



El Camino College
COURSE OUTLINE OF RECORD – Official

Subject:	CADD
Course Number:	24
Descriptive Title:	Advanced 3D Design with SolidWorks
Division:	Industry and Technology
Department:	Computer Aided Design/Drafting
Course Disciplines:	Computer Aided Design/Drafting, Drafting
Catalog Description:	This advanced-level course, the culmination in the three-part SolidWorks series, elevates students' three-dimensional (3D) modeling and analysis skills using industry-grade SolidWorks software. It introduces advanced surfacing tools, analysis, and simulation, covering advanced sub-assemblies, design for manufacturing, motion studies, animations, product rendering, 3D printing, CAM features, and mold design. A pivotal aspect of this course is to prepare students for a job-ready design portfolio, showcasing their refined capabilities in engineering and product design, prepared for practical and professional applications. This course readies students for the Certified SolidWorks Associate (CSWA) and/or Certified SolidWorks Professional (CSWP) exams.
Prerequisite:	Computer Aided Design/Drafting 23 with a minimum grade of C
Co-requisite:	
Recommended Preparation:	
Enrollment Limitation:	
Hours Lecture (per week):	2
Hours Laboratory (per week):	4
Outside Study Hours:	4
Total Course Hours:	108
Course Units:	3
Grading Method:	Letter Grade only
Credit Status:	Credit, degree applicable
Transfer CSU:	Yes
Effective Date:	
Transfer UC:	Yes
Effective Date:	propose/pending
General Education ECC:	
Term:	
Other:	
CSU GE:	
Term:	
Other:	
IGETC:	

Term:	
Other:	
Student Learning Outcomes:	<p>SLO #1 Advanced Surfacing</p> <p>Students will be able to use lofting and boundary features to create a complex surface model using SolidWorks.</p> <p>SLO #2 Simulation & Analysis</p> <p>Students will be able to use SolidWorks simulation features to apply a force on a part to identify weak and strong geometries.</p> <p>SLO #3 3D Printing & Prototyping</p> <p>Students will be able to prepare 3D printing files from models created in SolidWorks. The models can then be loaded onto a 3D printer for prototyping.</p>
Course Objectives:	<ol style="list-style-type: none"> 1. Create advanced 3D models using surfaces and loft features. 2. Create multi-component assemblies. 3. Utilize SolidWorks mold design to prepare for manufacturing. 4. Design motion study to analyze design errors and assembly collisions. 5. Use stress simulation to analyze weak points and then change the design of a part. 6. Create high-resolution professional renders of parts and assemblies with SolidWorks.
Major Topics:	<p>I. Advanced Modeling (5 hours, lecture)</p> <ol style="list-style-type: none"> A. Sweep with composite curve B. Advanced modeling with sweep & loft C. Loft vs. sweep D. Loft with guide curves <p>II. SolidWorks Advanced Models (9 hours, lab)</p> <ol style="list-style-type: none"> A. Surfaces B. Offset surface and ruled surface C. Curved driven pattern and flex bending D. Filled, knit, and boundary surfaces <p>III. Sub-Assemblies (5 hours, lecture)</p> <ol style="list-style-type: none"> A. Adding sub-assemblies B. In-context modeling C. Creating new parts in an assembly <p>IV. Motion Studies (9 hours, lab)</p> <ol style="list-style-type: none"> A. Adding motors to an assembly to recreated motion for analysis B. Exploded view animation using the Wizard Tool C. Keyframes modification for animation

V. Configurations (5 hours, lecture)

- A. Design table
- B. Configuration manager

VI. Design Table for Configurations (9 hours, lab)

- A. Create multiple parts using equations or formulas
- B. Assemblies with configurations

VII. Weldments (4 hours, lecture)

- A. How to setup a framework
- B. How to prepare a cut list
- C. Weldment drawings

VIII. Designing for Welds (9 hours, lab)

- A. 3D sketching for welds
- B. Structural member
- C. Gusset
- D. Weld bead

IX. Simulation and Analysis (5 hours, lecture)

- A. Creating a stress simulation
- B. Applying constraints and forces on a part to test its strength
- C. Fixtures and load
- D. Meshing

