SANTA ROSA CITY SCHOOLS
Excellence is our Common Ground

Santa Rosa City Schools Course Proposal - Advanced Building Trades P

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 2 - Applied Physics 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 2 - Applied Physics. 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

dvanced Building Trades P, allows for hands-on mastery of rigorous geometrical and ematical concepts within a context of Construction career preparation. In

Advanced Building Trades P, students will apply major concepts of Geometry, including measurement of angles and segments, polygon properties, area and surface area, congruence, proportion and similarity. Applying these skills, students use safe and appropriate practices following construction processes and systems vital to the industry. In addition, students maintain and troubleshoot equipment used in the construction industry. This year-long, multiple-project integration course will also provide a sequential series of industry experiences with the ultimate goal of providing a clear pathway for students interested in professions in Building Trades. These experiences will include field trips, job shadows, preliminary certifications, and internships offered through partnerships with construction companies. The value of the integration lies in the project-based process, which will include critical thinking, problem-solving, and analysis of mathematical problems following the progression of core geometrical concepts from inception to contextual (hands-on) completion. Students understand the attributes of good design and how it applies to the design, construction and servicing of structures. In small heterogeneous work groups, students mirror construction sites by demonstrating effective leadership styles, key concepts of group dynamics and individual decision making that will result in a tangible physical product.

Course Description (To be used in the course catalog)

Advanced Building Trades P, is the capstone course of the construction trades of framing and cabinetry, with introductions into roofing, plumbing, electrical, HVAC, masonry, finish work, and design and blueprinting. Students master measurement systems, safe use of hand and power tools, calculation and characteristics of materials, carpentry, framing, basic electrical wiring, plumbing, and cabinetry. Students learn about Construction and construction careers. Coursework is project-based, developing teamwork and project management skills. The culminating capstone project is a design project that will include: concrete/masonry, framing, electrical, plumbing, and finish work. Students demonstrate responsibility for personal, occupational safety on the job site.

Detailed Course Design

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

Unit 1: Blueprints and Construction: Students demonstrate their knowledge of the foundations of geometry by using geometric vocabulary and tools to modify a blueprint for construction. Design and use of scale drawings and blueprints, students demonstrate understanding of the rules of similarity and proportions. Students calculate area, and calculate volume of excavation, form materials, and

concrete. Students calculate framing materials needed from plans, and prepare budgets.

Assignments Blueprint Design: Students will create a blueprint using the following mathematical concepts: vocabulary concerning the building blocks of Geometry-congruent, collinear, coplanar, and bisect; using an architectural ruler to measure segments to determine length and verify congruence; naming angles in multiple ways and identifying the vertex and sides of the angle; applying geometric concepts such as congruence and bisecting to angles; verifying congruence and bisection by measuring angles with protractors; constructing congruent angles, angle bisectors, and perpendicular bisectors. Students calculate framing materials needed from plans, and prepare budgets. Students calculate area, and calculate volume of excavation, form materials, and concrete. The design will be a small home, with integration of smart and green technology.

Unit 2: Electrical Skills: This module introduces the students to the safety rules and regulations for electricians, including the necessary precautions for avoiding various job site hazards. Students also learn the various types of devices and installation procedures used in residential wiring. Students will demonstrate knowledge and application of electrical equipment. It also covers service-entrance and branch circuit calculations and National Electrical Code® requirements.

Assignments Electrical Design and Implementation: Students will work as teams to create a design plan for installing low and high voltage wiring into a residential home. Teams of students compete to see who most efficiently and effectively complete three wiring tasks: wiring a receptacle, switch, and lamp. While doing this assignment students must explain electrical safety issues concerning lockout/tag-out procedures, confined space entry, respiratory protection, and fall protection systems.

