▲ Drafting and Design (g)

COURSE CODES:

▲**ROP 67080**   ▲**WUHSD 3031A3**   ▲**ERUSD 00000**   ▲**STATE (CALPADS) 7710**

Industry Sector:	Engineering and Architecture	**Course Leads to:** Post-Secondary Education
Career Pathway:	Architectural Design - 150	
Classroom Hours:	180	**Course Level:** Concentrator
Work Based Learning:	180 (optional)	

Approved Textbook/Curriculum: *"Technology: Engineering & Design", 6th ed. Glencoe/McGraw Hill*

POST-SECONDARY EDUCATION	INDUSTRY CERTIFICATIONS	EMPLOYMENT
Articulation with College No Dual Enrollment with College No UC Approved a-g elective credit No **COLLEGE MAJOR** Drafting and Design Technology Mechanical Engineering Engineering Technology Civil Engineering Architecture	None **NEXT STEP** Advanced Drafting and Design PLTW courses	**Related Careers (O*NET)** 17-3011.01 Architectural Drafters 17-3012.01 Electronic Drafters 17-3013.00 Mechanical Drafters 17-3011.00 Architectural and Civil Drafters

Prerequisites:
None.

Course Description:
Computer Aided Design and Drafting is a year course designed to train students to think like an engineer, to improve upon the basic designs of others, to develop 3D prototypes, to develop critical thinking skills, to learn the basic commands of various CAD software programs (Auto CAD, solid works, 3D studio Max, sketch up and others), to visualize 2 –dimensional drawings as 3- dimensional Max, sketch objects and to take 3 dimensional objects and render them as 2 dimensional drawings, to design a full set of architectural plans for a personal residence in accordance with the UBC (Universal Building Code).

Integrated throughout the course are standards for Career Ready Practice and Academic Content Standards which include: appropriate technical skills and academic knowledge; communication skills; career planning; applied technology; critical thinking and problem solving; personal health and financial literacy; citizenship, integrity, ethical leadership and effective management; work productively while integrating cultural and global competence; creativity and innovation; reliable research strategies, and environment, social and economic impacts of decisions.

Course Outline

I. ORIENTATION
- A. Introduce course and facilities
- B. Discuss syllabus and major objectives
- C. Explain attendance, grading, classroom procedures, code of conduct
- D. Complete course safety requirements/test
- E. Evening of Excellence Essay

II. HISTORY OF ARCHITECTURAL DESIGN
- A. Understand how history shaped architecture and know significant events in the history of architectural design
- B. Demonstrate understanding of significant historical architectural projects and their effects on society
- C. Understand the development of architectural systems in relation to aesthetics, efficiency, and safety
- D. Research and understand various occupations within the Engineering and Architecture industry sector
- E. Prepare a resume, demonstrate a professional interview, and explore job search skills
- F. Discuss environmentally sound practices and sustainability within the industry sector

III. ARCHITECTURAL FUNDAMENTALS AND CONCEPTS
- A. Compare the theoretical, practical, and contextual issues that influence design
- B. Describe the influence of community context and zoning requirements on architectural design
- C. Understand and demonstrate the correct usage of architectural vocabulary
- D. Understand the ways in which sociocultural conditions and issues influence architectural design
- E. Analyze various projects design as related to the fundamentals and basic concepts learned

IV. SKETCHING
- A. Understand the sketching processes used in concept development
- B. Apply proper sketching techniques to various architectural models
- C. Produce proportional two- and three- dimensional sketches and designs

V. COMPUTER AIDED DRAFTING (CAD)
- A. Understand the use of CAD in developing architectural designs
- B. Develop a preliminary architectural proposal using CAD software
- C. Analyze the viability of a project as the design is developed using Building Information Modeling (BIM)
- D. Demonstrate technical proficiency and correct use of the CAD program
- E. Produce a CAD drawing to industry specifications

VI. ARCHITECTURE AND ENVIRONMENT
- A. Understand the significance of sustainable building design practices that incorporate beneficial energy and environmental design policies
- B. Develop a site analysis that considers passive energy techniques, sustainability issues, and landscaping
- C. Create a building design that incorporates passive and/ or active energy-efficient technologies

