

FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT



HONORS CIVIL ENGINEERING AND ARCHITECTURE

Board Approval Date: May 2, 2019	Course Length: 2 Semesters
Grading: A-F	Credits: 5 Credits per Semester
Proposed Grade Level(s): 10, 11, 12	Subject Area: Elective Elective Area (if applicable): Career Technical Education
Prerequisite(s): Integrated Math 1 (Required), and PLTW Introduction to Engineering Design or PLTW Principles of Engineering (Required)	Corequisite(s): None
CTE Sector/Pathway: Engineering and Architecture / Architectural Design (#159)	
Intent to Pursue ‘A-G’ College Prep Status: Yes	
A-G Course Identifier: (g) College-preparatory elective	
Graduation Requirement: No	
Course Intent: District Course Program (if applicable): CTE	

COURSE DESCRIPTION:

In Honors Civil Engineering and Architecture, students are introduced to important aspects of building, site design, and development. They apply math, science, and standard engineering practices to design both residential and commercial projects and document their work using 3-D architectural design software. Students will develop skills in engineering calculations, technical representation and documentation of design solutions according to accepted technical standards. Students will also learn the use of current 3-D architectural design and modeling software to represent and communicate solutions. Through both individual and collaborative team activities, projects, and problems, students will solve problems as they practice common design and development protocols such as project management and peer review.

DETAILED UNITS OF INSTRUCTION:

Unit Number/Title	Unit Essential Questions	Examples of Formative Assessments	Examples of Summative Assessment
<p>1. Overview of Civil Engineering and Architecture</p>	<p>In unit one student learning progresses from an introduction of civil engineering and architecture to the vast history of accomplishments in civil engineering and architecture and how improvements have paved the way for the structures that we use today. Students develop a foundation of knowledge regarding careers in civil engineering and architecture as they venture through the remainder of the course.</p> <p>The primary duties and responsibilities of civil engineers, architects, and related specialty disciplines are presented as well as the traditional educational and accreditation requirements that must be met in order to become a professional engineer and architect. Career connections and relationships between these two types of professionals and other stakeholders involved in building design and development are also introduced.</p>	<p>*Students are assessed on various aspects of engineering and architecture through quizzes, tests, and projects</p> <p>*Possible examples could include presentations and foam model of various architectural styles and research on various careers within these fields</p> <p>*Students build skills with CAD software</p>	<p>*Students complete a formal research project on a current/historical engineering or architecture project</p> <p>*Students are assessed on CAD software basic skills with a small design project (shed, playhouse, etc.)</p>
<p>2. Residential Design</p>	<p>Students are introduced to standard practices in the design of single family homes and provided an opportunity to develop a small single family home design that incorporates</p>	<p>*Students are assessed on various components and systems within a residence</p> <p>*These could include quizzes or models on vocabulary and function of construction, wood joinery, mechanical</p>	<p>*Students are assessed in a cumulative project in designing an affordable house for a client</p> <p>*They must demonstrate mastery of drafting and CAD design for the</p>

	<p>sustainable design practices as well as universal design features.</p> <p>Students research building codes and their impact on design as well as common wood-framed residential construction techniques and practices.</p> <p>Students investigate the cost of construction and the significant impact of the choice of construction materials and practices on the ongoing cost of energy for heating and cooling.</p> <p>They apply this knowledge to the design of a small, affordable home.</p>	<p>systems, framing, building, architectural design and cost estimation</p>	<p>various system and components earlier covered by the formative assessments in this project</p>
<p>3. Commercial Applications</p>	<p>Students learn about site considerations important to the function of the building, and about common built-up systems that provide the building envelope such as wall and roofs as they design commercial facilities including multiple building systems and involving a wide range of engineering and architectural considerations.</p> <p>They are introduced to the utilities and services that supply power, water, and communication services to the building, and learn about common structural systems employed to support all of the building components.</p> <p>Applying the knowledge they gain from this unit of study, students will design a renovation to a</p>	<p>*Students are assessed on various components and systems within a commercial project</p> <p>*These could include quizzes or models on vocabulary and function of construction, mechanical, loads, framing, building, architectural design and cost estimation</p>	<p>*Students are assessed in a cumulative project in designing a commercial space (store, library, school building, etc.) within a set of given constraints</p> <p>*They must demonstrate mastery of drafting and CAD design for the various system and components earlier covered by the formative assessments in this project</p>

