CTE/ROP Architectural Design

San Diego County Office of Education - Sweetwater Union High School District
Pacing Guide/Course Description

Course Length: 2 Semesters	**Classroom Instruction:** 180 hours
SUHSD Course Number:	**Grade Level:** 10, 11, 12
SDCOE Course Number:	**SDCOE Total Hours:**
CBEDS Number/Title:	**Year of Implementation:**
Course Pre-requisites: Pre-Engineering or consent of instructor & basic understanding of Microsoft Office & Windows	**Articulation (school/credits):** None
CTE Industry Sector: : Engineering and Design	**CTE Pathway(s):** Architectural and Structural Engineering, Engineering Design, Engineering Technology

Job Titles: Civil Engineer, Architect, Architectural and Civil Drafters, Construction and Building Inspectors
Credential Information: Preliminary or Clear Full-Time Designated Subjects CTE Teaching Credential in Engineering Design
Required Textbooks: Architecture Residential Drawing and Design-ISBN-10:159070195XTheGoodheart-Willcox Company, Inc
Course Description: In Architectural Design, students will learn the principles of design and their application in architecture. The students will gain an understanding of the social, political, economic and technological events that influenced the development of architectural design. Students will complete several design projects that will stress the principles of design as it relates to architecture. Students will develop their drawing skills on both drawing board and computer while completing class projects.

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Semester 1

Unit 1: Introductory Skills Part 1
Unit 2: Architectural Drafting & Design Fundamentals
Unit 3: Architectural CAD Fundamental Operations

Semester 2

Unit 1: Software
Unit 2: Architectural CAD Intermediate Operations
Unit 3: Introductory Skills Part 2
Unit 4: Architectural Drafting & Design Fundamentals Part 2
Unit 5: Career Development
Unit 6: Job Acquisition Skills

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<table>
<tr><td colspan="4" align="center"><u>Semester 1</u> - Unit 1 – Introductory Skills Part 1 (10 hours)</td></tr>
<tr><th>Competencies</th><th>Standards</th><th>Suggested Pacing</th><th>Resources/Materials</th></tr>
<tr>
<td>1A - Understands the history and cultural content of Architectural Design.
1B - Determines clients design needs & utilizes a design process including bubble diagrams, sketches, scaled drawings, & models.</td>
<td><u>Career Technical Education:</u>
*ED/ASEP/
A1.1 Know significant historical architectural and structural projects and their effects on society.
A1.2 Understand the development of architectural and structural systems in relation to aesthetics, efficiency, and safety.
A2.1 Understand the ways in which sociocultural conditions and issues influence architectural design.
<u>Core Academic:</u>
*ED/A/1.1M/MR/G7/
(2.2) Apply strategies and results from simpler problems to more complex problems.
(2.3) Estimate unknown quantities graphically and solve for them by using logical reasoning and arithmetic and algebraic techniques.
(2.4) Make and test conjectures by using both inductive and deductive reasoning.
(2.5) Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.
(2.6) Express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work.
(2.7) Indicate the relative advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy.
(2.8) Make precise calculations and check the validity of the results from the context of the problem.
(3.1) Evaluate the reasonableness of the</td>
<td>1A: Architectural design is the act of creating architecture
1.Problem Design
2.Design Process

1B: Conditions that affect design
1.Function
2.Social
3.Economics
4.Symbolic
5.Environmental – include thinking green concept into all designs</td>
<td><u>Teacher and Student Resources:</u>
<i>*Textbook:</i>
Architecture Residential Drawing and Design-ISBN-10:159070195X by The Goodheart- Willcox Company, Inc</td>
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</table>

	solution in the context of the original situation. **(3.3)** Develop generalizations of the results obtained and the strategies used and apply them to new problem situations.		

