

Russellville School District STEM Pathways

The Expansion of STEM Programs in Career and Technical
Education

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RSD STEM Pathways

- PLTW Engineering
- PLTW Biomedical Science
- PLTW Computer Science



PLTW Gateway Courses

Each PLTW Gateway unit engages students in activities that not only build knowledge and skills in areas including computer science, engineering, and biomedical science, but also empower students to develop essential skills such as problem solving, critical and creative thinking, communication, collaboration, and perseverance.

RJHS offers 6 Gateway courses currently in 8th grade.



RJHS School of Innovation

Our Problem: Not enough 8th grade students were able to take the Project Lead The Way (PLTW) courses because of their other state required electives. As a PLTW school, RJHS wanted more 8th grade students exposed to the high level, rigorous curriculum.

Our Innovation: RJHS requested a waiver from the standards of accreditation 9.03.3.5 Physical Education, 9.03.3.6 Fine Arts, and 9.03.3.9 Career and Technical Education (Career Development), requirements in 8th grade, for those 8th grade students who enrolled in the PLTW electives offered instead.

RJHS Data

Students Enrolled in 8th PLTW Courses



RJHS Gateway Courses

- Design & Modeling
- Automation & Robotics
- Science of Technology
- Magic of Electrons
- Medical Detectives

NEW 2017-2018: App Creators



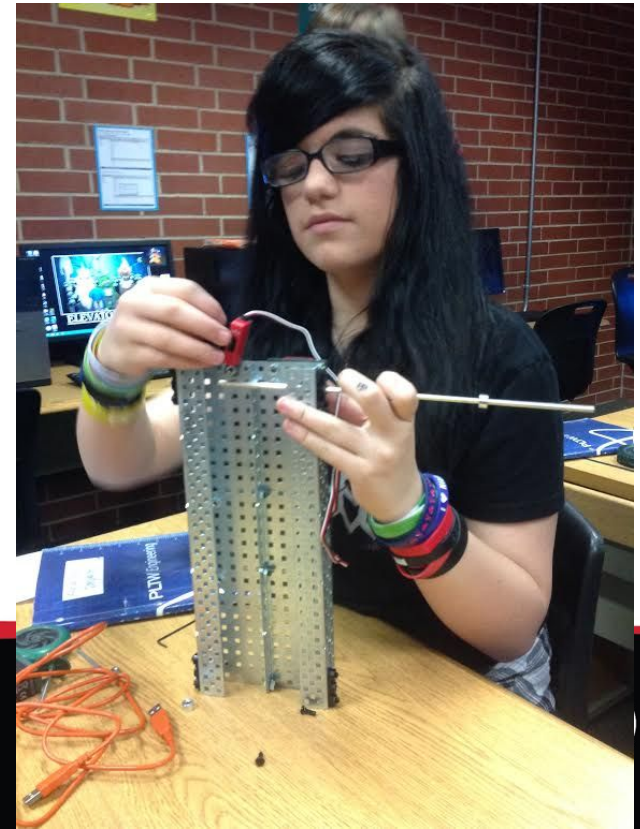
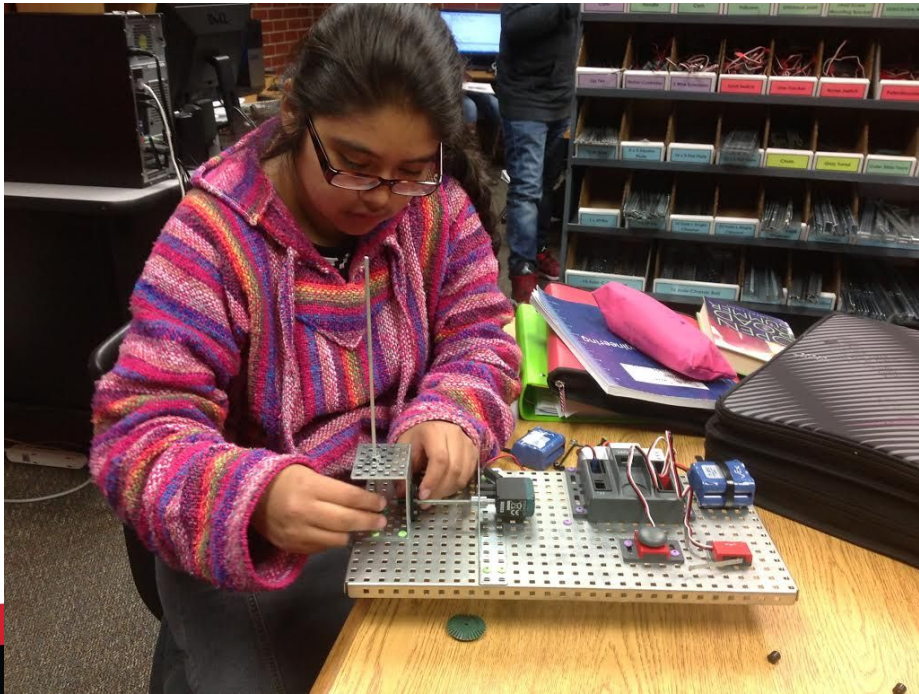
Design & Modeling

