COURSE OUTLINE

Department of Thermo-Fluids, Faculty of Mechanical Engineering, Universiti Teknologi Malaysia	
Course : Applied Thermodynamics and Heat Transfer **Code : SKMM 2433** **Section : 01**	**Academic Session : 2015/2016** **Semester : I**

Lecturer : MOHSIN MOHD SIES
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Synopsis :

This course aims to develop a fundamental understanding of the processes by which heat and energy are inter-related and converted and by which heat is transferred. The course will review major principles of energy conversion and the modes of heat transfer. The basic laws of thermodynamics and the governing equations for heat transfer and thermodynamics will be introduced and subsequently used to solve practical engineering problems involving thermodynamics and heat transfer. The course will also cover fundamental principles of power generation systems.

Course Learning Outcomes :

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

No.	Course Learning Outcomes	Programme Outcome(s) Assessed	Bloom Taxonomy	Assessment Methods
1.	**Describe** the working principles of thermodynamics systems (steam & gas power plants; refigerators and heat pumps) and **explain** the concept of various heat transfer modes.	PO1	C2, P3, A2	T, E
2.	**Analyze** the performance of thermodynamics systems (steam & gas power plants; refigerators and heat pumps).	PO2	C4, P3, A2	HW, T, E
3.	**Analyze** the magnitude of heat transfer rates for various heat transfer modes.	PO2	C4, P3, A3	HW, T, E
4.	**Propose** ways for further improvement of thermal performance of thermodynamics systems and/or heat transfer rates.	PO4	C5, P4, A2	PR

Note: (T – Test ; PR – Project; HW – Homework ; E – Exam)

Teaching Methodology :

Lectures and tutorials

Assessment :

1. Quizzes/Assignments	10%
2. Project	10%
2. Test 1	20%
3. Test 2	20%
3. Examination	40%
Total	100%

Textbooks:

1. Fundamentals of Thermal-Fluid Sciences, Yunus A. Çengel, Robert H. Turner, John M. Cimbala, 3rd Edition, McGraw-Hill Inc., 2008.
2. T.D. Eastop and A. McConkey, Applied Thermodynamics for Engineering Technologist, 5th Ed., Pearson Education Limited, England,1995.

References :

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

Class Schedule: Section 01

Monday : 2:00 – 2:50 pm (C24-108)
Tuesday : 10:00 – 11:50 am (BK3-E07)

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation

1. Students must attend not less than 80% of lectures.
2. The students are prohibited from sitting in the tests and final examination upon their failure to comply with the above requirement.

Weekly schedule :

Week 1	**TOPIC 1 : STEAM CYCLES** Introduction, The Rankine Cycle; Rankine Cycle with Superheat;
Week 2	The Enthalpy-Entropy Chart; The Reheat Cycle;
Week 3	The Regenerative Cycle.
Week 4	**TOPIC 2 : GAS TURBINE CYCLES** Introduction**,** The Practical Gas Turbine Cycle, Use of a power turbine
Week 5	Intercooling and Reheat cycles, The use of a Heat Exchanger
Week 6	**TOPIC 3 : REFRIGERATION AND HEAT PUMPS** Reversed Heat Engine Cycles; Vapour-Compression Cycles; Refrigerating Load;
Week 7	**Mid Semester Break**
Week 8	The Pressure-Enthalpy Diagram; The Use of the Flash Chamber**.** **TEST 1 (Topic 1 & 2) :**
Week 9	**TOPIC 4 : INTRODUCTION TO HEAT TRANSFER** Introduction to Heat Transfer; Basic Mechanism of heat transfer : Conduction, Convection and Radiation; Importance and Applications of Heat Transfer.
Week 10	**TOPIC 5 : CONDUCTION** Steady heat conduction in plane walls, Thermal contact resistance
Week 11	Generalized thermal resistance networks, Heat conduction in cylinders.
Week 12	**TOPIC 6 : FORCED CONVECTION** Physical mechanism of convection, Thermal boundary layer, Parallel flow over flat plates, Flow across cylinders
Week 13	General considerations for pipe flow, General thermal analysis, Laminar flow in tubes, Turbulent flow in tubes. **TEST 11 (Topic 4, 5, & 6) :**
Week 14	**TOPIC 7 : NATURAL CONVECTION** Physical mechanism of natural convection, Equation of motion and the Grashof Number,
Week 15	Natural convection over surfaces, Natural convection inside enclosures.
	Revision Week
	Final Examination