FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT

ADVANCED DRAFTING AND ARCHITECTURE

Date: January 2017 **Course Length: 1 year**
Proposed Grade Level(s): 11-12 **Subject Area: Career Technical Education**
Grading: A-F **Credits: 5.0 / semester**
CTE Sector / Pathway: Engineering and Architecture / Architectural Design

Prerequisite(s): C or better in Civil Engineering and Architecture or similar course

Intent to Pursue 'A-G' College Prep Status: Yes

COURSE DESCRIPTION:

This is an advanced course in which students will continue to develop both the hands on application of engineering and the artistic appreciation of architecture. Students will expand their knowledge and experience in Civil Engineering and Architecture involving drafting and building design. This course allows for practical visual and performing arts applications for Career Technical Education pathway students. Students taking this course are preparing for higher education in architecture and building design.

The primary focus of this class will be expanding the skills of the level one course. Students will be expected to produce projects at the highest level, partnering with industry professionals and community partners in their designs. Collaborative efforts may include local design competitions, SMUD Tiny House, Green Architectural Design, LEED Certification, and development planning.

The course is designed to be articulated with Los Rios CCD Architectural Design courses. This class will also apply for A-G articulation.

Course of study includes:

- Continued study in the field of architecture and engineering
- Project planning and scheduling
- Site layout, grading consideration and aesthetic appeal
- Building design that meets applicable codes
- Documentation and model creation
- Resource conservation

GENERAL GOALS/ESSENTIAL QUESTIONS:

- To prepare students for success in post-secondary architectural and engineering design coursework. To develop a logical step-wise method of problem solving. To develop hands on skills commonly used within the industry including proper use of drafting instruments, modeling tools, and surveying methodologies.

COMMON CORE STATE ANCHOR STANDARDS FOR READING (K-12):

Key Ideas & Details

1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
3. Analyze how and why individuals, events, or ideas develop and interact over the course of a text.

Craft & Structure

4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
5. Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.
6. Assess how point of view or purpose shapes the content and style of a text.

Integration of Knowledge & Ideas

7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.
9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

Reading Range / Text Complexity

10. Read and comprehend complex literary and informational texts independently and proficiently.

COMMON CORE STATE ANCHOR STANDARDS FOR WRITING (K-12):

Text Types & Purposes

1. Write arguments to support claims in an analysis of substantive topics or texts using valid reasoning and relevant and sufficient evidence.
2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
3. Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details and well-structured event sequences.

Production & Distribution of Writing

4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

Research to Build Knowledge

7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.
8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.
9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

Range of Writing

10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

COMMON CORE STATE ANCHOR STANDARDS FOR SPEAKING AND LISTENING (K-12):

Comprehension & Collaboration

1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
2. Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.
3. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric.

Presentation of Knowledge & Ideas

4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and ensure that the organization, development, and style are appropriate to task, purpose, and audience.
5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.
6. Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.

CA STANDARDS FOR CAREER READY PRACTICE

1. Apply appropriate technical skills and academic knowledge.
   Career-ready individuals readily access and use the knowledge and skills acquired through experience and education. They make connections between abstract concepts with real-world applications and recognize the value of academic preparation for solving problems, communicating with others, calculating measures, and other work-related practices.
2. Communicate clearly, effectively, and with reason.
   Career-ready individuals communicate thoughts, ideas, and action plans with clarity, using written, verbal, electronic, and/or visual methods. They are skilled at interacting with others, are active listeners who speak clearly and with purpose, and are comfortable with the terminology common to the workplace environment. Career-ready individuals consider the audience for their communication and prepare accordingly to ensure the desired outcome.
3. Develop an education and career plan aligned with personal goals.
   Career-ready individuals take personal ownership of their own educational and career goals and manage their individual plan to attain these goals. They recognize the value of each step in the educational and experiential process and understand that nearly all career paths require ongoing education and experience to adapt to practices, procedures, and expectations of an ever-changing work environment. They seek counselors, mentors, and other experts to assist in the planning and execution of education and career plans.
4. Apply technology to enhance productivity.
   Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring and using new technology. They understand the inherent risks—personal and organizational—of technology applications and they take actions to prevent or mitigate these risks.
5. Utilize critical thinking to make sense of problems and persevere in solving them.
   Career-ready individuals recognize problems in the workplace, understand the nature of the problems, and devise effective plans to solve the problems. They thoughtfully investigate the root cause of a problem prior to introducing solutions. They carefully consider options to solve the problem and, once agreed upon, follow through to ensure the problem is resolved.