Students discover the design process and develop an understanding of the influence of creativity and innovation in their lives. They are then challenged and empowered to use and apply what they've learned throughout the unit to design a therapeutic toy for a child who has cerebral palsy.



Automation & Robotics

Students trace the history, development, and influence of automation and robotics as they learn about mechanical systems, energy transfer, machine automation, and computer control systems. Students use the VEX Robotics® platform to design, build, and program real-world objects such as traffic lights, toll booths, and robotic arms.



Science of Technology

Science impacts the technology of yesterday, today, and the future. Students apply the concepts of physics, chemistry, and nanotechnology to STEM activities and projects, including making ice cream, cleaning up an oil spill, and discovering the properties of nano-materials.



Magic of Electrons

Through hands-on projects, students explore electricity, the behavior and parts of atoms, and sensing devices. They learn knowledge and skills in basic circuitry design, and examine the impact of electricity on the world around them.



Medical Detectives

Students play the role of real-life medical detectives as they analyze genetic testing results to diagnose disease and study DNA evidence found at a “crime scene.” They solve medical mysteries through hands-on projects and labs, investigate how to measure and interpret vital signs, and learn how the systems of the human body work together to maintain health.



App Creators

This unit will expose students to computer science by computationally analyzing and developing solutions to authentic problems through mobile app development, and will convey the positive impact of the application of computer science to other disciplines and to society.



PLTW Engineering

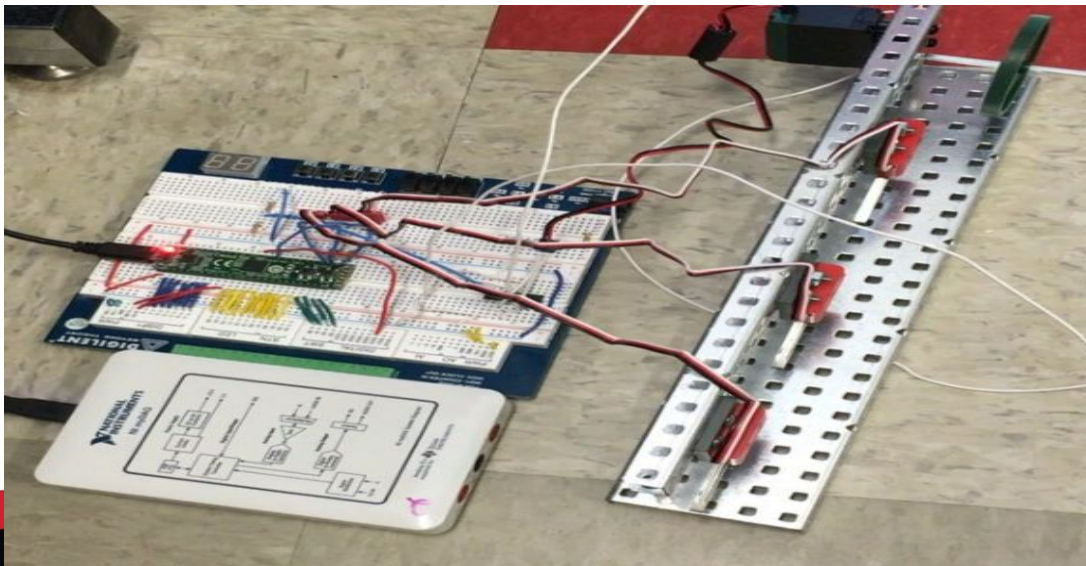
From launching space explorations to delivering safe, clean water to communities, **engineers find solutions to pressing problems** and turn their ideas into reality.

