

# Engineering Design and Development

**Overview** The primary intent of the course is to provide the student with the skills necessary to understand and interpret 3D models and engineering drawings. To do this, the student will learn to apply design intent to construct 3D models using computer-aided design and document their design intent through a design rationale and engineering drawings. In addition to working on developing spatial reasoning and technical drawing skills, students will develop technical writing and oral presentations skills as they discover various topics throughout the semester. The course will culminate with a 6-8 week long final project where students will work in teams to identify a problem, design a unique solution, create a prototype, then test the solution.

- Objectives**
- Understanding the design intent
  - Using graphics to accurately communicate information and design
  - Sectioning and dimensioning multi-view drawings
  - Visualizing in three dimensions
  - Designing solid models.
  - Creating and interpreting engineering drawings

**Assessment** Students will be assessed using homework assignments, quizzes, and exam as well as a final project.

Equipment	Cost/Unit
Inventor 3D Modeling Software	\$0 for Educational Use
Computers to run Inventor	\$500 each (\$0 if you already have computers). Must come with a mouse (not a tracking/touchpad)
Autodesk Inventor Certified User Exam <i>Advanced Statewide Industry Based Credential</i>	\$80/student
3D Printers (Makerbot Replicator recommended) <i>Purchase is optional</i>	<u>Reusable</u> : \$3,000 each, purchase 1 per 7-10 students - Less expensive 3D printer options are available <u>Consumable</u> : filament (\$500 per year)

## First Semester Course Outline

<b>Unit 1: Introduction to Design</b>	Engineering design process, Safety, Sketching
<b>Unit 2: Multiviews</b>	Introduction to multi-views, Isometric view
<b>Unit 3: Visualization</b>	Visualization in 2D and 3D
<b>Unit 4: Inventor – Basics</b>	The basics of 3D modeling, sketches versus features
<b>Unit 5: Inventor – Intermediate Part 1</b>	Parametric modeling dimensions, Mirroring sketches and features
<b>Unit 6: Inventor – Intermediate Part 2</b>	Linear and Circular Patterns, Revolved features and Shells, Machined holes

## Second Semester Course Outline

<b>Unit 7: Section Views and Working Drawings (Paper and Inventor)</b>	Defining section views, Understanding the importance of section views, Title Blocks, multi-views, sectional views, dimensioning
<b>Unit 8: Dimensioning (Paper and Inventor)</b>	Rules of dimensioning, Dimensioning non-standard views and holes
<b>Unit 9: Inventor - Advanced Modeling</b>	Lofts, Ribs, and Sweeps
<b>Unit 10: Inventor - Assemblies and Exploded Views</b>	Mating parts, inserting BOM, inserting balloons and part names
<b>Unit 11: Final Project</b>	Define, Research, Design, and Prototype Solution, 3D print and test solution, Present final solution, Project design and engineering notebooks, Writing a good problem statement, Gantt charts, Scholarly journal article review, Professionalism and ethics, Work ethic, Patents