6. Practice personal health and understand financial literacy.
   Career-ready individuals understand the relationship between personal health and workplace performance. They contribute to their personal well-being through a healthy diet, regular exercise, and mental health activities. Career-ready individuals also understand that financial literacy leads to a secure future that enables career success.
7. Act as a responsible citizen in the workplace and the community.
   Career-ready individuals understand the obligations and responsibilities of being a member of a community and demonstrate this understanding every day through their interactions with others. They are aware of the impacts of their decisions on others and the environment around them and think about the short-term and long-term consequences of their actions. They are reliable and consistent in going beyond minimum expectations and in participating in activities that serve the greater good.
8. Model integrity, ethical leadership, and effective management.
   Career-ready individuals consistently act in ways that align with personal and community-held ideals and principles. They employ ethical behaviors and actions that positively influence others. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the direction and actions of a team or organization, and they recognize the short-term and long-term effects that management's actions and attitudes can have on productivity, morale, and organizational culture.
9. Work productively in teams while integrating cultural and global competence.
   Career-ready individuals positively contribute to every team as both team leaders and team members. They apply an awareness of cultural differences to avoid barriers to productive and positive interaction. They interact effectively and sensitively with all members of the team and find ways to increase the engagement and contribution of other members.
10. Demonstrate creativity and innovation.
    Career-ready individuals recommend ideas that solve problems in new and different ways and contribute to the improvement of the organization. They consider unconventional ideas and suggestions by others as solutions to issues, tasks, or problems. They discern which ideas and suggestions may have the greatest value. They seek new methods, practices, and ideas from a variety of sources and apply those ideas to their own workplace practices.
11. Employ valid and reliable research strategies.
    Career-ready individuals employ research practices to plan and carry out investigations, create solutions, and keep abreast of the most current findings related to workplace environments and practices. They use a reliable research process to search for new information and confirm the validity of sources when considering the use and adoption of external information or practices.
12. Understand the environmental, social, and economic impacts of decisions.
    Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact other people, organizations, the workplace, and the environment. They are aware of and utilize new technologies, understandings, procedures, and materials and adhere to regulations affecting the nature of their work. They are cognizant of impacts on the social condition, environment, workplace, and profitability of the organization.

CTE KNOWLEDGE AND PERFORMANCE ANCHOR STANDARDS:

1.0 Academics: Students will analyze and apply appropriate academic standards required for successful industry sector pathway completion leading to postsecondary education and employment.

2.0 Communications: Acquire and accurately use Engineering and Architecture sector terminology and protocols at the career and college readiness level for communicating effectively in oral, written, and multimedia formats.

3.0 Career Planning and Management: Students will integrate multiple sources of career information from diverse formats to make informed career decisions, solve problems, and manage personal career plans.

4.0 Technology: Students will use existing and emerging technology to investigate, research, and produce products and services, including new information, as required in the Engineering and Architecture sector workplace environment

5.0 Problem Solving and Critical Thinking: Students will conduct short, as well as more sustained, research to create alternative solutions to answer a question or solve a problem unique to the Engineering and Architecture sector using critical and creative thinking, logical reasoning, analysis, inquiry, and problem solving techniques.

6.0 Health and Safety: Students will demonstrate health and safety procedures, regulations, and personal health practices and determine the meaning of symbols, key terms, and domain-specific words and phrases as related to the Engineering and Architecture sector workplace environment.

7.0 Responsibility and Flexibility: Students will initiate and participate in a range of collaborations demonstrating behaviors that reflect personal and professional responsibility, flexibility, and respect in the Engineering and Architecture sector workplace environment and community settings

8.0 Ethics and Legal responsibilities: Students will practice professional, ethical, and legal behavior, responding thoughtfully to diverse perspectives and resolving contradictions when possible, consistent with applicable laws, regulations, and organizational norms.

9.0 Leadership and Teamwork: Students will work with peers to promote divergent and creative perspectives, effective leadership, group dynamics, team and individual decision making, benefits of workforce diversity, and conflict resolution as practiced in the SkillsUSA career technical student organization.

10.0 Technical Knowledge and Skills: Students will apply essential technical knowledge and skills common to all pathways in the Engineering and Architecture sector, following procedures when carrying out experiments or performing technical tasks.

11.0 Demonstration and Application: Demonstrate and apply the knowledge and skills contained in the Engineering and Architecture anchor standards, pathway standards, and performance indicators in classroom, laboratory and workplace settings.

