COURSE OUTLINE

Thermofluids Department, Faculty of Mechanical Engineering	Page : 1 of 4
Subject & Code : **SMU2113 – Engineering Science (Thermodynamics)**	Semester : II Academic Session : 2011/2012

Lecturer : Assoc. Prof. Ir. Hayati Abdullah
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Synopsis :

Heat transfer is a basic science that deals with energy. This course introduces students to the basic principles of thermodynamics. It will discuss basic concepts and introduces the various forms of energy and energy transfer as well as properties of pure substances. A general relation for the conservation of energy principle will be developed and applied to closed systems and extended to open systems. The second law of thermodynamics will be introduced and applied to cycles and cyclic devices.

Course Learning Objectives (CLO) :

At the end of the course, students should be able to:

1. Explain the basic concepts of thermodynamics, energy and forms of energy transfer.
2. Solve problems for closed systems and common steady-flow devices using the principles of mass conservation and the first law of thermodynamics
3. Determine the performance of reversible and actual heat engines and refrigerators based on the first law of thermodynamics and the Carnot principles.

Prepared by	**Certified by**
Signature :	Signature :
Name : Assoc. Prof. Ir. Hayati Abdullah	Name :
Date : 12 April 2007	Date :

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Generic Skills Addressed :

1. Problem solving

Topics :

1. Definitions & Basic Concepts
2. Properties of Pure Substance
3. Energy, Heat and Work
4. First Law of Thermodynamics
5. Second Law of Thermodynamics

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Weekly schedule :

Weeks 1	**1. Definitions & Basic Concepts**. – Units, pressure, temperature. Systems, Surroundings, Boundary, Properties, State, Process, Cycle. Equilibrium, State Postulate.
Week 2	**2. Properties of Pure Substance –** Phase change process of pure substances. Pressure-volume-temperature relationship, property tables, ideal gas equation of state. Property diagrams.
Weeks 3 & 4	**3. Energy. Heat & Work –** Kinetic, potential and internal energy. Heat Transfer. Boundary work, Polytropic processes. Forms of energy, enthalpy, specific heats, internal energy, enthalpy and specific heats of ideal gases.
Week 5	**4. First Law of Thermodynamics** – Closed system. Conservation of energy for closed systems.
Week 6	**First Law of Thermodynamics** – Open system. Conservation of mass and energy for open systems. Applications of the steady state equations to common flow devices such as turbine and compressor.
Week 7	**5. Second Law of Thermodynamics –** Thermal reservoir, heat engines and refrigerators, Kelvin-Planck statement, Clausius statement, Carnot principles, Performance of irreversible and reversible heat engines and refrigerators.

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Teaching Methodology :

Lectures and Active Learning

Assessment :

1. Quiz & Assignments	10%
2. 2 Tests	40%
3. (Solid Mechanics Module)	50%
Total	**100%**

Textbook:

Y.A. Cengel and M.A. Boles, *Thermodynamics: An Engineering Approach*, Fifth Edition in SI units, McGraw-Hill, Singapore, 2006.

Reference :

1. M.J. Moran and H.N. Shapiro, Fundamentals of Engineering Thermodynamics, Fifth Edition. John Wiley & Sons Inc., US, 2004.
2. R.E. Sontag, C. Borgnakke and G.J. Van Wylen, Fundamentals of Thermodynamics, Sixth Edition, John Wiley & Sons Inc., US, 2003.

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