	commercial facility and document that design using 3D architectural software.		
4. Commercial Building Systems	<p>Students collaborate on the design and documentation of a small commercial facility within a project design team.</p> <p>They will identify a need within their community, investigate a potential site, develop a preliminary design, and document the design of the facility as a team.</p> <p>They will also present their design concept to a panel of industry professionals that will critique their design and offer feedback to the team related to their design and presentation.</p>	<p>*PLTW EOC exam and Autodesk Revit Certification test</p> <p>*Students have the ability to retake the certification test and build towards a higher level certification with their skill base</p>	<p>*Students work individually and with a group towards a capstone project showcasing their skills acquired through the year</p> <p>*They must incorporate all their knowledge into a large project (multi-family, mixed use development, etc.) and present to a panel of industry experts**</p>

ESSENTIAL STANDARDS:

Architecture Design Pathway Standards, <https://www.cde.ca.gov/ci/ct/sf/documents/enginearchit.pdf> (pages 7-8)

- A1.0 Understand how history shaped architecture and know significant events in the history of architectural design.
- A2.0 Compare the theoretical, practical, and contextual issues that influence design.
- A3.0 Understand the sketching processes used in concept development.
- A4.0 Understand the use of computer-aided drafting (CAD) in developing architectural designs.
- A5.0 Compare the relationship between architecture and the external environment.
- A6.0 Understand methods used to analyze simple structures.
- A7.0 Understand the properties of structural materials.
- A8.0 Systematically completes an architectural project. A9.0 Using various methods creates both written and digital portfolios to represent architectural renderings.

RELEVANT STANDARDS AND FRAMEWORKS, CONTENT/PROGRAM SPECIFIC STANDARDS:

Link to Common Core Standards (if applicable):

Educational standards describe what students should know and be able to do in each subject in each grade. In California, the State Board of Education decides on the standards for all students, from kindergarten through high school.

<https://www.cde.ca.gov/be/st/ss/documents/finalelaccsstandards.pdf>

Link to Framework (if applicable):

Curriculum frameworks provide guidance for implementing the content standards adopted by the State Board of Education (SBE). Frameworks are developed by the Instructional Quality Commission, formerly known as the Curriculum Development and Supplemental Materials Commission, which also reviews and recommends textbooks and other instructional materials to be adopted by the SBE.

Link to Subject Area Content Standards (if applicable):

Content standards were designed to encourage the highest achievement of every student, by defining the knowledge, concepts, and skills that students should acquire at each grade level.

<https://www.cde.ca.gov/ci/ct/sf/documents/ctescrpflyer.pdf> and

<https://www.cde.ca.gov/ci/ct/sf/documents/enginearchit.pdf> (pages 7-8)

Link to Program Content Area Standards (if applicable):

Program Content Area Standards applies to programs such as International Baccalaureate, Advanced Placement, Career and Technical Education, etc.

TEXTBOOKS AND RESOURCE MATERIALS:

Textbooks

Board Approved	Pilot Completion Date (If applicable)	Textbook Title	Author(s)	Publisher	Edition	Date
	3/1/2019	<i>The Professional Practice of Architectural Working Drawings</i>	Osamu A. Wakita, Nagy R. Bakhoum, Richard M. Linde	John Wiley and Sons, Inc.	5th	9/1/2017

Other Resource Materials

Students must have a computer that meets the PLTW hardware requirements and provides access to the course materials via the PLTW website (www.pltw.org), and their individual accounts. Student computers must be loaded with all the required software as specified by PLTW which may change as the curriculum is updated.

Supplemental Materials

Board Approved Supplemental Materials (Including but not limited to: Film Clips, Digital Resources, Supplemental texts, DVDs, Programs (Pebble Creek, DBQ, etc.):