PLTW Engineering empowers students to step into the role of an engineer, adopt a problem-solving mindset, and make the leap from dreamers to doers.

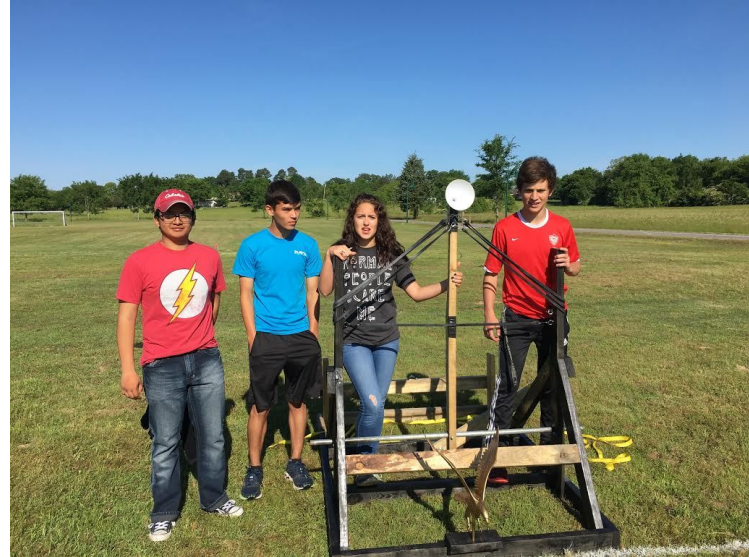
These courses engage students in compelling, real-world challenges that help them become better collaborators and thinkers.

RSD Engineering Pathway

- Introduction to Engineering Design
- Principles of Engineering
- Digital Electronics
- Engineering Design & Development