Standards Met:

D11.0 Demonstrate skills necessary to complete an electrical system in a single-family residence in accordance with accepted industry standards. D11.1 Determine whether or not an electrical circuit is "live." D11.2 Prepare rough framing for the installation of electrical cables and conduit. D11.3 Lay out components to the tolerances indicated on the construction drawings, specifications, and government codes. D11.4 Install typical devices, junction boxes, and panels. D11.5 Install lighting and ceiling fan support boxes according to the National Electrical Code (NEC). D11.6 Install conduit typical of residential construction and pull conductors through conduit as required by the NEC. D11.7 Splice and tap conductors for the installation of fixtures and devices. D11.8 Install low voltage control and communication cables. D11.9 Demonstrate grounding techniques for all electrical boxes, cabinets, and enclosures. D11.10 Terminate electrical connections to receptacles, switches, lighting fixtures, large appliances, and other devices. D11.11 Select receptacles and

switches based on load requirements. D11.12 Terminate equipment grounding and neutral conductor at the electrical service. D11.13 Terminate communication and control wiring.

Unit 3: Smart Home and Green Construction: Smart Homes and Green Construction is an exciting exploration into the process of environmentally responsible and sustainable construction techniques that will attract a lot of student interest. Students will learn about low voltage technology. Students will learn about smart technology, and the wide variety of options for home use. Students will learn how to install and test of a solar panel array, installation of energy-saving plumbing components, and analysis of lighting for electrical efficiency. Students also conduct a LEED audit.

Assignments Smart/Green Home: Student teams will prepare a presentation on a smart device or green technology, including how to install, setup and maintain the smart device. Student groups will present in-class to ~~other~~others students, and will need to justify decisions.

Unit 4: Energy Efficiency: Students research energy efficiency and weatherization strategies to make projects more environmentally friendly, and understand the environmental regulations that influence residential design. Students explain the impact of insulation, sealing, heating, ventilation, and HVAC on building performance. Students will learn about the cost benefits of such technologies. Students explain the impact of water conservation and solar thermal on a project.

Assignments Home Efficiency Evaluation: Students will work in small groups analyzing a small home design. The group will present data as to the home efficiency, and submit new plans to make the home more efficient. Students will explain how homes gain and lose heat energy and how those losses can be reduced by sealing the building shell and by adding insulation. Students will prepare a cost analysis of replacing existing technology for more efficient technology. The group will present findings to the class.

Unit 5: Wall & Roof Framing: Students demonstrate their knowledge of the Pythagorean Theorem, Distance Formula, and trigonometric functions when analyzing blueprints, calculating angles, and constructing wall frames. Students identify the relationship between the angles formed when a transversal intersects parallel lines, then use these relationships to find the measures of angles. Students begin demonstration framing in the classroom, from simple walls to complex structural systems. This work continues throughout the year.

Standards Met:

D6.0 Demonstrate carpentry techniques for the construction of a single-family residence.
D6.1 Properly place a moisture barrier and pest control guard on a foundation.
D6.2 Attach a sill plate at top of concrete foundation.
D6.3 Lay out, cut, and install joist supports, rim joists, and floor joists as specified on construction plans.
D6.4 Install a subfloor.
D6.5 Demonstrate wall and plate layout, including rough openings.
D6.6 Measure, cut, and assemble wall components using appropriate tools and fasteners.
D6.7 Demonstrate the ability to square wall systems and install wall bracing and shear panels according to code.
D6.8 Stand, square, plumb, and brace walls.
D6.9 Describe the applications and uses of metal stud framing.
D6.10 Lay out, cut, and install ceiling joists and common and jack rafters.
D6.11 Frame and erect shed and gable roof systems.
D6.12 Lay out and install trusses "on-center" with specified hardware.
D6.13 Install appropriate blocking, bracing, lookouts, fascia, and drip edge.
D6.14 Frame for roof penetrations and attic access.
D6.15 Apply roof sheathing and install appropriate flashings.
D6.16 Understand different roofing materials and methods of application.

Assignments Introductory Framing: Small groups of students will frame a small wall and a pitched roof, demonstrating the Pythagorean Theorem to determine distance and find missing lengths of sides of right triangles, and also using trigonometric functions to solve for an unknown length of a side right triangle, given an angle and a length.

Unit 6: Cabinetmaking: In this unit students will identify basic tools and equipment used in the cabinet making trade, gain a basic understanding of cabinet making techniques, and design and sketch a cabinet system.

Assignments Cabinet Assembly and Installation: The students will learn and demonstrate the proper procedures for cutting and assembling a kitchen-type cabinet. Additionally, students will install a pre-made cabinet. Students will use typical cabinet materials and hardware.