VII. ARCHITECTURAL ANALYSIS
- A. Understand load transfer mechanisms
- B. Understand stress-strain relationships of building structures
- C. Interpret basic structural design considerations, including load-bearing relationships of shear walls, columns, and beams
- D. Design a simple structure using structural analysis principles

VIII. PROPERTIES OF STRUCTURAL MATERIALS
- A. Understand the basic properties of structural materials
- B. Understand the integration of architectural factors, such as soil mechanics, foundation design, engineering materials, and structure design
- C. Develop a basic stress analysis chart of typical structural components
- D. Evaluate available building materials (steel, concrete, and wood) by considering their properties and their effect on building form

Course Outline
E. Develop a preliminary building plan using the appropriate materials

IX. ARCHITECTURAL PROJECT

A. Describe the various components of structures, including lighting, heating, ventilating, and air-conditioning (HVAC), mechanical, electrical, plumbing, communication, security, and vertical transportation systems
B. Develop a preliminary proposal for presentation of an architectural design
C. Read and interpret basic architectural and construction plans, drawings, diagrams, and specifications
D. Develop a complete set of architectural plans and drawings
E. Estimate the materials needed for a project by reading an architectural drawing
F. Plan a project using site and building restrictions imposed by various entities (Planning, Zoning, Building, and Home Owner's associations (HOA))
G. Plan the sequence of events leading to an architectural project

X. PORTFOLIO WORK

A. Develop a binder or digital portfolio representative of completed work for presentation
B. Prepare an effective multi-media oral presentation of the portfolio content

ESSENTIAL STANDARDS AND KEY ASSIGNMENTS
INDUSTRY SECTOR: Engineering & Architecture

ESSENTIAL PATHWAY STANDARD - A1.0

KEY ASSIGNMENT

ESSENTIAL PATHWAY STANDARD - A2.0

KEY ASSIGNMENT

ESSENTIAL PATHWAY STANDARD – A3.0

KEY ASSIGNMENT

ESSENTIAL PATHWAY STANDARD – A4.0

KEY ASSIGNMENT

ESSENTIAL PATHWAY STANDARDS – A5.0

KEY ASSIGNMENT

CTE MODEL CURRICULUM 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 performing 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: they are active listeners who speak clearly and with purpose, and they are comfortable with terminology that is common to workplace environments. 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 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 they 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 a 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 they 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 contribute positively to every team, as both team leaders and team members. To avoid barriers to productive and positive interaction, they apply an awareness of cultural differences. 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.

1: Academics
Analyze and apply appropriate academic standards required for successful industry sector pathway completion leading to postsecondary education and employment. Refer to the industry sector alignment matrix for identification of standards. Note: alignment listed within each sector Anchor Standard

2: Communications Language Standard
Acquire and accurately use general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the (career and college) readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression. LS 9-10, 11-12.6 Anchor Standard

3: Career Planning and Management Speaking and Listening Standard
Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. SLS 11-12.2 Anchor Standard

4: Technology Writing Standard
Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments and information. WS 11-12.6 Anchor Standard

5: Problem Solving and Critical Thinking Writing Standard
Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem, narrow or broaden the inquiry when appropriate, and synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. WS 11-12.7 Anchor Standard

6: Health and Safety Reading Standards for Science and Technical Subjects
Determine the meaning of symbols, key words, and other domain-specific words and phrases as they are used in a specific scientific or technical context. RSTS 9-10 11-12.4 Anchor Standard

7: Responsibility and Flexibility Speaking and Listening Standard
Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners, building on others' ideas and expressing their own clearly and persuasively. SLS 9-10 11-12.1 Anchor Standard

8: Ethics and Legal Responsibilities Speaking and Listening Standard
Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the work. SLS 11-12.1d Anchor Standard

9: Leadership and Teamwork Speaking and Listening Standard
Work with peers to promote civil, democratic discussions and decision making; set clear goals and deadlines; and establish individual roles as needed. SLS 11-12.1b Anchor Standard

10: Technical Knowledge and Skills Writing Standard
Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. WS 11-12.6 Anchor Standard

11: Demonstration and Application
Demonstrate and apply the knowledge and skills contained in the industry-sector anchor standards, pathway standards, and performance indicators in classroom, laboratory, and workplace settings, and the career technical student organization.