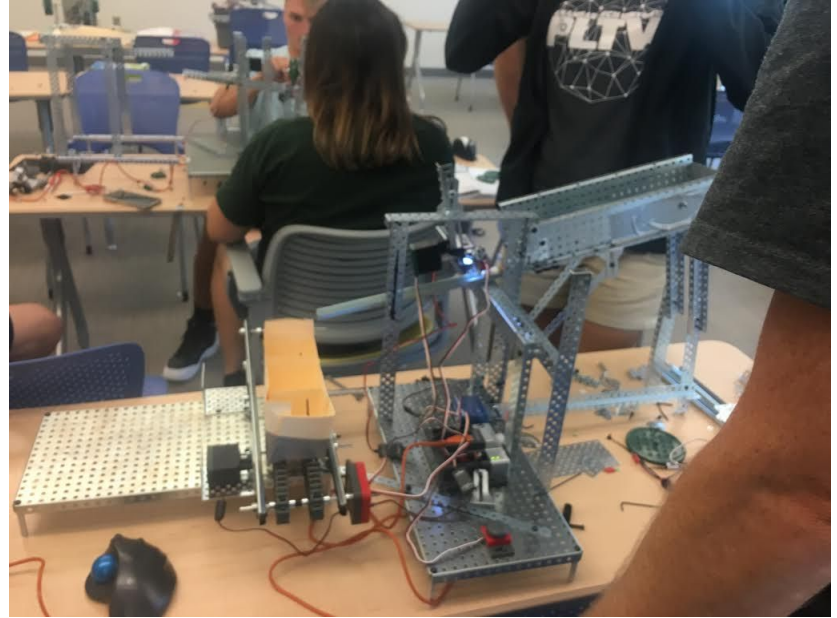
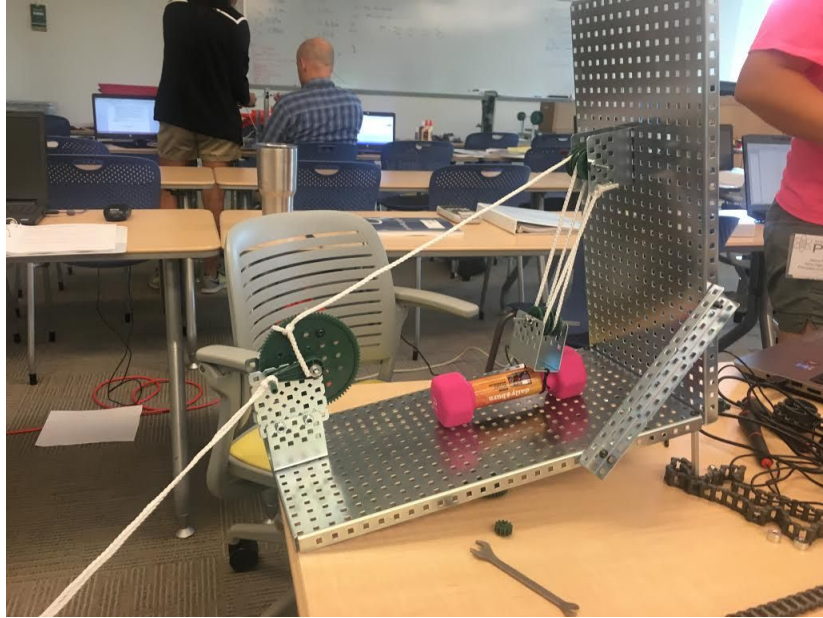


Introduction to Engineering Design



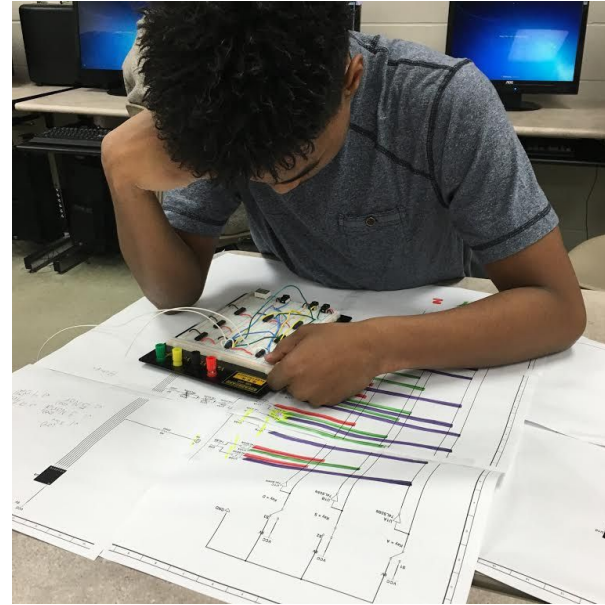
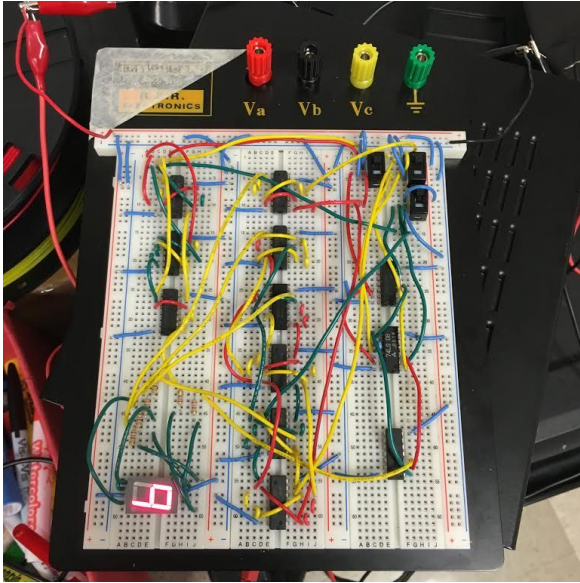
Students dig deep into the engineering design process, applying math, science, and engineering standards to hands-on projects. They work both individually and in teams to design solutions to a variety of problems using 3-D modeling software, and use an engineering notebook to document their work.

