



## Santa Rosa City Schools Course Proposal - Introduction to Engineering, Construction, and Design

Proposal Submitted By: John Williams

Needs Statement: Discuss how this course fits into your Site and/or the District's goals. Attach minutes of meetings where this course was approved at site or district leadership meetings.

The course will be replacing an existing course - Project Make 1 to better align to industry trends and the site's STEM goals. This course is also an a-g approved course, which will support providing students greater access to postsecondary options upon graduation.

Graduation Requirements: Specify which requirement is met. (High School only)

A-G elective and CTE

UC a-g Requirements: Specify which requirement is met. (High School only)

G - elective

Explain the rationale for course addition or modification. How does this fit in with district/site goals. If this course is replacing a current course, which course is it replacing and why? Will this course require new sections? Be explicit.

This course is replacing an existing course - Project Make 1. Now that the existing Project Make instructor is credentialed as a CTE teacher, we are rewriting the Project Make course sequence to align with the new Building and Construction Trades emphasis to take full advantage of his credential. This will bring the Project Make course sequence into closer alignment with the STEM goals of Piner High School by creating a practical, hands-on, career-technical engineering and technology learning environment.

Explain the measurable learning outcomes

The Engineering Design process

- Building engineering design skills using introductory drafting methods
- Professions within and those that support Engineering, Construction, and Design
- Safety and proper hand tool use
- Project and data management
- History of Engineering, Construction, and Design

Students will be able to:

- explore via product deconstruction and construction of items
- apply the engineering design process to next 'challenges
- use data to create solutions for people, make design decisions, justify changes made to designs
- read, interpret, and construct from a design and ask questions of designers
- collaborate on a group projects
- document work using an engineering notebook following a set of norms
- develop reasoning and critical thinking skills when reflecting on their work and others'
- work with in a given set of constraints
- analyze data and present to peers, industry, and community

A major goal is to use group and individualized applied projects, direct instruction, multi-media, demonstration, field trips, and guest speakers to facilitate and motivate students to pursue further study in STEM based courses in high school and post matriculation.

#### Course Description (To be used in the course catalog)

Introduction to Engineering, Construction, and Design (ECD) is a full year course that teaches and explores engineering, construction, and design concepts through a series of projects in order to encourage students to consider careers in Engineering, Construction, and Design fields. Students are introduced to the design process and industry standards while developing their problem solving skills, professionalism, career exploration, and necessary skills needed in ECD and STEM related fields. Units will cover a variety of engineering, from civil to mechanical, and a brief history of engineering, as well as construction safety education, and introductory drafting and CAD programs. Presentation skills are further developed as is technical writing and reporting.

## Detailed Course Design

(Course design should include the objectives, activities, assessments, and standards to be addressed in this course.)

The course shifts emphasis in each quarter.

### 1st Quarter:

Students jump into the Engineering process by getting going right away with a variety of small projects. Bridge building, solar cars, parachutes, water bottle rockets, and CO2 dragsters give students opportunities to start making right off the bat with minimal prior instruction. Students learn about roles and accountability in team projects, and they focus on the engineering and design process. Research, planning, prototyping, and revision are given attention as students learn about what works and what doesn't 'on the job'. Students begin their individual portfolio and have opportunities for written reflection, technical reading and writing assignments, and speaking and presentation.

### 2nd Quarter:

In the second quarter, students will move from smaller, handheld tools to working with larger power tools. Shop safety and tool safety are major learning goals for the first few weeks of the quarter as students learn to use powerful tools for cutting, joining, and shaping wood and metal. Students learn via instruction and experience the relative advantages and disadvantages of hand tools, handheld power tools, stationary power tools, and CNC tools. Students learn how to read technical drawings, symbols on plans, begin to use drafting instruments, and basic introduction to computer aided drafting and design (CADD). Students increase knowledge and skills in precise measurement, reading and recognizing differences with scales, navigating through plans, drafting tool use, unit conversion, and CADD concepts and vocabulary.

### 3rd Quarter:

The 3rd quarter gives students opportunities to investigate integrated systems, circuits, electronics, and basic programming concepts. Students will learn the basics of electron flow, Ohm's law, and types of circuits, and they'll learn tools for measurement of electricity and electrical safety practices. They'll learn basic electrical soldering, and complete a small electronic assembly project. From there, students begin designing small robots to complete basic robotics challenges, and apply foundational computer science principles in the process.

### 4th Quarter:

In the 4th quarter, students apply their teamwork, engineering, design, wood and metalworking, and electrical and technical skills on a more significant and extended project, which they design in teams. Fourth quarter projects will be connected to

the theme of designing for change, with projects that address sustainable housing, transportation, and other challenges of the 21st century. Many of the 4th quarter projects will be incorporated into either our electric car build or one of our Tiny House on Wheels build.

Budget- budget figures must be included even if they are an estimate.

Projected Costs	Start-up	Ongoing
Personnel (Not to include classroom instructor unless a new section is needed)	CTE Credentialed Teacher	CTE Credentialed Teacher
Instructional Material Supplies per student (textbooks, software, etc.)	\$100 per student	
Services (training, equipment maintenance, contracts, etc.)		
Capital Outlay (remodeling, technology, etc.)		
<b>Total Projected Costs</b>	\$3300	

Instructional Materials- must include estimate for new materials even if none have been selected. Place in chart above.

Type	Publisher	Title	ISBN	Author	Copyright	# Have/Need

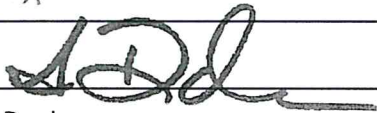
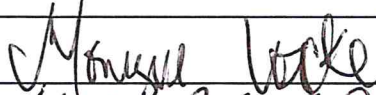

Funding Source(s) for Costs and Instructional Materials

Grants (indicate specific grant and grant timeline)	
Categorical Funds (include related programs)	
Career Technical Education (must be for an approved CTE course)	CTE Incentive Grant Perkins V Grant
Department Funds	
Other (be specific)	

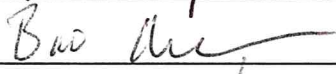

Appendix of Additional Documents

*\* Required additional documents include meeting minutes where the course was discussed and approved*

District Principal Review and Approvals:

Principal's Signatures	Site	Approved / Not Approved
<i>Gabriel Albavera</i>	EAHS	Approved
	<del>MCHS</del> PHS	Approved
Adam Paulson	MHS	Approved
	<del>MHS</del> MCHS	Approved (Verbal)
	SRHS	Approved
Valerie Jordan	Ridgway	Approved

District Department Chair Review and Approvals:

Department Chair Signatures	Site	Approved / Not Approved
<i>Cara M Parlato</i>	EAHS	Approved
<i>Colleen Spiers</i>	MCHS	Approved
	MHS	Approved
<i>Maura McCabe</i>	PHS	Approved
	SRHS	Approved
N/A	Ridgway	