DETAILED UNITS OF INSTRUCTION:

Lesson 1.1 History of Civil Engineering and Architecture

The goal of this lesson is to introduce students to the vast history of accomplishments in civil engineering and architecture. The study of and improvements to these accomplishments have paved the way for the design and development of methods that we practice today. In this lesson students will begin to build a common vocabulary related to architectural styles and features, structural systems, and the elements and principles of design. Students will construct models, showcasing various styles of architecture and developing their own taste/style upon which they will build upon throughout the year.

Lesson 1.2 Careers in Civil Engineering and Architecture

This lesson will provide foundation and perspective for students regarding careers in civil engineering and architecture as they venture through the remainder of the course. The primary duties and responsibilities of civil engineers (and related specialty disciplines) and architects are presented as well as the traditional educational and accreditation requirements that must be met in order to become a professional engineer or architect. Career connections and relationships between these two professions and other stakeholder roles involved in building design and development are introduced. Lessons will include presentations from industry guest speakers and opportunities for extra-curricular engagement through ACE/CREATE club.

Lesson 2.1 Building Design and Construction

In this lesson students will learn typical wood-framed residential construction techniques and practices. They will build a common vocabulary related to building components and materials and become familiar with common residential framing methods and roof styles. In addition, students will be introduced to the technical

documentation of residential structures and will use 3D architectural modeling software to model and document the design of a small outdoor storage structure. Advanced students will expand creating a workshop / storage space, effectively modeling their architectural style.

Lesson 2.2 Cost and Efficiency Analysis
In this lesson students investigate the cost of construction and the recurring energy costs associated with design decisions and construction techniques. Students will have the opportunity to perform quantity take-offs and cost estimates related to parts of construction projects. In addition, students will learn about and compare the energy efficiency of a variety of construction materials. Based upon building designs, students will calculate the rate of heat loss or gain through a building envelope which can be used to estimate energy demands for heating and cooling a building. Calculated energy demands will be compared with experimental values in the construction of full sized wall sections.

Lesson 2.3 Residential Design
In this lesson students apply elements of good residential building and site design to design a small affordable home. The design must meet client specification and all applicable local codes. Local codes will be identified by students ensuring designs and conforming to universal design principles. Students will also learn about sustainable building practices which they will apply to their home design. Basic site design and orientation considerations are presented to guide students in appropriately locating the home on the building site to improve usability and reduce environmental impact. During the design process, students will also be introduced to a variety of residential foundation systems, basic residential electrical system components, plumbing systems, water supply calculations, and wastewater disposal and treatment systems. They will take the design and operation of these systems into consideration during their residential design process. Advanced students will design solar and radiant heat systems for these residential units.

Lesson 3.1 Commercial Building Systems
In this lesson students will be exposed to topics related to the design and development of commercial facilities, building codes and land development regulations that impact commercial construction. Students are presented with a commercial renovation design project on which they will work throughout this unit. They will research building codes and land development regulations and learn about a variety of commercial wall, roof, and floor framing systems as they further develop a common vocabulary related to building design and development. Students continue to build expertise in the use of a 3D architectural design software package as they model and document their commercial design project ideas.

Lesson 3.2 Structures
This lesson is designed to introduce students to the concepts and principles of structural engineering and structural efficiency. The activities related to this lesson are designed to aid students in learning about the variety of forces that impact the design and performance of a building and how to quantify those loads using building codes and the physical characteristics of the structure. Students are also introduced to the physical laws and mathematics involved in determining the internal resistive forces generated by the imposed loads as the loads are transferred through the structural elements of the building to the ground. A variety of structural systems are presented, and the lesson focuses on the analysis and design of beams and spread footings.

Lesson 3.3 Services and Utilities
This lesson will introduce students to the multiple modern utilities and services required in order for a building to function effectively and lawfully in today's society. These utilities and services include a reliable supply of energy and water, a system to dispose of wastes, and capacity for communication via multiple modes. Students will identify typical utilities and services for commercial buildings and common methods for distribution and measuring of those services. They will interpret and apply building code requirements and consider other physical constraints in the design and location of new utility service connections for their commercial project. In addition students will interpret and apply energy code requirements in the design of their commercial project

building envelope and internal utility distribution systems in an effort to conserve natural resources, reduce operating costs, and protect the environment from the negative impact of development.