X. Creating Simulations (9 hours, lab)

- A. Applying force to a part
- B. Running studies
- C. Modifying after results

XI. Mold Design (4 hours, lecture)

- A. 3D Cavity and Core feature
- B. Designing for injection molding
- C. Parting lines

XII. Creating Molds (9 hours, lab)

- A. Using the Mold Tools Tab to create a mold for manufacturing
- B. Draft analysis
- C. Undercut analysis

XIII. 3D Printing & Prototyping (4 hours, lecture)

- A. Outputting models for 3D printing
- B. FDM vs SLA printing

	<p>C. Primary 3D printer settings</p> <p>XIV. 3D Printing Tangible Models (9 hours, lab)</p> <p>A. Preparing 3D models for 3D printer B. Setting up 3D printers C. Finishing prints for presentation</p> <p>XV. Portfolio (4 hours, lecture)</p> <p>A. Rendering 3D models for layouts B. Preparing mechanical drawings for digital delivery C. Website creation</p> <p>XVI. Presentation & Portfolio (9 hours, lab)</p> <p>A. Creating professional high-resolution renders and animations B. Advanced rendering with SolidWorks Visualize and third-party software C. Prepare renders and animations for portfolio</p>
Total Lecture Hours:	36
Total Laboratory Hours:	72
Total Hours:	108
Primary Method of Evaluation:	3) Skills demonstration
Typical Assignment Using Primary Method of Evaluation:	Creating a complex 3D model using advanced surfaces: with the given dimensions and parameters, create a lofted solid body with guide rails. After creating the loft, use the split command to project lines on the surface. Change the color/material finish of each surface using the appearance functions. The model should be rendered in isometric view with perspective mode enabled. Upload the image to the cloud or save them to a secure device. Submit the high-resolution image to the instructor for assessment.
Critical Thinking Assignment 1:	Based on the wall mount assembly provided by the instructor, create a simulation. Make sure to enter the correct forces and material conditions, and then run a stress simulation. Using SolidWorks analysis, determine the maximum downward force on the assembly before its failure. Suggest two modifications to improve the assembly's strength. Upload your explanation and all associated components to the cloud or save them to a secure device. Submit the files to the instructor for evaluation.
Critical Thinking Assignment 2:	Create threads manually in SolidWorks. Design a two-inch length bolt with a standard 1/4-20 thread using the Sweep boss/bass 3D feature. In a new assembly, add the newly created bolt. Import an appropriate nut to match the bolt you just created using the Tool box library. Prepare a 2D assembly drawing that includes orthographic views. Upload the drawing and all associated components to the cloud or save them to a secure device. Submit the files to the instructor for assessment.
Other Evaluation Methods:	Class Performance, Homework Problems, Objective Exam, Other Exams, Presentation, Quizzes
If Other:	
Instructional Methods:	Demonstration, Discussion, Group Activities, Lab, Lecture
If other:	
Work Outside of Class:	Problem solving activity, Required reading, Skill practice, Study

If Other:	
Up-To-Date Representative Texts:	Paul Tran. <u>SOLIDWORKS 2022 Intermediate Skills</u> . SDC. 2022.
Alternative Texts:	
Required Supplementary Readings:	
Other Required Materials:	
Requisite	Prerequisite
Category	sequential
Requisite course:	Computer Aided Design/Drafting 23
Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).	Ability to create and manipulate 3D solid geometry with SolidWorks software. CADD-23: Apply functional dimensions to 3D models with SolidWorks.
Requisite Skill:	
Requisite Skill and Matching skill(s): Bold the requisite skill(s). if applicable	
Requisite course:	
Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).	
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Requisite Skill and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s). if applicable	
Enrollment Limitations and Category:	
Enrollment Limitations Impact:	
Course Created by:	Vince Phamdo
Date:	11/04/2023
Original Board Approval Date:	03/21/2024
Effective Term:	FALL 2024