Principles of Engineering



Through problems that engage and challenge, students explore a broad range of engineering topics, including mechanisms, the strength of structures and materials, and automation. Students develop skills in problem solving, research, and design while learning strategies for design process documentation, collaboration, and presentation.

Digital Electronics



From smartphones to appliances, digital circuits are all around us. This course provides a foundation for students who are interested in electrical engineering, electronics, or circuit design. Students study topics such as combinational and sequential logic and are exposed to circuit design tools used in industry, including logic gates, integrated circuits, and programmable logic devices.

Engineering Design & Development

The knowledge and skills students acquire throughout PLTW Engineering come together in Engineering Design and Development as they identify an issue and then research, design, and test a solution, ultimately presenting their solution to a panel of engineers. Students apply the professional skills they have developed to document a design process to standards, completing Engineering Design and Development ready to take on any post-secondary program or career.



Robotics in Engineering

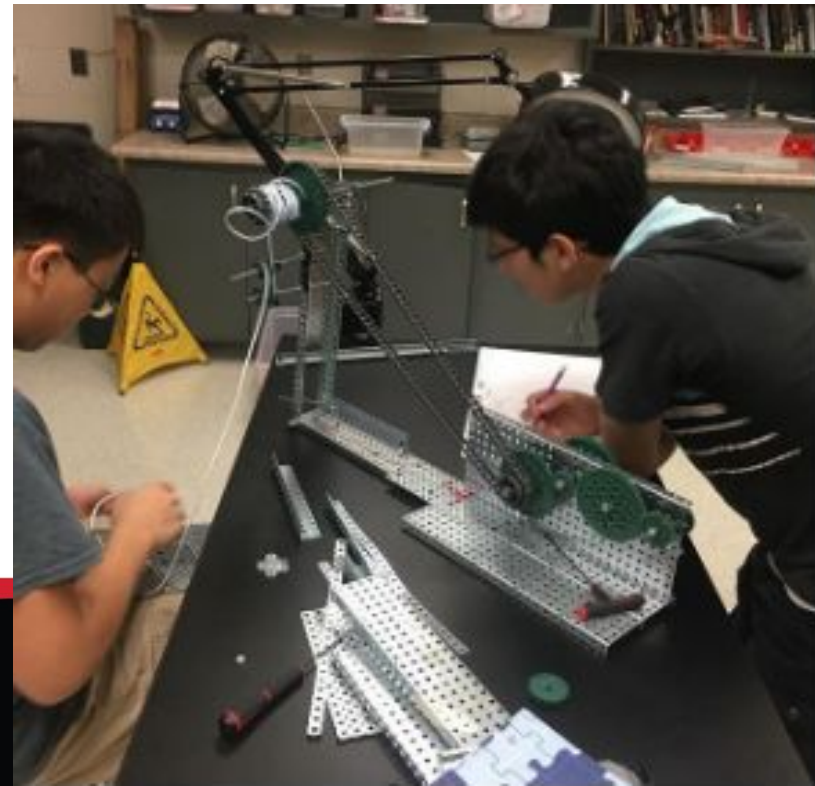
Students have to design and build a robot to compete against other teams.

Tournaments are held year-round, and local winners go on to compete globally at VEX World Competition each April.



RHS Robotics

High school robotics teams have qualified for State already this year and for the first time in school history, they qualified for Nationals!



RJHS Engineering Success

Last year's Engineering EOC scores for RJHS:

- 88% of our 9th grade Intro. to Engineering Design students scored Proficient or Advanced on their EOC!
- 68% scored at or above the National Average!
- 32% scored Advanced on their EOC (this is an 8 or 9 out of 9)!
- 10 students scored a perfect 9 out of 9 on the EOC!!



