ME 231 THERMODYNAMICS FOR MECHNICAL ENGINEER

Credit: 3(3-0-6) **Semester 2 Year 2010**
Prerequisite: ME 230 Thermodynamics I

Instructor: Chainarong Chaktranond (ไชยณรงค์ จักรธรานนท์) Section: 0750001
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Lecture time: Tue (9.30 – 12.30)
Consulting hours: Tue (13.30 – 16.00) or make an appointment via email

Objectives: Students are expected to

1. To understand the closed system and open system/ control volume concepts and be able to describe engineering problems in terms of these concepts.
2. To understand the 1st and 2nd laws of thermodynamics, and learn how to apply these laws to both open and closed systems.
3. To understand how the relations between the energy storage and phase change in various kinds of power cycles and refrigeration cycles.
4. To understand how to analysis of performance of engineering components, systems, and combustion processes.

Course Description:

Applications of Thermodynamics. Review of thermodynamics principles. Thermal efficiency. 2nd law efficiency. Analysis of entropy production. Irreversibility and availability. Analysis of Power cycles. Analysis of Vapor and combined cycles. Basic of Refrigeration cycles.

Teaching Schedule:

Week	Topics
1	**1. Reviews of Thermodynamics I** Overviews and importance of Thermodynamics in real applications; Open-close systems; Control volume; adiabatic process; Isothermal process; Steam table; Conservation of mass; Conservation of energy
2 – 3	**2. Second law of Thermodynamics** Introduction to the second law; Refrigerators and heat pumps; Reversible and Irreversible processes; Carnot cycle; Carnot refrigerator and heat pumps
4 – 5	**3. Entropy** Entropy; increase of entropy principle; Isentropic processes; Entropy generation; T – ds Relations; Entropy change of liquids, solids, and ideal gases; Reversible Steady – flow work; Minimizing the compressor work; Isentropic efficiencies of steady – flow; Entropy balance
6 – 7	**4. Exergy: A measure of work potential** Work potential of energy; Reversible work and irreversibility; Second – law efficiency; Exergy change of a system; Exergy transfer by heat, work, and mass; Decrease of exergy principle; Exergy balance
8 – 9	**Mid-term examination (26 Dec 10 – 9 Jan 11)**
***10 – 12**	**5. Gas power cycles** Basic considerations in the analysis of power cycle; Carnot cycle; Air standard cycle; Reciprocating engines; Otto cycle; Diesel cycle; Stirling cycle; Brayton cycle; Second –

	law analysis of gas power cycles
	2nd Examination (To be announced)
13 – 15	**6. Vapor and combined power cycles** Carnot vapor cycle; Rankine cycle; Deviation of actual vapor power cycles; Cogeneration; Combined gas – vapor power cycles
16	**7. Refrigeration cycles** Refrigerators and heat pumps; Reversed Carnot cycle; Ideal vapor – compression refrigeration cycle; Actual vapor compression refrigeration cycle
	Final examination (28 Feb – 14 Mar 2011)

Material courses:

- Handout or lecture note by instructor (http://www.chainarong.me.engr.tu.ac.th/teaching.html)

Reference Books:

- Cengel, Y.A., and Boles, M.A., 2003. Thermodynamics: An engineering approach, 5th ed., McGraw-Hill

Tentative evaluation:

Attendance, Quiz and Assignment	20%
Mid-term Examination (topic 1 – 4)	20%
2nd Examination (topic 5)	30%
Final Examination (topic 6 – 7)	30%
Total	100%

Evaluation

≥ 80	**A**
74 - 79	**B+**
68 – 73	**B**
62 – 67	**C+**
56 – 61	**C**
50 – 55	**D+**
44 – 49	**D**
< 44	**F**