Unit 7: Tile Setting In this unit students will learn how to measure, cut, set and finish both vertical and floor tile. Students will cut and fit tile using several types of cutting tools, and apply mortar and grout. Students will learn about the various types of tiles and the application of each style.

Assignments Tile Installation: Students, in small groups, will design a tile plan, with artistic renderings. Groups will install counter tiles and back splash, explaining procedures and safety concerns relating to tile work.

Unit 8: Concrete and Masonry: In this unit, students will learn to identify and describe basic tools, equipment, and materials used in the concrete and masonry trade. They will gain an understanding of basic concrete and masonry trade and reinforcing applications. This is introductory, in preparation for the third year course, which includes advanced masonry.

Unit 9: Finish Carpentry: In this unit students use a full size window and door trainer to install a pre-hung door and window. They learn to use techniques for applying flashing and using shims, levels and squares to correctly set the door and window.

Assignments Molding Installation: Students will learn how to cut and install crown and base molding. Students will demonstrate and explain cutting multiple angles on a compound mitre saw. Students will explain how to install a door and window as part of the finish work process.

D7.0 Demonstrate proper installation techniques of interior finish materials and protective finishes. D7.1 Identify types and uses of wall finishing materials. D7.2 Cut, fit, and install gypsum wallboard onto a framed wall using appropriate fasteners. D7.3 Describe the finishes and textures for gypsum wallboard. D7.4 Properly prepare walls to receive protective finishes. D7.5 Apply finishes according to specifications and industry standards. D7.6 Identify types and application of finish flooring materials. D7.7 Install pre-hung interior doors. D7.8 Install interior trim and case work.

Unit 10: Plumbing: Students groups will learn about plumbing careers, tools, techniques and troubleshooting. Students will explain the blueprinting process in relation to plumbing, including how to get permits and inspections. Students will estimate the cost of the small house plumbing project, calculating material requirements from a plan, generating a budget, and preparing a project bid, including personnel needs.

Assignments Plumbing Installation: Teams of students design a small house plumbing project, demonstrating mastery of concepts taught, having previously estimated materials, and prepared a bid. Students will write a short essay on the benefits of green technology in plumbing. Students will demonstrate the installation of a faucet, sink and toilet.

Standards Met:

D10.0 Demonstrate skills necessary to complete a plumbing system in a single-family residence in accordance with accepted industry standards. D10.1 Demonstrate techniques for cutting, deburring, and joining metallic and nonmetallic water piping. D10.2 Lay out and install hot and cold water piping to fixture locations as indicated on the construction documents. D10.3 Perform pressure test of an installed piping system. D10.4 Install fastened in-place fixture valves and shut-off valves as indicated on construction drawings. D10.5 Install and secure proper drainage piping to fixture locations. D10.6 Determine the proper slope for DWV piping using hand levels, laser levels, and transits. D10.7 Install traps and vents as indicated by construction drawings, specifications, and government codes.

Additional Assessments: A variety of formative and summative assessment methods are used throughout this course in order to assess student learning. The assessments are aligned with the course purpose and the instructional strategies used, and with the Common Core Standards for the development of mathematically proficient students. In all course assignments and assessments, students experience hands-on geometry as they problem-solve and reason, use appropriate tools, attend to precision, and construct a series of projects in the CTE classroom.

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.)		
Services (training, equipment maintenance, contracts, etc.)	$1600 For NOAH RDI Certification	$1600 For NOAH RDI Certification
Capital Outlay (remodeling, technology, etc.)	$100 per student	
Total Projected Costs	$5000	$1600

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)	
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
	PHS	Approved
	SRHS	Approved
Monique Luke	MCHS	Approved
Gabriel Albavera	EAHS	Approved
Adam Paulson	MHS	approved
Valerie Jordan	Ridgway	Approved

District Department Chair Review and Approvals:

Department Chair Signatures	Site	Approved / Not Approved
Cara M Parlato	EAHS	Approved
Colleen Spiess	MCHS	Approved
Bric Aldrich	MHS	approved.
Maureen McCabe	PHS	Approved
Tim Sinsel	SRHS	Approved
N/A	Ridgway	