PLTW Biomedical Science

Whether discovering new cancer treatments or teaching healthy lifestyle choices to their communities, today's biomedical science professionals are tackling big challenges to make the world a better place.

PLTW Biomedical Science students are taking on these same real-world challenges – and they're doing it before they even graduate from high school. They work with the same tools used by professionals in hospitals and labs, to find solutions to problems.

RSD Biomedical Science

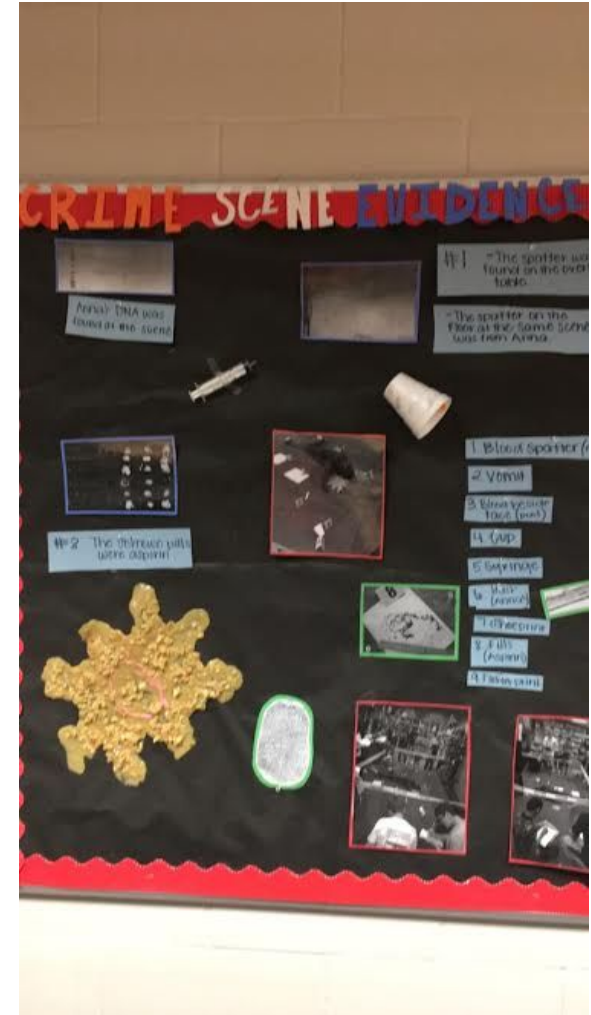
- Principles of Biomedical Science
- Human Body Systems
- Medical Interventions
- Biomedical Innovation



Principles of Biomedical Science

Students begin the course learning how to investigate a crime scene.

Throughout the year, students study blood and genetics through sickle cell anemia, heart disease through hypercholesterolemia, and infectious disease through a UTI.



Principles of Biomedical Science



Human Body System

Students examine the interactions of human body systems as they explore identity, power, movement, protection, and homeostasis in the body. Exploring science in action, students build organs and tissues on a skeletal Maniken®; use data acquisition software to monitor body functions such as muscle movement, reflex and voluntary action, and respiration; and take on the roles of biomedical professionals to solve real-world medical cases.



Medical Interventions



Students follow the life of a fictitious family as they investigate how to prevent, diagnose, and treat disease. Students explore how to detect and fight infection; screen and evaluate the code in human DNA; evaluate cancer treatment options; and prevail when the organs of the body begin to fail. Through real-world cases, students are exposed to a range of interventions related to immunology, surgery, genetics, pharmacology, medical devices, and diagnostics.

Biomedical Innovation

In the final course of the PLTW Biomedical Science sequence, students build on the knowledge and skills gained from previous courses to design innovative solutions for the most pressing health challenges of the 21st century. Students address topics ranging from public health and biomedical engineering to clinical medicine and physiology. They have the opportunity to work on an independent project with a mentor or advisor from a university, medical facility, or research institution.



