Alanya Alaaddin Keykubat University | Rafet Kayış Faculty of Engineering
Mechanical Engineering Department
2021-2022 Fall Semester
SYLLABUS

Code/Name	MEC 205 / Thermodynamics I
Type	Required
Credit/ECTS	5/5
Hour per Week	3 (3+0+0)
Level/Year	Undergraduate/2
Semester	Fall
Classroom	A 203 and A 403
Content	Basic concepts of thermodynamics. Properties of pure substances, ideal gases and compressibility factor. Energy, energy transfer and the first law of thermodynamics. Energy analysis for closed systems and control volumes. The second law of thermodynamics. Heat engines and refrigerators. Carnot cycle. Entropy, entropy generation, and entropy balance. Isentropic efficiencies of steady-flow devices. Exergy analysis.
Prerequisites	
Textbooks	***Primary*** Y A Cengel, M A Boles, M Kanoglu, *Thermodynamics: An Engineering Approach*, 9th edition, McGraw-Hill, 2019. ***Supplementary*** M J Moran, H N Shapiro, D D Borttner, M B Bailey, *Fundamentals of Engineering Thermodynamics*, 9th edition, Wiley, 2020.
Objectives	• To analyze energy systems using the first law of thermodynamics • To analyze energy systems using the second law of thermodynamics • To assess performance of energy conversion devices
Course Outcomes	In this course you will be able to: CO1 Identify different forms of energy and energy conversion processes CO2 Use energy balance on closed systems to formulate and solve different thermodynamic problems CO3 Use mass and energy balance to solve steady-flow and unsteady flow problems CO4 Describe operation and principles of heat engines, steam cycle, refrigerators, and heat pumps CO5 Perform entropy and exergy balance on closed systems and control volumes C06 Calculate isentropic efficiencies of turbines, compressors, nozzles, and pumps

Weekly Schedule of Topics

W	Topic
1	Basic concepts of thermodynamics, temperature
2	Energy and the first law of thermodynamics
3	Properties of pure substances, ideal gases, compressibility factor
4	Closed system energy analysis for real substances
5	Closed system energy analysis for ideal gases and incompressible substances
6	Mass balance, energy analysis for steady-flow devices
7	Energy analysis for steady-flow devices and unsteady systems
8	The second law of thermodynamics, irreversibility
9	Heat engines, refrigerators, Carnot cycle
10	Entropy, entropy transfer, entropy generation

11	Isentropic efficiencies
12	Entropy balance
13	Exergy, exergy destruction, second-law efficiency
14	Exergy balance

Professional Contribution	Ability to understand, analyze, and improve energy systems

Contribution to Program Outcomes*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	0	0	0	0	0	0	0	0	5	0	0
CO2	5	0	0	5	0	0	0	0	3	3	0
CO3	5	0	0	5	0	0	0	0	3	3	0
CO4	4	0	0	5	0	0	0	0	3	0	0
CO5	5	0	0	5	0	0	0	0	3	3	0
CO6	5	0	0	5	0	0	0	0	3	3	0

* Contribution Level | 0: None | 1: Very Low | 2: Low | 3: Medium | 4: High | 5: Very High

Special Conditions	• Students work in groups for project and presentations. • The consequence of violation of the attendance rule is to receive a grade of NA.
Requirements	
Evaluation	Midterm Exam 30% Quizzes 10% Assignment 20% Final Exam 40% Total 100%
Rubric	
Course Policy	1. You must attend at least 70% of the sessions including add-drop period. 2. Be in the class on time. 3. English should always be used to communicate with one another. 4. Mobile phone should be switched off and put away during the class. 5. No talking to classmates during class no matter what the subject is.
Cheating & Plagiarism	• Copying or letting someone to copy your work on exams, assignments, or reports is cheating. • Cutting and pasting text, figures and tables from the web sources or any other electronic source is plagiarism. • The consequence of academic dishonesty is to receive a grade of F for the course.

Instructor

Name/Surname	Mehmet Kanoglu	Email	mehmet.kanoglu@alanya.edu.tr
Room	121	Office Hours	Monday: 12:00 – 13:00 Tuesday: 12:00 – 13:00

Prepared by Mehmet Kanoğlu on Sep. 7, 2021