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	Semester 1 - **Unit 2 – Architectural Drafting & Design Fundamentals (40 hours)**		
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
2A - Understands and appropriately uses drafting equipment, materials, tools, and media. **2B** - Understands and uses appropriate projection techniques in developing drawings. **2C** - Applies appropriate lettering techniques and fonts. **2D** - Uses and understands architectural measuring systems and scale. **2E** - Understands and demonstrates basic drafting fundamentals and standards. **2F** - Understands and applies the developmental drafting process by using appropriate drafting techniques in laying out and developing drawings. **2G** - Understands and applies dimensions accurately by preparing fully dimensioned and noted plans. **2H** - Applies basic codes related to architectural drafting. **2I** - Uses appropriate components and symbols when creating and architectural drawing.	**Career Technical Education:** ***ED/ASEP/** **A3.1** Understand the influence of community context and zoning requirements on architectural design. **A3.2** Develop a site analysis that considers passive energy techniques, sustainability issues, and landscaping. **A3.3** Develop a preliminary proposal for a simulated architectural design. **A3.4** Develop a complete set of architectural plans and drawings. **A7.1** Develop, read, and understand architectural and construction plans, drawings, diagrams, and specifications. **A7.2** Estimate the materials needed for a project by reading an architectural drawing. **A7.3** Plan the sequence of events leading to an architectural project. **A7.4** Develop a process to record the progress of a project. ***ED/EDP/** **C2.1** Use the appropriate methods and techniques for employing all engineering design equipment. **C2.2** Apply conventional engineering design processes and procedures accurately, appropriately, and safely. **C3.1** Know how the various measurement systems are used in engineering drawings. **C6.1** Know a variety of drafting applications and understand the proper dimensioning styles for each. **C6.2** Apply dimensioning to various objects and features. **C6.3** Edit a dimension by using various editing methods.	**2A:** Primary elements 1.Point 2.Line 3.Line to plane 4.Plane 5.Volume **2B:** Form 1.Shape 2.Irregular & regular shape 3.Transformation of form 4.Articulation of form a. Edges & corners b. Surfaces **2C**: Space 1.Defining space with horizontal elements 2.Defining space with vertical elements 3.Qualities of space a. Degree of closure b. Light c. View **2D**: Organization of form & space 1.Spatial relationships a. Space within a space b. Interlocking space c. Adjacent space d. Spaces linked by common space 2.Spatial organizations a. Centralized b. Linear c. Radial	**Teacher and Student Resources:** *Textbook: Architecture Residential Drawing and Design-ISBN-10:159070195X by The Goodheart- Willcox Company, Inc

	Core Academic: ***ED/A/1.1M/MR/G7/** **(2.2)** Apply strategies and results from simpler problems to more complex problems. **(2.4)** Make and test conjectures by using both inductive and deductive reasoning. **(2.6)** Express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work. **(2.8)** Make precise calculations and check the validity of the results from the context of the problem. **(3.3)** Develop generalizations of the results obtained and the strategies used and apply them to new problem situations.	d. Clustered e. Grid **2E**: Proportion & scale 1. Proportioning systems a. Golden sections b. The orders c. Renaissance theories d. The modular e. Anthropomorphic proportions 2. Scale **2F**: Principles 1. Axis 2. Symmetry 3. Hierarchy 4. Datum 5. Rhythm 6. Transformation	

