



**El Camino College**  
**COURSE OUTLINE OF RECORD – Official**

<b>Subject:</b>	CADD
<b>Course Number:</b>	16
<b>Descriptive Title:</b>	Advanced 3D Design with CATIA
<b>Division:</b>	Industry and Technology
<b>Department:</b>	Computer Aided Design/Drafting
<b>Course Disciplines:</b>	Computer Aided Design/Drafting, Drafting
<b>Catalog Description:</b>	Building on the fundamental skills honed in the introductory course, CADD-14, this is the second course of the two-part CATIA series certificate. In this advanced Computer-Aided Design (CAD) course, students navigate through the extensive surfacing and analysis/simulation capabilities of CATIA. They explore kinematic analysis, generative stress analysis, wireframe and surface functionality throughout the course. Learners attain proficiency in crafting, manipulating, analyzing, and rendering sophisticated three-dimensional surface models, along with engaging in other Computer Aided Engineering (CAE) functions.
<b>Prerequisite:</b>	Computer Aided Design/Drafting 14 with a minimum grade of C
<b>Co-requisite:</b>	
<b>Recommended Preparation:</b>	
<b>Enrollment Limitation:</b>	
<b>Hours Lecture (per week):</b>	2
<b>Hours Laboratory (per week):</b>	4
<b>Outside Study Hours:</b>	4
<b>Total Course Hours:</b>	108
<b>Course Units:</b>	3
<b>Grading Method:</b>	Letter Grade only
<b>Credit Status:</b>	Credit, degree applicable
<b>Transfer CSU:</b>	Yes
<b>Effective Date:</b>	
<b>Transfer UC:</b>	Yes
<b>Effective Date:</b>	pending/propose
<b>General Education ECC:</b>	
<b>Term:</b>	
<b>Other:</b>	
<b>CSU GE:</b>	
<b>Term:</b>	
<b>Other:</b>	
<b>IGETC:</b>	
<b>Term:</b>	

<b>Other:</b>	
<b>Student Learning Outcomes:</b>	<p><b>SLO #1 Knowledgeware and Generative Sheet Metal Functions</b></p> <p>Given sufficient product definition information, students will be able to create tabulated models and flat pattern models utilizing the Knowledgeware and Generative Sheet Metal functions within the CATIA software.</p> <p><b>SLO #2 Kinematic Simulations</b></p> <p>Given a CATIA product model of a simple mechanism, students will be able to create kinematic simulations utilizing the Kinematics Simulation function within the CATIA software.</p> <p><b>SLO #3 Utilizing Surfacing Functions</b></p> <p>Given a fully dimensioned multi-view engineering drawing of a complex molded part, students will be able to utilize the appropriate functions within the CATIA software to construct a 3D surface model of the part.</p>
<b>Course Objectives:</b>	<ol style="list-style-type: none"> <li>1. Create and unfold a sheet metal part.</li> <li>2. Demonstrate appropriate use of the Knowledgeware portion of the CATIA software.</li> <li>3. Perform a kinematic analysis of a mechanism model.</li> <li>4. Perform a generative stress analysis on an existing structural model.</li> <li>5. Design and create a three-dimensional (3D) kinematic mechanism model.</li> <li>6. Appraise stress characteristics of several competing design concepts.</li> <li>7. Compare and contrast tabulated versus non-tabulated model definitions.</li> <li>8. Create advanced 3D surface models.</li> <li>9. Create hybrid models utilizing 3D solid geometry merged with surface geometry.</li> <li>10. Utilize existing 3D geometry and modify properties to produce realistic images of parts and assemblies.</li> </ol>
<b>Major Topics:</b>	<p><b>I. Advanced CATIA Overview (6 hours, lecture)</b></p> <ol style="list-style-type: none"> <li>A. System interface</li> <li>B. Menu structure</li> <li>C. Parametric design</li> <li>D. Efficient modeling</li> </ol> <p><b>II. Advanced Modeling Concepts (12 hours, lab)</b></p> <ol style="list-style-type: none"> <li>A. History of wireframe and surface modeling</li> <li>B. Benefits and drawbacks in surface models</li> <li>C. Geometric construction methodology</li> </ol> <p><b>III. Wireframe Modeling (6 hours, lecture)</b></p> <ol style="list-style-type: none"> <li>A. Creating complex wireframe geometry</li> </ol>

- B. Utilizing sketches and geometry from existing components
- C. Creating wireframe part