Lesson 3.4 Site Considerations
In this lesson students will learn about the important factors to be considered in commercial site design. They will perform a land survey, conduct a soil analysis, and conduct a physical investigation of the site in order to gather information relevant to their commercial project design. Students will use the information they have collected to design and document appropriate site improvements to provide adequate parking and provide safe vehicular and pedestrian traffic access and flow. The site must also meet handicap access requirements and provide access for emergency vehicles and the movement of goods and waste. Students will also become familiar with the requirements related to storm water runoff and management and learn the calculations necessary to comply with building codes. Based on the knowledge they acquire during this lesson, students will design and document a site design for their commercial project. Their design will utilize low impact development techniques in order to incur minimal impact on people and the environment

Lesson 4.1 Commercial Design Problem
In this lesson students will work within design teams to develop a preliminary design for a small commercial facility. As part of the design process, they will investigate a potential site for development of their commercial project; research codes, zoning ordinance, and regulations that impact the site; and determine the legal description of the property. Students will develop an architectural program to describe the desired outcome of the project and help guide development. They will become familiar with legal, physical, and financial conditions that should be considered in order to determine the viability of project development and help determine whether a project solution should be undertaken. As the team project progresses, students will apply the skills and knowledge they have gained throughout the course to the team commercial project. They will learn new skills related to team design work, including creating a project organization chart, developing and using a Gantt chart to plan and monitor project progress, and holding regular team meetings. Students will document their design according to accepted practice using 3D architectural modeling software.

Lesson 4.2 Commercial Design Presentation
In this lesson students will create and deliver a formal presentation (both oral and written) of their final team commercial design project to include a description of both the design process (and justifications of design decisions) as well as the resulting design. The project presentation will be reviewed and critiqued by a panel who will offer feedback to the team related to their design process, decision making, and the resulting design and documentation. This will involve a mixed use development with at least 30 residential units, retail space, co-working stations, and maker lab.

TEXTBOOKS AND RESOURCE MATERIALS:

A variety of lesson materials will be selected and used from the supplemental sources below:
Architecture Residential Drawing and Design. Clois, E. Kicklighter, Goodheart-Wilcox Co., Inc. 1999
A History of Architecture. Spiro Kostof, Oxford University Press 1995
The Visual Dictionary of Buildings. Alexandra Kennedy. Dorling Kindersley Publisher 1992
American Shelter: Illustrated Encyclopedia. Lester Walker, Overlook 1998
Modern Carpentry. Willis H. Wagner; Goodheart Wilcox, 12th Edition 2015

* No student textbooks will be required.

CTE INDUSTRY PATHWAY STANDARDS:

- A1.0 Understand how history shaped architecture and know significant events in the history of architectural design.
    - A1.1 Know significant historical architectural projects and their effects on society.
    - A1.2 Understand the development of architectural systems in relation to aesthetics, efficiency, and safety.

- A2.0 Compare the theoretical, practical, and contextual issues that influence design.
    - A2.1 Describe the influence of community context and zoning requirements on architectural design.
    - A2.2 Understand the ways in which sociocultural conditions and issues influence architectural design.
    - A2.3 Compare the theoretical and practical effects of human and physical factors on the development of architectural designs.
    - A2.4 Analyze project design and compile a cost analysis.

- A3.0 Understand the sketching processes used in concept development.
    - A3.1 Apply sketching techniques to a variety of architectural models.
    - A3.2 Produce proportional two- and three-dimensional sketches and designs.
    - A3.3 Present conceptual ideas, analysis, and design concepts using freehand graphic communication techniques.

- A4.0 Understand the use of computer-aided drafting (CAD) in developing architectural designs.
    - A4.1 Develop a preliminary architectural proposal using CAD software.
    - A4.2 Analyze viability of a project as the design is developed using Building Information Modeling (BIM).

- A5.0 Compare the relationship between architecture and the external environment.
    - A5.1 Understand the significance of sustainable building design practices that incorporate beneficial energy and environmental design policies.
    - A5.2 Develop a site analysis that considers passive energy techniques, sustainability issues, and landscaping.
    - A5.3 Create a building design that incorporates passive and/or active energy-efficient technologies.

- A6.0 Understand methods used to analyze simple structures.
    - A6.1 Understand load transfer mechanisms.
    - A6.2 Understand stress-strain relationships of building structures.
    - A6.3 Interpret structural design considerations, including load-bearing relationships of shear walls, columns, and beams.
    - A6.4 Design a simple structure by using structural analysis principles.

