IŞIK UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING
COURSE SYLLABUS

ME 265
FUNDAMENTALS OF THERMAL SCIENCES

Core

Level of Course: **Second year/Third year** Year of Study: **2015-2016 Spring Semester**
Language of Instruction: **English**

Instructor: **Prof. Dr. Erkan AYDER**
Department of Mechanical Engineering, İstanbul Technical University

Instructor's office no/phone no/e-mail address:
Office: **Room # 462;** Phone: **(0212)29131300/2698;** e-mail: **aydere@itu.edu.tr**

Class hours: FFFF 1234

Prerequisite: **MATH 102**

Course Description: Fundamentals and concepts of thermodynamics. Applications of first and second laws of thermodynamics to closed systems and flow processes. Thermodynamics property tables and charts. Power cycles. Fundamentals of heat transfer. Conduction, convection and radiation. Applications of knowledge of thermodynamics and heat transfer to design and analysis of automotive and mechatronics systems.

Course Objectives: To introduce the fundamentals of thermodynamics and heat transfer to the students.

Course Learning Outcomes:

Students, who pass the course satisfactorily:

1. Learn fundamental concepts such as closed, open and isolated thermodynamic systems, thermodynamic equilibrium and extensive and intensive properties of a system.
2. Become knowledgeable about properties of pure substances, phase diagrams and phase transitions.
3. Become knowledgeable about heat and work interactions.
4. Become knowledgeable about the first and second law of thermodynamics and their applications to closed and open systems.
5. Get to know energy conversion engines and devices such as compressor, turbine, boiler, heat exchanger, nozzle, diffuser etc. and their energy balance.
6. Learn thermodynamic cycles and thermodynamics analyses.
7. Become knowledgeable about fundamentals of heat transfer.
8. Become knowledgeable on heat transfer by conduction, convection and radiation.

Textbook:

Thermodynamics:An Interactive Approach, Global Edition, Subrata Bhattacharjee, Pearson, November 2015

Recommended Readings:

1. **Thermodynamics – An Engineering Approach,** 8/e, Y. Çengel, Michael A. Boles, McGrawHill, 2015
2. **Introduction to Thermal Systems Engineering: Thermodynamics, Fluid mechanics, and Heat transfer**, Michael J. Moran, Howard N . Shapiro, Bruce N. Munson, David P. DeWitt Second Edition, John Wiley & Sons Inc., 1st Edition, 2003.
3. **Çözümlü Problemlerle Termodinamik,** A. Öztürk ve A. Kılıç, 3.Baskı, Çağlayan Kitabevi, İstanbul, 1993.
4. **Engineering Thermodynamics,** M.C. Potter, C. Somerton, McGraw-Hill, 1996.
5. **Fundamentals of Classical Thermodynamics,** G.J. Van Wylen, R.E. Sonntag, 3rd revised edition, Wiley, 1985.

(List of lessons, labs, exams, including number of sessions each week and duration o each session)

Week	Topics
1	Basic definitions for thermodynamical systems
2	Properties of pure substances, ideal gas law
3	Properties of pure substances, ideal gas law
4	Work and heat interactions
5	The First Law for closed systems **(Midterm 1)**
6	The First Law for closed systems
7	The First Law for flow processes
8	The First Law for flow processes
9	The Second Law and Entropy
10	Power and refrigeration cycles
11	Power and refrigeration cycles **(Midterm 2)**
12	Heat transfer by conduction
13	Heat transfer by convection and radiation **(Makeup)**
14	Heat transfer applications in automotive and mechatronics engineering

Design content: None.

Computer usage: Required in solving at least one of the homework assignments.

Class Policies: Requirements of the course, grading: number, type, weight of midterm exams, quizzes, problem sets etc. Attendance requirements.

	Number	Ratio (%)
Midterm Exams	2	35 (15 % + 20%)
Quizzes	8 (minimum)	20 (each contributing 2,5%)
Homework	5 (minimum)	15
Final Exam	1	30
		100