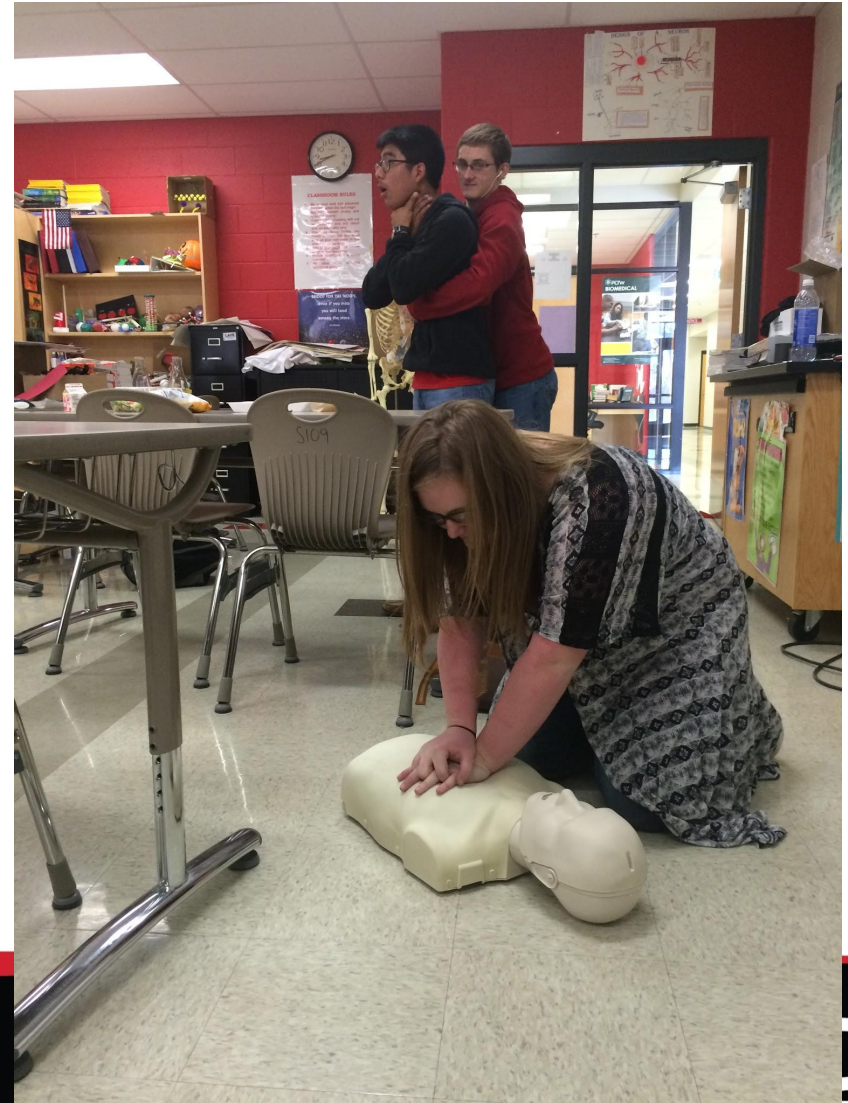
HOSA

HOSA (Health Occupational Students of America) - This club is paired with the biomedical program.

We competed in the state competition for the first time last year. We had one biomedical innovation team get 3rd in state and qualify for Nationals!



RHS Biomedical Science



PLTW Computer Science

At a time when computer science affects how we work and live, PLTW Computer Science **empowers students in grades 9-12 to become creators**, instead of merely consumers, of the technology all around them.

The program's interdisciplinary courses engage students in compelling, real-world challenges. As students work together to design solutions, **they learn computational thinking** – not just how to code – and become better thinkers and communicators.

RSD Computer Science

NEW 2016-2017: PLTW AP Computer Science Principles in 9th grade

NEW 2017-2018:

- Computer Science Essentials **(NEW)**
- AP Computer Science Principles
- AP Computer Science A
- Cyber Security (coming Fall 2018)

RSD Computer Science

