

Course Outline – Computer Aided Design (CAD)

Course Description:

The Computer Aided Design course provides students with practical experiences using basic CAD software to design solutions to technological problems. Students design, print on a plotter and use 3D prototyping machines, to test and verify their designs.

Course Competencies:

1. A Theory (30%): Using and documenting the engineering design process when solving computer design problems
2. Skills Application (30%): Using CAD software to design projects that can be fabricated by a variety of processes
3. Class participation, Teamwork & Safety (30%): Students will be able to apply effective safety practices in the lab, including selection and use of tools.
4. Mission (10%)

Course Indicators woven into each unit of the course:

Unit I: Introduction to CAD

Unit Essential Question(s):

- Why are design problems seldom presented in a clearly defined form?
- How do we redefined and improved a design?
- How do design requirements compete with each other?
- How do we apply design principles?
- What personal characteristics influence engineering design?
- How do criteria and constraints affect the design process?
- How are computers and calculators used in the design process?

Unit Indicators:

Content Knowledge

- Explain that design problems are seldom presented in a clearly defined form.
- Explain how a design needs to be continually checked and critiqued, in order for the ideas of the design to be redefined and improved.
- Describe a design where the requirements, such as criteria, constraints, and efficiency, compete with each other.
- Apply design principles to evaluate existing designs, to collect data, and to guide the design process.
- Explain how engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly
- Identify criteria and constraints and determine how these will affect the design process.
- Use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate.

Unit 2: Constructive Solid Geometry

Unit Essential Question(s):

- Why are design problems seldom presented in a clearly defined form?
- What role does checking and critiquing a design play in redefining and improving design ideas?
- How do we apply design principles?
- What personal characteristics influence engineering design?
- How do criteria and constraints affect the design process?
- How are conceptual, physical, and mathematical models used to evaluate design solutions?
- How is the design process used to develop and produce a product or system?

Unit Indicators:

Content Knowledge

- Explain why design problems are seldom presented in a clearly defined form.
- Continually check and critique a design, in order to redefined and improved the ideas of a design.
- Use design principles to evaluate existing designs, to collect data, and to guide the design process.
- Describe the personal characteristics, that influence engineering design.
- Identify criteria and constraints and determine how these will affect the design process.
- Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed.
- Develop and produce a product or system using a design process.

Unit 3: Using the Prototyping Machines to Produce 3D Parts

Unit Essential Question(s):

- How do you create a prototype solution to a design problem?
- Why do we evaluate the design solution using conceptual, physical, and mathematical models?

Unit Indicators:

Content Knowledge

- Create a prototype solution to a design problem.
- Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed.