

# **Piner High School STEM Certificate**

## **Levels of Involvement**

The STEM certificate requires an ongoing participation in STEM related activities at different levels of complexity and community involvement. As depicted on the STEM flowchart, the levels are further explained in the paragraphs below.

### **Level 1: Ongoing Personal Involvement**

Students earning the PHS STEM Certificate must demonstrate a consistent commitment to STEM activities on campus. A wide variety of opportunities for ongoing involvement in STEM activities exists at Piner. Numerous science and engineering related clubs meet regularly on campus and host frequent fun and educational events for students. In addition, a number of regular events are sponsored by the PHS Science Department that allow PHS students to interact with professional scientists and give opportunities to learn more about STEM careers through guest speakers and field trips. Consistent participation in clubs and these STEM events will provide students with valuable learning experiences and will significantly shape their academic and professional work.

### **Level 2: Community Involvement**

Many STEM careers include a strong community service component. Students completing the PHS STEM Certificate must demonstrate a strong commitment to interacting with and serving our local community. This involves two components: community service and interfacing with local professionals in a professional setting. Working with local elementary or middle school students and job shadowing are examples of the opportunities that exist at Piner. It is crucial that students completing the STEM Certificate are aware of the importance of community service and that they gain significant experience working alongside professionals in our local community.

### **Level 3: Original Science or Engineering Inquiry Project**

Students completing the PHS STEM Certificate will demonstrate the ability to design and carry out an original, independent project. This project will allow students to experience science and engineering practices first hand. Students will design an original scientific study or engineering project while working closely with adult mentors on campus and/or in the community. Emphasis should be placed on addressing real-world problems. Students will present the results of their work publicly, demonstrating a deep understanding of scientific and/or design processes.

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### Athletic Training Club

Athletic Training Club participants will have the chance to discover the vast opportunities in the exciting field of Athletic Training. Participants will learn the basics of injury identification, assessment, treatment and injury rehabilitation. Each club member will have the opportunity to view various injuries via online simulations and fields trips to athletic training facilities. Treatment will include learning the latest taping techniques to support injuries to get athletes back on the sports fields as quickly as possible. There will be a field experience component to this club that can be utilized for Level 2 experience. See Level 2 Athletic Training Club Field Experience

### ChemClub

The ACS ChemClub is a high school chemistry club that provides students with a unique opportunity to experience chemistry beyond the classroom. There are over 530 clubs across the United States and abroad where students participate in after-school activities, get involved in community building, learn about chemistry careers, enjoy social events, and better understand how chemistry plays a role in our everyday lives. Our students plan and enjoy a variety of chemistry-focused activities, including hearing invited speakers and performing demonstrations and teaching for elementary school students. For more information go to <http://www.acs.org/content/acs/en/education/students/highschool/chemistryclubs.html>

**(Health Occupations Students of America)** Our local Cal-HOSA chapter brings together students with interests in Health Science Careers. This group strives to promote health across campus, interact with community professionals and prepare for the annual Leadership conference. Students are expected to take a leadership role in managing a project as well as prepare for their competitive event. We meet bi-monthly to plan activities and create fundraising opportunities. Consult these website for more information: Cal HOSA <http://cal-hosa.org/> or HOSA National <http://www.hosa.org/http://www.hosa.org/>

### MAKE Club

The Piner High School Make program will be a continuation of the super fun Project Make and

Applied Physics Make classes. Led by students who are interested in creating new projects, finish existing projects or provide support for needed tasks on campus. The club will use fundraisers to raise money for desired projects and tools. Group projects could include go-carts or solar cars as well as unique group designed ideas. We will use power tools and learn skills that may not be learned in normal MAKE classes, such as welding, metal shaping and wiring as just a few examples. Participants do not have to have previous MAKE experience. All are invited to join.

### **Math Club**

Math Club meets to discuss interesting mathematical topics and problem solving. We participate in the California Mathematics League that puts on monthly mathematical contests. We also send a team of eight students to compete in the Sonoma County Mathematical Association's annual math steeplechase. Math Club members also provide voluntary tutoring services after school.

### **Math Steeplechase**

The steeplechase is a countywide math competition for high school students. Teams of four students compete in a problem-solving course of 12 stations, solving challenging problems in a collaborative effort. The Piner High School Math Club participates each year at Spring Lake. Our students are teamed up with other high schools throughout the county.

### **PHAST**

Piner High Astronomy, Science, and Technology is an active club on the Piner Campus that caters to students interested in STEM and especially the field of Astronomy. We meet weekly and are a mix of service, social and scientific activities. **PHAST** is responsible for and involved with: The **SPARQ** Center Planetarium and Observatory, StarLab portable planetarium, S<sup>4</sup>, and the Robert Ferguson Observatory.