- A7.0 Understand the properties of structural materials.
    - A7.1 Understand the integration of architectural factors, such as soil mechanics, foundation design, engineering materials, and structure design.
    - A7.2 Develop a stress analysis chart of typical structural components.
    - A7.3 Evaluate available building materials (e.g., steel, concrete, and wood) by considering their properties and their effect on building form.
    - A7.4 Develop a preliminary building plan using the appropriate materials.

- A8.0 Systematically completes an architectural project.
    - A8.1 Describe the various components of structures, including lighting; heating, ventilating, and air-conditioning (HVAC); mechanical; electrical; plumbing; communication; security; and vertical transportation systems.
    - A8.2 Develop a preliminary proposal for presentation of an architectural design.
    - A8.3 Read and interpret architectural and construction plans, drawings, diagrams, and specifications.
    - A8.4 Develop a complete set of architectural plans and drawings.

- A8.5 Estimate the materials needed for a project by reading an architectural drawing.
- A8.6 Plan a project using site and building restrictions imposed by various entities (e.g., Planning, Zoning, Building, and Home Owners Association [HOA]).
- A8.7 Plan the sequence of events leading to an architectural project.

- A9.0 Using various methods creates both written and digital portfolios to represent architectural renderings.
  - A9.1 Develop a binder or digital portfolio representative of completed work for presentation.
  - A9.2 Prepare an effective oral presentation of the portfolio content.

- C1.0 Understand historical and current events related to engineering design and their effects on society.
  - C1.1 Know historical and current events that have relevance to engineering design.
  - C1.2 Interpret the development of graphic language in relation to engineering design.

- C2.0 Understand the effective use of engineering design equipment.
  - C2.1 Employ engineering design equipment using the appropriate methods and techniques.
  - C2.2 Apply conventional engineering design equipment procedures accurately, appropriately, and safely.
  - C2.3 Apply the concepts of engineering design to the tools, equipment, projects, and procedures of the Engineering Design Pathway.

- C3.0 Understand the sketching process used in concept development.
  - C3.1 Apply sketching techniques to a variety of architectural models.
  - C3.2 Produce proportional two- and three-dimensional sketches and designs.
  - C3.3 Present conceptual ideas, analysis, and design concepts using freehand, graphic, communication techniques.

- C4.0 Understand measurement systems as they apply to engineering design.
  - C4.1 Know how the various measurement systems are used in engineering drawings.
  - C4.2 Understand the degree of accuracy necessary for engineering design.

- C5.0 Use proper projection techniques to develop orthographic drawings.
  - C5.1 Understand the concepts and procedures necessary for producing drawings.
  - C5.2 Develop multi-view drawings using the orthographic projection process.
  - C5.3 Understand the various techniques for viewing objects.
  - C5.4 Use the concepts of geometric construction in the development of design drawings.
  - C5.5 Apply pictorial drawings derived from orthographic multi-view drawings and sketches.

- C6.0 Understand the applications and functions of sectional views.
  - C6.1 Understand the function of sectional views.
  - C6.2 Clarify hidden features of an object using a sectional view and appropriate cutting planes.

- C7.0 Understand the applications and functions of auxiliary views.
  - C7.1 Understand the function of auxiliary views.
  - C7.2 Use auxiliary views to clarify the true shape and size of an object.

- C8.0 Understand and apply proper dimensioning standards to drawings.
  - C8.1 Know a variety of drafting applications and understand the proper dimensioning standards for each.
  - C8.2 Apply dimension to various objects and features.

- C9.0 Understand the tolerance relationships between mating parts.
    - C9.1 Understand what constitutes mating parts in engineering design.
    - C9.2 Interpret geometric tolerancing symbols in a drawing.
    - C9.3 Use tolerancing in an engineering drawing.

- C10.0 Understand the methods of applying text to a drawing.
    - C10.1 Describe the processes of lettering and/or text editing.
    - C10.2 Implement standard methods of title block creation and use.
    - C10.3 Develop drawings using notes and specifications.
    - C10.4 Plan, prepares, and interprets drawings and models through traditional drafting or computer-aided design (CAD) techniques.

- C11.0 Understand the methods of creating both written and digital portfolios.
    - C11.1 Develop a binder or digital portfolio representative of completed work for presentation.
    - C11.2 Give an effective oral presentation of a portfolio.

