Introduction to Computer-aided Design (CAD)
COURSE OUTLINE

Course Description

This class introduces students to the tools, concepts, and workflows used in digital design, including hard-body vs. soft-body modeling, parametric design, and applications such as CAM, simulation, and rendering. Students will learn the design process from sketching and dimensioning 2D drawings to shaping them into 3D objects. The course culminates in a hands-on project where students model a functional part in CAD.

01 Introduction to CAD
- What is Computer-aided Design (CAD)
- CAD in different industries: engineering, manufacturing, product design, art
- Hard-body vs. soft-body modeling
- Popular CAD software (Fusion 360, SolidWorks, Onshape, Blender, etc.)

02 The Design Process in Practice
- From idea to prototype: brainstorming, iteration, and refinement
- Translating real-world requirements into digital designs

03 Fundamentals of Sketching and Constraints
- 2D sketches as the foundation of 3D models
- Dimensioning and geometric constraints (parallel, perpendicular, equal, etc.)
- Best practices for fully defining sketches
- Hands-on: creating simple constrained sketches

04 Building 3D Models
- From sketch to solid: extrusions, revolutions, sweeps, lofts
- Adding features: fillets, chamfers, holes, patterns, and shells
- Hands-on: creating a 3D object from a sketch and adding features

05 Creating Assemblies
- What is an assembly
- Types of joints
- Hands-on: creating an assembly by joining multiple objects

06 Next Steps: Exporting, Rendering, Simulation, and CAM
- Exporting STL/STEP files for 3D printing
- Rendering basics
- Simulations
- Computer-aided Manufacturing (CAM)

07 Class Project: Design a Part in CAD
- Students will be presented with a part to design in CAD

08 Questions & Comments