

CAD 241
Parametric Solid-Modeling I

Prerequisites:

CAD 111

Course Description:

Focuses on teaching students the design of parts by parametric solid modeling. Topics covered include, but are not limited to, theory and application of industry standards; sketch profiles; geometric and dimensional constraints; 3-D features; model generation by extrusion, revolution, and sweep; and the creation of 2-D drawing views that include sections, details and auxiliary. Credit will not be awarded for both CAD 241 and DRF 241.) Lecture 2 hours. Laboratory 2 hours. Total 4 hours per week

Course utilizes AutoDesk CAD software and AutoDesk Certification materials.

Required Materials:

- Textbook
- Access to a current **64-bit** Laptop/PC with WINDOWS OS and a media player, webcam, microphone, and Snipping Tool
- AutoDesk Inventor software
- Other software: GMetrix, Microsoft Word, PowerPoint.

NOTE: Software downloads are available for no cost to the student.

Recommended additional Materials:

- A computer mouse- recommended for laptops, but not required.
- USB portable - recommended, but not required

The following supplementary materials are available:

VWCC offers an open computer lab format available throughout each semester if needed.

Course Learning Outcomes (CLO):

1. The student will create 2D and 3D industry geometric drafting constructions using sketching and/or a computer-aided drafting (CAD) system.
2. The student will demonstrate their knowledge and usage of the Inventor software 2D and 3D tools and commands.
3. The student will utilize and demonstrate design intent and reverse engineering methods for mechanical engineered models.
4. The student will apply American Society of Mechanical Engineers (ASME) guidelines to illustrate 3rd angle projection views created in the Inventor software.
5. The student will create in the Inventor software ready-to-plot detailed drawings for the purpose of manufacturing.
6. The student will demonstrate the theory and application of ASME dimension guidelines.

Topical Descriptions and Course Map:

The CAD 241 Topical Descriptions will promote active learning and aid in preparing students to take the Inventor Certification Exam. Each topic below will be reviewed in a weekly Module and the learned materials will continue to build and have more relevancy to the mechanical engineering industry throughout the semester's progression. Each weekly Module will include Objectives, learning materials and assessments, such as assignments, projects, quizzes, and tests.

(Note: The below reflects the CAD 241 topics to be covered in the course and does not reflect a specific week of the semester.)

1. Getting Started with a Review of Industry Fundamentals (CLO #1, CLO #6)
 - The student will analyze engineering fundamentals and apply these important theories to the weekly assessments.
 - The student will demonstrate their knowledge of the ASME drafting standards.
 - The student will hand draft simple detailed drawings using tools and mechanical engineering basic guidelines.
2. ASME Dimensions; Precision and Accuracy (CLO #1, CLO #6)
 - The student will demonstrate their knowledge of ASME dimensions and drafting standards.
 - The student will apply engineering industry fundamentals to the week's assessments
3. Inventor Fundamentals and ASME standards; Test
Learning Objectives: (CLO #1, CLO #2, CLO#6)
 - The student will demonstrate their knowledge of the Inventor Interface.
 - The student will demonstrate their knowledge of the theory vs application of ASME standards
 - The student will prepare to complete TEST 1 by reviewing previously learned concepts and viewing graded assessments' comments.
 - The student will complete Test 1.

4. Inventor Introduction and usage of basic 3D Modeling tools (CLO #1, CLO #2)
 - The student will create simplistic 3D models in Inventor.
 - The student will sketch in Inventor and use 3D modeling tools to create a 3D model.
 - The student will apply Inventor 3D fundamentals to the week's assessments.
5. Inventor Placed Features vs. Sketched Features and Geometrics (CLO #1, CLO #2)
 - The student will demonstrate their ability to create a placed feature in Inventor using new fundamental skills along with previously and newly learned industry standard concepts.
 - The student will create industry standard 3D models.
 - The student will apply Inventor fundamentals by interpreting the mechanical engineering standards in weekly assessments.
6. Detailed Drawings using ASME standards and Inventor; Project(s) Introduction (CLO #1, CLO #2, CLO #4, CLO #5; CLO #6)
 - The student will create 3D CAD models by using industry standard multi-views including orthographic, isometric, section, or auxiliary views.
 - The student will create a detailed sheet in Inventor.
 - The student will demonstrate the understanding of how dimensions are applied to a multi-view on a detailed drawing sheet.
 - The student will apply Inventor fundamentals and previously learned skills to complete the weekly assessments.
 - The student will utilize the creation of parts to form a whole 3D model.
7. More 3D modeling Techniques and Inventor (CLO #1, CLO #2; CLO #4, CLO #5, CLO #6)
 - The student will create 3D models using more advanced 3D Inventor techniques.
 - The student will apply the ASME standard rules and guidelines to the weekly assessments.
 - The student will create detailed drawings that follow ASME rules and guidelines by using 3D Inventor tools.
8. Putting it all together; Project Introduction (CLO #1, CLO #2; CLO #4, CLO #5, CLO #6)
 - The student will apply and reuse previously created setup and unique content from other files into the existing Inventor file.
 - The student will use Inventor to create organized detailed drawings.
 - The student will create 3D models, detailed views, and apply ASME industry standards to drawing sheets.

9. Reverse Engineering Introduction (CLO#1, CLO #2, CLO #3; CLO #4, CLO #5, CLO #6)
 - The student will create 3D models using RE applications and ASME theory and guidelines to complete a comprehensive project.
 - The student will apply previously learned 3D Inventor tools and concepts to complete a RE project.
10. Prepare for AutoDesk Certification User (ACU) Exam and Test 2 (CLO#1, CLO #2, CLO #3; CLO #4, CLO #5, CLO #6)
 - The student will review and apply all previously learned industry theories and Inventor applications.
 - The student's RE project should reflect their learned knowledge and satisfy the project's rubric. The student will utilize all course materials, including the correct application of Inventor and ASME standards.
 - The student will complete GMetrix Practice Tests to prepare for the AutoDesk Certification Exam (ACU) for Inventor. These GMetrix Practice tests will also help the student to evaluate their course material knowledge and will aid in their studies.
 - The student will review previous course materials and complete Test 2.
11. RE Project, Course Final Exam, and ACU Exam (CLO #1, CLO #2, CLO #3; CLO #4, CLO #5, CLO #6)
 - The student will complete a Final RE Project.
 - The student will demonstrate their knowledge when taking the Inventor ACU exam.
 - The student will finalize the course by completing and submitting the Course Final Exam.

Notes to Instructors:

Required in course materials:

- 3rd Angle projection
- Imperial vs Metric units
- ASME industry standards to prepare students for CAD 242 and CAD 298
- Each student is required to complete weekly assignments, assessments, and a special project.
- (Inventor) ACU Certification materials should be used in course materials.

[ADA Statement](#) (PDF)

[Title IX Statement](#) (PDF)