

ME357 Syllabus – Fall 2024

Description

Focus on engineering modeling in 3D and technical drawing in 2D using advanced CAD tools. Hands-on course work will allow students to ideate and model mechanisms. Course will focus on design tools for subsequent classes and industrial best practices. Topics will include ideation, design of machine components, and introduction to design for prototyping, machining, manufacture, assembly and repair. 2 credits.

Prerequisites by topic: none

Summary of Course Topics

1. **Design Process:** ideation, concept selection and sketching
2. **Basic Part modeling in CAD:** setting up datum planes, defining the coordinate systems, feature selection, parent/child relationships, dimension driven 3D sketching (e.g. protrusions, revolving and fillets etc), and visualization (e.g. hidden lines, shaded, and perspective views)
3. **Complex Parts and Surfaces:** Curved surfaces and blends, shelled/molded parts, adding ribs and bosses, and apply threads to holes
4. **Detailing and Blueprint Creation:** Orthographic projections, line and text forms, coordinate dimensioning and tolerancing principles and standards, geometric dimensioning and tolerancing (GD&T), section and part-section views, compliance with ANSI and ISO standards
5. **Assembly:** Assembly constraints (e.g. mating planes and coordinates, aligning, orienting etc), exploded views, creating a Bill of Materials (BOM), interference and clearance checking, and orthographic assembly drawings
6. **Engineering Documentation:** export/import of files, rendering, document control, and drawing printing
7. **Introduction to Kinematics:** Mechanism Analysis using CAD (e.g. angular position and velocity plots) and creating animations
8. **Introduction of Design for X:** Connection between design and prototyping, machining, manufacture, assembly and repair using BOM for costing analysis of a mechanism.

Learning Objectives & Printing

Course Goal

- Develop the ability to create three-dimensional engineering models and two-dimensional drawings using CAD
- Use dimensioning and tolerancing techniques to create manufacturable parts
- Conduct motion analysis of a mechanism
- Understand the connections between CAD design with prototyping, machining, manufacture, assembly, and repair

Course Learning Outcomes

Upon completing this course, students will be able to:

- Convey ideas through sketches and other graphical means
- Create and analyze solutions to design problems in accordance to professional standards
- Create two dimensional drawings incorporating basic conventions of geometric dimensioning and tolerancing of components and mechanisms using CAD
- Create three dimensional models of components and mechanisms using CAD
- Conduct a motion analysis of a mechanism
- Understand CAD practices that facilitate iteration and change
- Document and communicate a design process in written and oral form

Assessment & Assignments

Course Assessment

Weighting

- Attendance 10%
 - All attendance will be recorded online in Top Hat
- Quizzes 40%
 - Single lowest grade will be dropped from average calculation
- Project Assignments 50%
 - No project grades will be dropped from average calculation

Grading Scale

- A = 94–100%
- A– = 90–93.99%
- B+ = 87–89.99%
- B = 84–86.99%
- B– = 80–83.99%
- C+ = 77–79.99%
- C = 74–76.99%
- C– = 70–73.99%
- D = 60–69.99%
- F = 0–59.99%

Project Assignments

- Multiple project assignments will be given, and details will be discussed as they are assigned
 - There will be (3) CAD model and drawing projects
 - There will be (5) components to the 4-Bar Linkage project
- All project details will be provided in Blackboard
- All assignments will be submitted in Blackboard
- All assignments will be graded in Blackboard
- Student solutions should be original; plagiarism will not be tolerated

Quizzes

- Given on Blackboard with the same deadline for all sections
 - Released on Monday morning of the week they are due
 - Must be submitted by Sunday at midnight for full credit
- Submitted electronically using Blackboard
- Offer two attempts

- Only the latest submission will be graded
- Lowest score will be dropped from the average calculated in Blackboard
- Some quizzes may require the submission of an image file, CAD file or PDF file
 - Pay attention to the requested file types and submit the proper file formats for full credit

Class Participation

- Class participation is based on each student's professional, active and constructive participation in the solution of the example problems in class, responses to general questions and your regular attendance of the class lectures. Remote students can show their attendance by actively participating in online sessions and piazza.
- You MUST act in a professional manner to all students while in the classroom and for all group projects. Class discussions can be passionate and opinionated, but should never make other students feel poorly. Bullying or belittling will not be tolerated. Attack the idea, not the person. Being able to take and give criticism is a skill and it will be developed in this class.
- BU's academic Conduct Code: <http://www.bu.edu/academics/policies/academic-conduct-code>

Copyright 2024, Boston University, All rights reserved. No distribution without written permission.