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	Semester 1 - **Unit 3 – Architectural CAD Fundamental Operations (40 hours)**		
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
3A - Demonstrates knowledge of hardware components and input/output devices. **3B** - Opens files and starts new files as well as save and exit the program. **3C** - Uses basic operating system commands and utility commands within the program. **3D** - Understands and demonstrates the function keys and their purpose. **3E** - Sets limits, units, grid sizes and snap increments. **3F** - Sets user coordinate system / coordinate display. **3G** - Utilizes zoom functions. **3H** - Utilizes view ports. **3I** - Sets type/line style and Lt scale commands. **3J**- Understands and is able to use hatch commands and set hatch styles. **3K** - Understands and demonstrates text/text style and all the text options. **3L** - Sets up layout drawing. **3M** - Uses and understands draw commands. **3N** - Uses and understands modify commands. **3O** - Uses Properties toolbar. **3P** - Uses window, fence, crossing, C polygon and W polygon to make entity	**Career Technical Education:** ***ED/ASEP/** **A6.1** Know various CADD programs that are commonly used in architectural design. **A6.2** Use CADD software to develop a preliminary architectural proposal. **A7.1** Develop, read, and understand architectural and construction plans, drawings, diagrams, and specifications. **A7.2** Estimate the materials needed for a project by reading an architectural drawing. **A7.3** Plan the sequence of events leading to an architectural project. **A7.4** Develop a process to record the progress of a project. ***ED/EDP/** **C2.1** Use the appropriate methods and techniques for employing all engineering design equipment. **C2.2** Apply conventional engineering design processes and procedures accurately, appropriately, and safely. **C3.1** Know how the various measurement systems are used in engineering drawings. **C5.1** Understand the commands and concepts necessary for editing engineering drawings. **C5.2** Know the various object-altering techniques. **C5.3** Know the CADD components and the operational functions of CADD systems. **C6.1** Know a variety of drafting applications and understand the proper dimensioning styles for each. **C6.2** Apply dimensioning to various objects and features. **C6.3** Edit a dimension by using various editing	**A**: Period architectural styles **B**: Cultural effects on Architecture **C**: Technological advancements	**Teacher and Student Resources:** *Textbook: Architecture Residential Drawing and Design-ISBN-10:159070195X by The Goodheart- Willcox Company, Inc

selections.

3Q - Understands setup commands, layers, is able to freeze/thaw layers and is able to set and change colors and line types.

3R - Understands "units" command and is able to set-up drawings in architectural, and metric.

3S - Uses standard CAD commands to prepare 2-D architectural working drawings.

3T - Uses toolbar management and customization.

methods.

Core Academic:

*M/MA/G10-12/

1.0 Students are familiar with, and can apply, polar coordinates and vectors in the plane. In particular, they can translate between polar and rectangular coordinates and can interpret polar coordinates and vectors graphically.

*ELA/WS/G11-12/

1.8 Integrate databases, graphics, and spreadsheets into word-processed documents.

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Semester 2 - **Unit 1 – Software (3 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
4A - The student is proficient in the use of AutoCAD **4B** - The student is proficient in the use of Revit **4C** - The student is proficient in the use of Word **4E** - The student is proficient in the use of PowerPoint **4F** - The student is proficient in the use of Microsoft Excel **4G** - The student is proficient in the use of Adobe Photoshop **4H** - The student is proficient in the use of Converting files to PDF format.	**Career Technical Education:** ***ED/ASEP/** **A1.1** Know significant historical architectural and structural projects and their effects on society. **A1.2** Understand the development of architectural and structural systems in relation to aesthetics, efficiency, and safety. **A2.1** Understand the ways in which sociocultural conditions and issues influence architectural design. **A6.1** Know various CADD programs that are commonly used in architectural design. **A6.2** Use CADD software to develop a preliminary architectural proposal. ***ED/EDP/** **C5.4** Apply two-dimensional and three-dimensional CADD operations in creating working and pictorial drawings, notes, and notations. **C5.5** Understand how to determine properties of drawing objects. **Core Academic:** ***ED/C/2.2W/WSA/G11-12/** **(2.6)** Deliver multimedia presentations: a. Combine text, images, and sound and draw information from many sources (e.g., television broadcasts, videos, films, newspapers, magazines, CD-ROMs, the Internet, electronic media-generated images). b. Select an appropriate medium for each element of the presentation. c. Use the selected media skillfully, editing appropriately and monitoring for quality. d. Test the audience's response and revise the presentation accordingly.	**A**: Site Plan **B**: Floor Plan **C**: Elevations **D**: Perspective Views	**Teacher and Student Resources:** *Textbook: Architecture Residential Drawing and Design-ISBN-10:159070195X by The Goodheart- Willcox Company, Inc