### **Robotics Club**

The Robotics Club gathers regularly to design, build, and test robotic systems. LEGO Mindstorms robotics systems serve as the basis of our work. Basic computer programming is used to control robotic systems for a variety of purposes. Students are free to create their own robotic systems and/or to participate in local competitions such as robotics obstacle course and SUMO competitions. No prior robotics experience is necessary!

### **SRJC/SSU Colloquium**

The various colloquiums offered through Santa Rosa Junior College and Sonoma State University are a series of weekly public guest lectures on cutting-edge topics in the various sciences. Talks by distinguished members of the science community are given at their various sites. Many students attend the series to gain an understanding of what it means to be a scientist in their area of choice and many establish valuable connections through the informal meetings with the speakers. Examples of the different science colloquium include:

- SSU Colloquium <http://www.sonoma.edu/scitech/pls/http://www.sonoma.edu/scitech/pls/>
- SRJC Environmental science:  
[http://online.santarosa.edu/homepage/kgerber/envs/ENVS\\_Calendar.htm](http://online.santarosa.edu/homepage/kgerber/envs/ENVS_Calendar.htm)

### **Science Exploratorium**

This level 1 activity allows students to explore and analyze an exhibit or exhibits. Students will document their observations and conduct research into their chosen topic. The goal for this activity is to develop a deeper understanding of discovery through while gaining an appreciation for the scientific process.

<http://www.exploratorium.edu/>

<http://www.exploratorium.edu/education/creating-learning-teaching-experiences>

### **SRJC Calculus Camp**

This is an event that prepares students for the AP Calculus Exam. Calculus camp offers extra instruction, from SRJC instructors that provides a preview of the structure of the three-hour advanced placement exam. Break-out sessions focus on a particular topic in calculus and practice for the different formats (multiple choice, free response) of the AP calculus exam. It also emphasizes pacing, explanation, a means for clarifying concepts and builds confidence for taking the AP Calculus Exam.

### **STEM Cafe'**

The STEM Cafe' is an ongoing speaker series focused on relevant science topics such as Vaccines & the Immune System or STEM Cells. Each speaking engagement consists of a 45 minute talk by an industry expert, followed by tasty snacks and then a 20 minute activity where audience members get involved asking questions or participating in a discussion. STEM students will be required to formally respond to what they learned in the talk. Note: STEM Cafe' participation counts for a ½ share of level one (2 STEM Cafe's count for 1 item of Level 1)

### **TrigStar**

The TrigStar Program Contest is an annual high school mathematics competition sponsored by the National Society of Professional Surveyors based on the practical application of Trigonometry. The program recognizes the best students from high schools throughout the nation. Our students compete with students from across the county at the Santa Rosa Junior College. The winner from a local high school is eligible to compete at the state and national levels.

<http://www.nsps.us.com/index.cfm?fuseaction=page.viewPage&pageID=522&stopRedirect=1>

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### **Athletic Training Club** - Field Experience

Athletic Training Participants will have the opportunity to have an authentic athletic training experience. Each member will be assigned an athletic team that they will support during the school year. There are 3 sports seasons for you to choose from and you can participate in as many seasons as you like. Your job is to support coaches with basic athletic training responsibilities. These basic responsibilities will involve ice preparation, basic pre game taping, and to assist coach / medical professional during injury assessment and treatment of an athlete. Student will only be allowed to assess athletes injuries they will only support medical professionals who oversee the athletic event.

### **Bay Area Science Festival**

The Bay Area Science Festival provides a wide range of science & technology activities, lectures, debates, exhibitions, concerts, plays, and workshops annually at the Sonoma County Fairgrounds. This ambitious collaborative public education initiative brings together our leading academic, scientific, corporate, and nonprofit institutions to showcase the region as an international leader in innovation and STEM. Students will prepare and participate in sharing Piner High STEM Programs, and experience the range of Bay Area Science Festival science and technology activities.

[www.bayareascience.org](http://www.bayareascience.org)

### **First Light: Elementary School Outreach**

Piner students participating in the First Light outreach program will prepare and teach science lessons in local 5th and 6th grade classrooms. Teaching teams will teach basic physics and chemistry lessons once each month on local elementary campuses, and will serve as coaches and guides for elementary students during visits to the Piner campus for Elementary STEM Activity Day.

## **Internships**

**GTP- Geospatial Technology Pathway** students participate in an internship allowing them to apply their GIS, Survey, and Workflow knowledge at a local professional business. Internships culminate with an important letter of recommendation documenting their real world GIS application and experience.

**HSB- Health Science & Biotechnology-Year III** students will job shadow professionals in a science related field of their choice. We have students placed at Kaiser, Vista Clinic, St. Joseph, Medtronic, Safari West, SRJC Sports Medicine, with many other community options open to students. Students seminar biweekly about their experience with a focus on site based vocabulary. Internships culminate in a public based presentation about their experiences and a portfolio that includes a resume and letter of recommendation.

