## **Engineering Graphics & Solid Modeling**

Course Code: ME 182 Course Period: Spring Course Type: Core Credits: 3 Theoric: 2 Practice: 0 Laboratory Hour: 2 ECTS: 8 Course Language: English Courses given by: Fethi Okyar [1] Course Objectives:

This course serves three major goals of introducing the students with the concepts from solid modeling theory, the language of technical drawing and design practice.

Course Content:

Engineering design principles, graphics language. Geometric constructions, parallelism, perpendicularity, intersection and tangency. Sketching using a CAD system. Manufacturing processes and features in solid modeling. Multiview projection, sectional views, auxiliary views. Working with design drawings, dimensioning, tolerancing. Working with assemblies.

Course Methodology:

1: Lecture, 4: Project work; 5: Laboratory; 6: In-class practice

Course Evaluation Methods:

A: Midterm and final exams, C: Homework, D: Report, E: Presentation, G: In-class practice

Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods	
<ol> <li>visualize, project and sketch using the free-hand technique, three-dimensional objects, compose missing lines and views in multiview drawings.</li> </ol>	7	1,6	C,G	
2) develop solid modeling skills by constructing 2D sketches, use them to create three dimensional objects via solid modeling techniques, assemble these parts, and finally create their technical drawings.	4	4,5	A,D,G	
<ol> <li>recognize the fundamentals of geometric dimensioning and tolerancing concepts, relate part tolerances with manufacturing processes.</li> </ol>	9	1	A,D	
<ol> <li>develop design skills by decomposing a product via reverse engineering practice, search for its patents, and then by reconstructing it in the virtual domain.</li> </ol>	6,7	1,5	D,E	

COURSE CONTENT						
Week	Topics	Study Materials				
1	Engineering design concepts	textbook				
2	Phases of design and dimensional measurement	textbook				
3	Free-hand sketching and other preliminary concepts	textbook				
4	Practices in reverse engineering	textbook				
5	Parallel projections and pictorial sketching	textbook				

6	Multiview Drawings and Sketching in Multiview	textbook
7	Object Visualization based on Multiview Drawings	textbook
8	Multiview Drawings, missing lines and views.	textbook
9	Auxiliary views	textbook
10	Section views	textbook
11	Creating working drawings	textbook
12	Dimensioning of drawings	textbook
13	Overview of geometric dimensioning and tolerancing	textbook
14	Project presentations	

RECOMMENDED SOURCES							
TextbookJames Leake, Jacob Borgerson, Engineering Design Graphics: Sketching, Modeling and Visualization, Wiley 2008.							
Additional Resources	Brian Griffiths, Engineering Drawing for Manufacture, Kogan Page Science, 2003.						

MATERIAL SHARING					
<b>Documents</b> Lecture notes, weekly lab assignment					
Assignments Project documents, timeplan					
Exams	Final exam is not shown in the website				

ASSESSMENT							
IN-TERM STUDIES	NUMBER	PERCENTAGE					
Sketch book	10	50					
Lab performance	10	50					
Total		100					
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40					
CONTRIBUTION OF FINAL PROJECT REPORT AND PRESENTATION TO OVERALL GRADE		20					
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		40					

Total

100

COURSE'S CONTRIBUTION TO PROGRAM								
No	Program Learning Outcomes		Contribution					
		NA	1	2	3	4	5	
1	Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.	x						
2	Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.	x						
3	Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.	x						
4	Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.					X		
5	Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions.	x						
6	Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually.				X			
7	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions.				X			
8	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself.	X						
9	Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice.			X				

10	Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development.	X			
11	Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions.	X			
12	Ability to work professionally in both thermal and mechanical systems areas, including design and realization.	x			
13	Ability to verify and validate numerical solutions to engineering problems.	x			

## ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION

Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 16x Total course hours)	16	4	64
Hours for off-the-classroom study (Pre-study, practice)	16	5	80
Project	1	40	40
Final examination	1	12	12
Total Work Load			196
Total Work Load / 25 (h)			7.84
ECTS Credit of the Course			8