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<u>Semester 2</u> - **Unit 2 – Architectural CAD Intermediate Operations (36 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
5A - Manages and transmits files. **5B** - Uses insert block and commands. **5C** - Uses filters. **5D** - Understands and uses dimensioning commands. **5E** - Sets variables and dim variables on dimensioning setup and styles. **5F** - Uses OSNAP, Polar, and object tracking. **5G** - Outputs drawing to plotter/printer to scale or to fit. **5H** - Applies libraries/symbols. **5I** - Understands multiple document environments. **5J** - Creates layouts utilizing modelspace/paperspace concepts.	<u>**Career Technical Education:**</u> ***ED/ASEP/** **A6.1** Know various CADD programs that are commonly used in architectural design. **A6.2** Use CADD software to develop a preliminary architectural proposal. ***ED/EDP/** **C5.4** Apply two-dimensional and three-dimensional CADD operations in creating working and pictorial drawings, notes, and notations. **C5.5** Understand how to determine properties of drawing objects. <u>**Core Academic:**</u> ***VAPA/VA/P/G9-12/** **1.1** Identify and use the principles of design to discuss, analyze, and write about visual aspects in the environment and in works of art, including their own. **1.2** Describe the principles of design as used in works of art, focusing on dominance and subordination.	**A**: Site Plan **B**: Floor Plan **C**: Elevations **D**: Perspective Views	<u>**Teacher and Student Resources:**</u> *Textbook: Architecture Residential Drawing and Design-ISBN-10:159070195X by The Goodheart- Willcox Company, Inc

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Semester 2 - **Unit 3 – Introductory Skills Part 2 (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
1C - Critiques architecture utilizing the aesthetics theories. **1D** - Understands the different career paths in Architecture & other fields of design/construction. **1E** - Compares, contrasts, and makes connections to present and future architectural styles. **1F** - Incorporates architectural styles into their designs.	**Career Technical Education:** ***ED/ASEP/** **A1.1** Know significant historical architectural and structural projects and their effects on society. **A1.2** Understand the development of architectural and structural systems in relation to aesthetics, efficiency, and safety. **A2.1** Understand the ways in which sociocultural conditions and issues influence architectural design. **A3.1** Understand the influence of community context and zoning requirements on architectural design. **A3.2** Develop a site analysis that considers passive energy techniques, sustainability issues, and landscaping. **A3.3** Develop a preliminary proposal for a simulated architectural design. **A3.4** Develop a complete set of architectural plans and drawings. **Core Academic:** ***VAPA/VA/P/G9-12/** **1.1** Identify and use the principles of design to discuss, analyze, and write about visual aspects in the environment and in works of art, including their own. **1.2** Describe the principles of design as used in works of art, focusing on dominance and subordination.	**5A:** Architect **5B:** Engineering 1.Civil 2. Structural 3. Geology 4. Mechanical engineer **5C:** Industrial design **5D:** Graphics design **5E:** Computer design **5F:** Construction Management **6A:** Develop visual arts knowledge to make aesthetic judgments **6B:** Use visual arts to express creative ideas.	**Teacher and Student Resources:** *Textbook: Architecture Residential Drawing and Design-ISBN-10:159070195X by The Goodheart- Willcox Company, Inc

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	Semester 2 - **Unit 4 – Architectural Drafting & Design Fundamentals Part 2 (36 hours)**		
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
2J - Uses catalogs and manufacturing references-specification (CSI format). **2K** - Understands and reads architectural drawings/plans.	**Career Technical Education:** ***ED/ASEP/** **A1.2** Understand the development of architectural and structural systems in relation to aesthetics, efficiency, and safety. **A6.2** Use CADD software to develop a preliminary architectural proposal. ***ED/EDP/** **C5.4** Apply two-dimensional and three-dimensional CADD operations in creating working and pictorial drawings, notes, and notations. **C5.5** Understand how to determine properties of drawing objects. **Core Academic:** ***VAPA/VA/P/G9-12/** **1.1** Identify and use the principles of design to discuss, analyze, and write about visual aspects in the environment and in works of art, including their own. **1.2** Describe the principles of design as used in works of art, focusing on dominance and subordination. **3.1** Identify contemporary styles and discuss the diverse social, economic, developments reflected in the works of art examined.	**7A**: Sample project: Design a house/single family residence. 1. Preliminary proposal. 2. Principles of design. 3. Architectural plans and drawings. 4. Use CAD software and design technologies. 5. Develop structural models 6. Presentation	**Teacher and Student Resources:** *Textbook: Architecture Residential Drawing and Design-ISBN-10:159070195X by The Goodheart- Willcox Company, Inc