Visual Art Academic Content Standards:

Artistic Perception:
Students will gain understanding, identification, and analysis of the elements and principles of design in art, architecture and building design. Students will also write evaluative essays and include them in visual presentations to explain how the elements and principles of design were used in the design of different buildings. These exercises will focus on artistic vocabulary and invoking the sensory emotions of a design as an example, horizontal structures represent stability versus diagonal lines in architecture evoke thoughts/feelings of action.

Creative Expression:
Students will create original art using the elements and principles of design such as line, shape, color, volume, and 3D in the form of sketch models and final presentation models (paper, foam, clay, plastic, and a wide array of other structural materials). Students will create scale drawings including plan views and 3D renderings and illustrations for a number of designs and projects throughout the year (shed, affordable house, commercial property, maker village, and historical building) in a specified architectural style (Greek, Roman, Modernist, etc. or through a specific type of inspiration (client needs, self-expression, nature). Each of these will be presented to class or shared in judged competitions.

Historical and Cultural Context:
Students will read and write about the history of the ancient world and its relation to the art and architecture of the period using the correct vocabulary to compare/contrast and trace styles through history (the writing process). Students are required to draw and identify major structures of each period; analyze and compare them in regards to design principles, function and the relation to the historical context. Students will gain insight into the time period by studying the art and architecture and compare the cultural and historical significance of each. The style of one culture can be compared with another culture and the importance of elements within each. An example will be students sketching and modeling historical buildings include Greek/Roman, Old Europe, historical and contemporary U.S. buildings. They will also examine the styles of major architects including Wright, Gehry, Khan, Pei, Eichler, among others and model designs of these influential designers.

Aesthetic Valuing:
Students develop the skills to respond to, analyze and making judgments about works in art and architecture using content specific/industry language. Student will use these skills in evaluating their own work and that of their peers. They will also consider cultural and social factors and how those may relate to what is valued in the designs and creative works of other societies.

Connections, Relationships, Applications:
Students will learn how to make inferences about social, political, cultural and religious values as it is reflected in art and architecture. The visual vocabulary they learned can be applied to all art disciplines including dance, theatre and the design of everyday objects. Students will develop an appreciation of the design of the world around them beginning with their knowledge of art and architecture.

CTE area standards are listed previously. In addition to the CTE standards, this class will support each student's overall academic growth and performance through hands on applications of Common Core math standards and Next Generation Science Standards. Examples include:

- Create equations that describe numbers or relationships.
    - CCSS.MATH.CONTENT.HSA.CED.A.1
        - Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
    - CCSS.MATH.CONTENT.HSA.CED.A.2
        - Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
    - CCSS.MATH.CONTENT.HSA.CED.A.3
        - Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.
    - CCSS.MATH.CONTENT.HSA.CED.A.4
        - Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R.
- Construct and compare linear, quadratic, and exponential models and solve problems.
    - CCSS.MATH.CONTENT.HSF.LE.A.1
        - Distinguish between situations that can be modeled with linear functions and with exponential functions.
    - CCSS.MATH.CONTENT.HSF.LE.A.1.A
        - Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
    - CCSS.MATH.CONTENT.HSF.LE.A.1.B
        - Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
    - CCSS.MATH.CONTENT.HSF.LE.A.2
        - Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
- Explain volume formulas and use them to solve problems
    - CCSS.MATH.CONTENT.HSG.GMD.A.1
        - Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.
    - CCSS.MATH.CONTENT.HSG.GMD.A.3
        - Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.

- Visualize relationships between two-dimensional and three-dimensional objects
    - CCSS.MATH.CONTENT.HSG.GMD.B.4
        - Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects
- NGSS HS-PS4-5 Waves and the Applications
    - Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.

DISTRICT ESLRS TO BE ADDRESSED:

Students will be:

- **Self-Directed Learners:** Students will be expected to take responsibility for their learning by participating in class activities, projects and discussions. Students will be expected to keep up with homework and project prep assignments
- **Constructive Thinkers:** Students will participate in cooperative groups for project assignments and in class activities. They will be expected to collaborate with each other in developing class concepts.
- **Effective Communicators:** Students will actively participate in classroom discussions on a regular basis. Students will present oral reports of all projects the complete.
- **Collaborative Workers:** Students will participate in cooperative groups for projects and in class activities. They will be expected to collaborate with each other in developing class concepts.
- **Quality Producers/Performers:** Assessment of class work requires students to be quality producers in order to be successful in class.
- **Responsible Citizens:** In order to become responsible citizens, students will use their knowledge of math, engineering and scientific inquiry to make informed decisions relating to engineering and the environment in their daily lives.