Design of Mechanical Systems

Course Code: ME 482 Course Period: Spring Course Type: Core Credits: 3 Theoric: 2 Practice: 2 Laboratory Hour: 0 ECTS: 5 Course Language: English Courses given by: Namik Çıblak [1] Course Objectives:

This class aims at simulating modern engineering design paradigms, techniques, and environment that are observed in real life engineering design processes.

Course Content:

Design philosophy and methodologies. Professional ethics in engineering. Use of computers and CAD in design engineering. Project engineering, planning and management. Design optimization. Cost evaluation and economic decisions. Quality aspects. Failure and reliability. Decision making and evaluation. Engineering economics. Human and ecological factors in design. Term project: Forming student project teams simulating the real engineering design teams, preparation and presentation of a project report, and prototype construction in some projects.

Prerequisite(s): Senior standing

Course Methodology:

1: Lecture, 4: Project, 7: Teamwork, 9: Seminar

Course Evaluation Methods:

A: Exam, D: Report, E: Presentation, G: In-class practice

Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods		
1) Identifying a market need to develop the customer requirements; translate these into engineering characteristics, yielding a product design specification document.	10	1, 4, 7	A, D, G		
2) Generate, evaluate and select alternative concepts for a design problem; breakdown the selected concept into modules; embody components by engineering analyses.	4, 5, 14	1, 4, 7	A, D, G		
 Operate in a team with an awareness of professional and ethical responsibility; communicate the progress and results verbally and in written form. 	11, 7, 9	4, 9	D, E		
4) Knowledge about contemporary issues and he global and societal effects of engineering practices on health, environment and safety; awareness of entrepreneurship, innovation, sustainable development, project management, risk management and change management.	12, 13	1, 4, 9	A, D		

COURSE CONTENT						
Week	Topics	Study Materials				
1	The Nature of Design	ТЕХТВООК				
2	The Design Process	ТЕХТВООК				

3	Product Development	TEXTBOOK
4	Clarifying the Need	TEXTBOOK
5	Phase 0 – Team Behavior and Research	ТЕХТВООК
6	Concept Generation	ТЕХТВООК
7	Selection	ТЕХТВООК
8	Embodiment Design	ТЕХТВООК
9	Seminar: Awareness for Engineers	LECTURE NOTES
10	Embodiment Design and Detail Design	ТЕХТВООК
11	Material Selection	ТЕХТВООК
12	Design for Manufacturing	ТЕХТВООК
13	Cost Evaluation	ТЕХТВООК
14	Legal & Ethical Issues	ТЕХТВООК

RECOMMENDED SOURCES							
Textbook	Dieter, G.E., <i>Engineering Design</i> , 4th ed., McGraw-Hill. ISBN: 0-07-116204-6						
Additional Resources	Cross, N., <i>Engineering Design Methods</i> 2nd ed., John Wiley & Sons. ISBN: 0 471 94228 6						

ASSESSMENT							
IN-TERM STUDIES	NUMBER	PERCENTAGE					
Mid-term	1	20					
Interim evaluation	14	30					
Progress report	1	10					
Design review	1	5					
Total		65					
CONTRIBUTION OF FINAL PRESENTATION & REPORT TO OVERALL GRADE		35					

CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE	65
Total	100

COURSE'S CONTRIBUTION TO PROGRAM								
No	Program Learning Outcomes Co			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: 14x Total course hours)	14	4	56
Hours for off-the-classroom study (Pre-study, practice)	14	4	56
Mid-term	1	5	5
Final presentation	1	10	10
Total Work Load			127
Total Work Load / 25 (h)			5.08
ECTS Credit of the Course			5