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Semester 2 - **Unit 5 – Career Development (8 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
1A - Accessing and utilizing technology and information **1B** - Practicing occupational safety standards **1C** - Thinking critically and solving problems effectively **1D** - Using basic skills in reading, writing, mathematics, listening and speaking as they relate to occupation specific skills **1E** - Attaining a comprehensive understanding of all aspects of industry the individual is preparing to enter **1F** - Applying knowledge to real world problems and situations. **2A** - Works independently and collaboratively. **2B** - Communicates effectively and appropriately. **2C** - Performs reliably and responsibly. **2D** - Working with diverse populations effectively and respectfully **2E** - Is punctual. **2F** - Follows directions. **2G** - Works well with minimum supervision. **2H** - Is cooperative. **2I** - Takes initiative by working beyond minimum requirements. **2J** - Meets job standards of	**Career Technical Education:** ***ED/CPM/** **3.1** Know the personal qualifications, interests, aptitudes, knowledge, and skills necessary to succeed in careers. **3.2** Understand the scope of career opportunities and know the requirements for education, training, and licensure. **3.6** Know important strategies for self-promotion in the hiring process, such as job applications, résumé writing, interviewing skills, and preparation of a portfolio. **Core Academic:** ***ED/A/1.4VPA/VA/ADV/G9-12/** **(5.3)** Prepare portfolios of their original works of art for a variety of purposes (e.g., review for postsecondary application, exhibition, job application, and personal collection). ***ED/C/2.2W/WSA/G11-12/** **(2.5)** Write job applications and résumés: **a.** Provide clear and purposeful information and address the intended audience appropriately. **b.** Use varied levels, patterns, and types of language to achieve intended effects and aid comprehension. **c.** Modify the tone to fit the purpose and audience. **d.** Follow the conventional style for that type of document (e.g., résumé, memorandum) and use page formats, fonts, and spacing that contribute to the readability and impact of the document. ***ED/C/2.3WO/ELC/G11-12/** **(1.2)** Produce legible work that shows accurate spelling and correct punctuation and capitalization.	**A:** Occupational Knowledge and Skills **B:** Workplace Skills and Behavior	**Teacher and Student Resources:** *Textbook:* Architecture Residential Drawing and Design-ISBN-10:159070195X by The Goodheart- Willcox Company, Inc

neatness and grooming. **2K** - Responds appropriately to constructive criticism.	***ED/C/2.2W/WSA/G11-12/** **(1.6)** Develop presentations by using clear research questions and creative and critical research strategies (e.g., field studies, oral histories, interviews, experiments, electronic sources).		

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Semester 2 - **Unit 6 – Job Acquisition Skills (2 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
3A - Completing an appropriate resume and job application **3B** - Acquiring job interview techniques **3C** - Attaining awareness of advanced career and educational opportunities	**Career Technical Education:** ***ED/CPM/** **3.1** Know the personal qualifications, interests, aptitudes, knowledge, and skills necessary to succeed in careers. **3.2** Understand the scope of career opportunities and know the requirements for education, training, and licensure. **3.6** Know important strategies for self-promotion in the hiring process, such as job applications, résumé writing, interviewing skills, and preparation of a portfolio. **Core Academic:** ***ED/C/2.2W/WSA/G11-12/** **(2.5)** Write job applications and résumés: **a.** Provide clear and purposeful information and address the intended audience appropriately. **b.** Use varied levels, patterns, and types of language to achieve intended effects and aid comprehension. **c.** Modify the tone to fit the purpose and audience. **d.** Follow the conventional style for that type of document (e.g., résumé, Memorandum) and use page formats, fonts, and spacing that contribute to the readability and impact of the document.	**A:** Resume **B:** Job Interview **C:** Career Opportunities	**Teacher and Student Resources:** *Textbook:* Architecture Residential Drawing and Design-ISBN-10:159070195X by The Goodheart- Willcox Company, Inc