Thermodynamics I

Course Code:

ME 211

Course Period:

Autumn

Course Type:

Core

Credits:

3

Theoric:

2

Practice:

1

Laboratory Hour:

1

ECTS:

6

Prerequisite Courses:

Calculus II [1]
Physics I [2]
Course Language:

English

Courses given by:

Ali Bahadır Olcay [3]
Course Objectives:

The goal of this course is to introduce the fundamental concepts of thermodynamics, and the first and second laws of thermodynamics.

Course Content:

Fundamental concepts of thermodynamics, properties of pure substances, the first law of thermodynamics, open and closed systems, the second law of thermodynamics, entropy, experiments in labs.

Course Methodology:

1: Lecture, 2: Solving problems, 3: Homework, 5: Lab, 7: Working in group

Course Evaluation Methods:

A: Exam, C: Homework, D: Report

Learning Outcomes	**Program Outcomes**	**Teaching Methods**	**Assessment Methods**
1) Understanding fundamental concepts of thermodynamics	1,2	1,2,3,5	A,C,D
2) Understanding the first law of thermodynamics	1,2,	1,2,3,5	A,C,D
3) Understanding the second law of thermodynamics	1,2	1,2,3,5	A,C,D
4) Ability to conduct thermodynamic experiments	1,2,6,7	5,7	D

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	Introduction and basic concepts	Ch. 1
2	Properties of pure substances	Ch. 3
3	Energy and energy transfer	Ch. 2
4	Energy analysis of closed systems	Ch. 4
5	Midterm exam I	
6	Energy analysis of closed systems	Ch. 4
7	Mass and energy analysis of open systems	Ch. 5
8	Mass and energy analysis of open systems	Ch. 5
9	Mass and energy analysis of open systems	Ch. 5
10	Midterm exam II	

11	The second law of thermodynamics	Ch. 6
12	The second law of thermodynamics	Ch. 6
13	Entropy	Ch. 7
14	Entropy	Ch. 7

RECOMMENDED SOURCES	
Textbook	Principles of Engineering Thermodynamics, Michael J. Moran, Howard N. Shapiro, Daisie D. Boettner and Margaret B. Bailey, 8th edition, 2015, Wiley.
Additional Resources	Thermodynamics – An Engineering Approach, Yunus Cengel and Michael Boles, 8th edition, 2014, McGraw Hill. Fundamentals of Thermodynamics, Claus Borgnakke, Richard E. Sonntag, 8th edition, 2012, Wiley.

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Midterm exams	2	40
Lab reports	3	15
HW Assignments	5	10
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		35
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		65
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: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	2	28
Laboratory	3	1	3
Lab report	3	7	21
Mid-term	2	10	20
Homework	6	4	24
Final examination	1	10	10
Total Work Load			148
Total Work Load / 25 (h)			5.92
ECTS Credit of the Course			6