered freshman year, and one section of the second course open to all high school students. In 2015, Northwestern Local School received an Advanced Careers Grant from the Ohio Department of Education through the HSTW Office, with support from the Southern Regional Education Board (SREB) for teacher training and curriculum resources. This program is designed to better prepare students for a wide array of postsecondary options in the clean energy industry. AC fuses a rigorous academic core with challenging project work and advanced technology. To provide additional support for the Clean Energy Technology and Agricultural Science programs and enhance student research and experimentation, Northwestern Local Schools constructed a 3,000 square foot greenhouse and Clean Energy Lab, complete with a wind turbine, solar array, geothermal HVAC, a biofuel plant, and a hydroponics system. On April 27, 2017, the greenhouse was dedicated and funded through grants, and business and community support.



**Clean Energy (Year 1)** In this course, students explore three sources of renewable energy: wind, solar, and biofuels. Working with solar, thermal, chemical, and mechanical sources of clean energy teaches students how to apply physics, geography, chemistry, biology, geometry, algebra, and engineering fundamentals. Students learn the most efficient and appropriate use of energy production as they explore the relevant relationships among work, power, and energy. Students are engaged in a wide variety of hands-on projects and lab activities that test their knowledge and illustrate the interrelationships between the various forms of clean energy. Topics include: Motors and Generators, Solar Panel Design and Manufacturing, Solar Water Heater, Biodiesel and Sustainability, Wind Turbine Blade Design.



**Clean Energy Applications (Year 2)** In this course, students explore five sources of renewable energy: nuclear, geothermal, bioenergy, electric vehicles, and hydroelectric. Working with these sources of clean energy teaches students how to apply physics, geography, chemistry, biology, geometry, algebra, and engineering fundamentals. Students learn the most efficient and appropriate use of energy production as they explore the relevant relationships among work, power and energy. Students are engaged in a wide variety of hands-on projects and lab activities that both test their knowledge and illustrate the interrelationships between the various forms of clean energy. Topics include: Nuclear, Geothermal, Bio Energy, Electric Vehicles, Hydroelectric and Drip Irrigation.

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## Northwestern: region, state, national recognized award-winning HSTW and STEM site

Northwestern High School (NHS) joined High Schools That Work (HSTW) in 2007. For the past 10 years, the school has focused on increasing student achievement and graduation rates through implementation of the HSTW 10 key practices. NHS success is due to strong leadership and a commitment to implementing a comprehensive school improvement plan, research-based strategies and nationally acclaimed STEM educational programs. NHS is recognized for receiving two national awards: U.S. News & World Report Bronze Award 2012 and SREB HSTW Gold Achievement 2014; three state recognitions: Ohio School of Promise 2010 and in 2012; Ohio School of Honor 2012; Ohio Academy of Science Thomas Edison Award – STEM 2012, and three regional awards in 2012, 2014 and 2016 from HSTW Ohio Network for meeting and exceeding all sites in Ohio and nationally on the HSTW Surveys. This school is most proud of the focus on rigor, relevance and relationships since implementing HSTW. This is evident with a 6.5 percent increase in the graduation rate.



### Advanced Career combines college ready academics with authentic, hands-on projects.

Schools are challenged to better prepare students for a wide array of postsecondary options. The workforce of today and tomorrow demands a higher level of skill – people who grasp complex problems, understand technology and troubleshoot problems. Advanced Careers answers both of these needs by fusing a rigorous academic core with challenging project work and advanced technology in a career pathway program of study. AC courses give students a greater depth of knowledge and skills, and prepares them for more options after high school.

### Advanced Career provides:

- Ready-to-implement AC course work for students
- Comprehensive training for teachers
- Access to tools and technology for project-based learning
- End-of-course assessments
- Opportunities for industry certification and/or dual credit

In 2000, Ohio joined the Southern Regional Education Board (SREB)'s High Schools That Work (HSTW) national network. SREB located in Atlanta, GA. chartered 1987 by a consortium of 13 member southern states now has HSTW sites in over 30 states. In 2002, Ohio joined the SREB's Making Middle Grades Work (MMGW). HSTW and MMGW states are among the first in the nation to implement strategies that address the critical transition from middle grades into high school and successfully transitioning from high school to postsecondary enrollment, employment or enlistment in the military. HSTW NE Ohio Region was officially funded by the Ohio Department of Education (ODE) as one of four HSTW regional centers serving 36 high school and career technical center and 16 middle grade sites in northeast Ohio.

For more information on HSTW NE Ohio Region, contact Diana Rogers, Regional Coordinator, [hstwdr@gmail.com](mailto:hstwdr@gmail.com) or the office at [hstwne@gmail.com](mailto:hstwne@gmail.com) 740.869.2650. For more information on HSTW state and national networks: [www.ohiohstw.org](http://www.ohiohstw.org) or [www.sreb.org](http://www.sreb.org)

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