**IV. Wireframe Modeling Practice (12 hours, lab)**

- A. Creating basic wireframe geometry
- B. Utilizing sketches and geometry from existing components
- C. Creating wireframe part

**V. Surface Modeling (6 hours, lecture)**

- A. Creating complex surface geometry
- B. Constructing surface geometry from wireframe components
- C. Creating surface part

**VI. Advanced Surface Modeling Practice (12 hours, lab)**

- A. Creating complex surface geometry
- B. Merging hybrid surface geometry with existing solid components
- C. Creating advanced surface part

**VII. Sheet Metal Workbench (6 hours, lecture)**

- A. Creating parts
- B. Unfolding parts
- C. Creating drawings

**VIII. Sheet Metal Practice (12 hours, lab)**

- A. Creating parts
- B. Unfolding parts
- C. Creating drawings

**IX. Generative Stress Analysis (6 hours, lecture)**

- A. Mesh creation
- B. Running the analysis
- C. Interpreting analysis results

**X. Stress Analysis Practice (12 hours, lab)**

- A. Mesh creation
- B. Running the analysis
- C. Interpreting analysis results

**XI. Kinematic Simulation (6 hours, lecture)**

- A. Defining the mechanism
- B. Building the mechanism

	<b>XII. Kinematic Simulation &amp; Knowledgeware (12 hours, lab)</b> <ul style="list-style-type: none"> <li>A. Running a simulation/analysis</li> <li>B. Designing tables</li> <li>C. Creating and editing links</li> </ul>
<b>Total Lecture Hours:</b>	36
<b>Total Laboratory Hours:</b>	72
<b>Total Hours:</b>	108
<b>Primary Method of Evaluation:</b>	3) Skills demonstration
<b>Typical Assignment Using Primary Method of Evaluation:</b>	Utilizing CATIA software and a provided diagram or engineering drawing, construct a basic aircraft skin as a 3D surface model. Then use this skin to make necessary modifications to the structural components. Upload the assembly and all associated components to the cloud or save them to a secure device. Submit the file(s) to the instructor for evaluation.
<b>Critical Thinking Assignment 1:</b>	With CATIA software, craft, assess, and finalize a complex surface to incorporate it into a hybrid model. Save the hybrid model on removable media or upload it to the cloud. Submit the model to the instructor for assessment.
<b>Critical Thinking Assignment 2:</b>	Utilize CATIA software to plan and perform a stress analysis on a 3D mechanical winch assembly model. Evaluate the analysis results to determine whether changes to the design are required. Implement the necessary modifications. Upload the assembly and all associated components to the cloud or save them to a secure device. Submit the file(s) to the instructor for evaluation.
<b>Other Evaluation Methods:</b>	Class Performance, Homework Problems, Objective Exam, Other Exams, Presentation, Quizzes
<b>If Other:</b>	
<b>Instructional Methods:</b>	Demonstration, Discussion, Group Activities, Lab, Lecture
<b>If other:</b>	
<b>Work Outside of Class:</b>	Problem solving activity, Required reading, Skill practice, Study
<b>If Other:</b>	
<b>Up-To-Date Representative Texts:</b>	Ascent Center for Technical Knowledge. <a href="#">CATIA V5-6R2018 - Introduction to Modeling Learning Guide</a> – 1 <sup>st</sup> Edition (2018). Ascent Center for Technical Knowledge. (Discipline Standard)
<b>Alternative Texts:</b>	
<b>Required Supplementary Readings:</b>	
<b>Other Required Materials:</b>	
<b>Requisite</b>	Prerequisite
<b>Category</b>	sequential
<b>Requisite course:</b>	Computer Aided Design/Drafting 14
<b>Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).</b>	

<p><b>Requisite Skill:</b></p>	<p><b>Familiarity with the basic CATIA interface and menu structure</b></p> <p>CADD-14 - Utilize CATIA software to create and manipulate 3D CAD models of geometrically simple objects.</p> <p><b>Ability to create and manipulate 3D solid geometry with CATIA software.</b></p> <p>CADD-14 - Employ the constraint tools to define and control sketched geometry.</p>
<p><b>Requisite Skill and Matching skill(s): Bold the requisite skill(s), if applicable</b></p>	
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<p><b>Enrollment Limitations and Category:</b></p>	
<p><b>Enrollment Limitations Impact:</b></p>	
<p><b>Course Created by:</b></p>	Vince Phamdo
<p><b>Date:</b></p>	10/04/2023
<p><b>Original Board Approval Date:</b></p>	03/21/2024
<p><b>Effective Term:</b></p>	FALL 2024