### **Peterson Creek Stewardship Project** – field experience

Students will work with the Sonoma County Water Agency and the City of Santa Rosa to develop, monitor and maintain the health of Peterson Creek. Field work will include invertebrate and invasive species studies, water quality, animal habitats and other geospatial inquiry questions. Community resource professions will work side by side with students in a collaborative environment in day to day studies and independent projects.

**PHAST** students travel to local elementary schools and perform live astronomy shows in the PHS StarLab planetarium. Students will also be performing live shows in the new SPARQ Immersive Theater. [StarLab Outreach](#)

### **Specialized Lab Aide/Tutor**

Students will provide individualized aid to students in science lab courses and in need of additional academic assistance. Students will be given a position of responsibility assisting science teachers in the classroom. The main duties of science lab assistants are to set up and put away equipment and supplies associated with specific laboratory activities. Science teachers will train lab assistants on behavioral expectations, equipment operation and storage procedures, and other tasks related to the performance of laboratory experiments. The students receive letter grade credit for the course.

### **SSU Summer Genetics Lab Workshop**

Piner students collaborate with a SSU graduate student practicing formal genetics lab techniques. Students will “fine-tune” the labs that will be used in the fall genetics unit (Genetically Modified Organisms, Forensics). This internship takes place over a two week period, culminating in a presentation where students discuss what they learned, the challenges they overcame and provide a rationale for the techniques and curriculum that will be used in the unit.

## **Science Olympiad**

The Science Olympiad is one of the premiere science competitions in the nation, providing rigorous, challenges to nearly 7,000 teams in United States. Science Olympiad's ever-changing line-up of events in all STEM disciplines exposes students to practicing scientists and career choices, and energizes classroom teachers with a dynamic content experience. Each year, a portion of the events are rotated to reflect the ever-changing nature of genetics, earth science, chemistry, anatomy, physics, geology, mechanical engineering and technology. By combining events from all disciplines, Science Olympiad encourages a wide cross-section of students to get involved. Emphasis is placed on active, hands-on group participation.

<http://www.soinc.org/about>

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## **CAMEOS (Coastal, Atmospheric & Marine Environmental Observation Studies)**

The goal of this program is to enhance ocean literacy, build partnerships between the K-12 & University educators, train future scientists, enhance grad student training, and have K-12 students participate in “Real Science” experiences. Piner has participated the last two years in this program. Piner students are designing semester long science projects (Bodega Bay Marine Lab, Armstrong Redwoods) and presenting them at a symposium made up of scientists and peers. [www.bml.ucdavis.edu/education/comeos/](http://www.bml.ucdavis.edu/education/comeos/)

## **Make Faire**

Part science fair, part county fair, and part something entirely new, Maker Faire is an all-ages gathering of tech enthusiasts, crafters, educators, tinkerers, hobbyists, engineers, science clubs, authors, artists, students, and commercial exhibitors. All of these “makers” come to Maker Faire to show what they have made and to share what they have learned. Students who participate in the Make Faire will go to the event as an individual or as a group and participate in displaying a project that they have created either in Make Class, on your own, or in other classes such as Math, Biology or GIS to name a few.

<http://makerfaire.com/http://makerfaire.com/>

## **S<sup>4</sup> (Small Satellites for Secondary Students)**

S<sup>4</sup> is a partnership between Piner High School, NASA, AeroPac, The Endeavor Institute, and the Public Outreach group at Sonoma State University. Through S<sup>4</sup>, students build experimental instrument payloads to fly on weather balloons and/or rockets, enabling students to participate in the thrill of experimental design, fabrication, implementation, and authentic data generation and analysis. S<sup>4</sup> is an exciting STEM activity integrating Science, Technology, Engineering, and Math.

## **Sonoma County Science Fair**

The Synopsys-Sonoma County Science Fair gives students in grades 6-12 the opportunity to learn about a topic of their own choice. Students can complete individual projects, or they can work in teams of two or three students. (*Note: The San Francisco Bay Area Science Fair accepts only individual projects.*) The idea is to design, complete, and report on a scientific research project. Topic categories can be in fields of agricultural science, behavior and social



sciences, biology, chemistry, earth and planetary sciences, electronic and electromagnetism, health and human biology, mathematics and software, physics and astronomy.

<https://www.scoe.org/pub/htdocs/science-fair.html>

### **SSU Symposium**

The School of Science and Technology hosts a poster session showcasing the scholarship and achievements of students in the School of Science and Technology as well as collaborations across disciplines and with community partners as part of the WATERS Collaborative, a reception with buffet and a keynote talk by local scientist is also part of the program. Our students would participate by working collaboratively with SSU students and sharing their poster at this public venue.