

Syllabus

ASE 492 Special Studies

Computer Aided Engineering Design and Drawing (2-2) 3

(Technical Elective Course)

2024-2025 Academic Year Spring Semester

Course ECTS Credit

6

Catalog Description

Stress analysis tools of Inventor, Autodesk Inventor NASTRAN, static stress analysis, thermal analysis, Thermal stress analysis in Fusion 360 environment, Details on Sectional Views, Geometric Tolerance, Surface Texture, Assembly Modelling in Inventor Environment, Weldments and Welding Annotations, Common Machine Elements; CAD applications in Inventor, Design Tools of Inventor, Conventional Views of Machine Elements, Sheet Metal Components and Developments.

Prerequisite(s)

MECH 113, ASE 264 (or MECH 206)

Offered Semester: Spring Semester (Regular)

Assoc. Prof. Dr. Murat Sönmez 2024-25 Academic Year 2nd Semester							
SCHEDULE							
Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
08:40 - 09:30							
09:40 - 10:30							
10:40 - 11:30	Office Hour						
11:40 - 12:30	MECH 114 [I-104]				Office Hour		
12:40 - 13:30	MECH 114 [I-104]						
13:40 - 14:30							
14:40 - 15:30			Office Hour				
15:40 - 16:30	MECH 100 [I-104]		ASE 492 [I-104]	MFAK SÖNMEZ	ASE 492 [I-104]		
16:40 - 17:30	MECH 100 [I-104]		ASE 492 [I-104]	MFAK SÖNMEZ	ASE 492 [I-104]		
17:40 - 18:30	MECH 113 [I-104]		MECH 533 [I-104]	MECH 114 [I-104]	MECH 113 [I-104]		
18:40 - 19:30	MECH 113 [I-104]		MECH 533 [I-104]	MECH 114 [I-104]	MECH 113 [I-104]		
19:40 - 20:30			MECH 533 [I-104]				

Reference books, Other Supplementary Materials

TEXT BOOK TITLE		AUTHOR	YEAR	ISBN
Lecture Notes in METU CLASS				
REFERENCE MATERIAL TITLE		AUTHOR	YEAR	ISBN
1	Technical Drawing with Engineering Graphics, 15 th Ed.	F. Giesecke, and at.al.	2017	13:9780137400140
2	Tools for Design Using AutoCAD 2018 and Autodesk Inventor 2018	Randy Shih	2018	978-1-63057-127-6
3	Computer Aided Design: Software and Analytical Tools	C.S. Krishnamoorthy, at.al.	2005	978-1842651261

Course Learning Outcomes

a. *specific outcomes of instruction*

Having successfully completed the course, the student will have achieved the following:

- (1) Perform stress analysis using the tools of Inventor, NASTRAN, and FUSION
- (2) Distinguish for which parts/features special hatching rule is applied in creating sectional views, create removed, aligned sections, use tools of Autodesk Inventor to shoot some troubles in creating sectional views
- (3) Show geometric tolerances on engineering drawings (in CAD application, particularly using tools of Autodesk Inventor) and explain, interpret geometric tolerances shown on an engineering drawing
- (4) Describe surface texture, use tools of Autodesk Inventor, and explain the meaning of surface texture symbols
- (5) Draw/ create and read the detailed drawings (working drawings) of objects.
- (6) Create the solid model of assemblies mating the solid models of custom-built parts and of the standard objects, particularly in Autodesk Inventor environment, create and read Assembly Drawings, create animation files.
- (7) Create the solid model of structures using standard structural elements in Autodesk Inventor
- (8) Create solid models and engineering drawings of weldments, perform design calculations using the tools of Autodesk Inventor
- (9) Create the solid model, and perform design calculations of shafts using the shaft generation tool of Autodesk Inventor
- (10) Create the solid models, and perform design calculations of keys, splines, pins, retaining rings, rivets, springs, bearings; plain bearings, roller bearings (particularly in Autodesk Inventor environment) and create and read the orthographic views of them, explain the meaning of their specification notes.
- (11) Create the solid models, and perform design calculations of standard threaded objects; bolts, nuts, cap screws, and studs (particularly in Autodesk Inventor environment) and create and read the schematic views of them, explain the meaning of their specification notes.
- (12) Create the solid models, and perform design calculations of gears; spur gears, helical gears, bevel gears, racks, worm gears, sprockets (particularly in Autodesk Inventor environment), create and read the working drawings of them.

- (13) Create solid models of sheet-metal works, create developments (particularly in Autodesk Inventor environment)

Teaching Format

4 METU Hours Lecture & CAD Applications, 10 hours video watching per week.

Computer Usage

The course is a computer-aided course. Autodesk Inventor, and FUSION are used for creating solid models, their views, and performing design calculations.

Category Content

Mathematics and Basic Sciences	10%
Engineering Sciences	15%
Humanities and Social Sciences	5 %
Departmental	10%
Engineering Design	60%

Grade Points:

Midterm Exam	: 40 %
Pop Quizzes, Quizzes & Class-works	: 30 %
Final	: 30 %

Attendance Requirement: 80% attendance is mandatory. If the attendance of student is below 80% the student will not be allowed to take the midterm and the final exams.

Relationship to Performance Indicators

This course contributes to the fulfillment of the following performance indicators:

- c3. Convert conceptual design into a form ready to be produced
- c4. Construct a functional prototype based on design documentation
- g1. Communicate using visual tools such as engineering drawings, graphics, diagrams, charts, plots, schematics, sketches, free body diagrams
- i1. Independently identify, utilize and evaluate publicly available resources such as internet, journals, patents, standards, tutorials, seminars, conferences, certificate courses
- k1. Use tools for 3D CAD modeling and fabrication/manufacturing
- k2. Use tools to prepare technical reports, presentations, and graphics

Prepared by: Assoc. Prof. Dr. Murat Sönmez

Date: February 2024

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