KOMAR UNIVERSITY OF SCIENCE AND TECHNOLOGY
(KUST)

Engineering Thermodynamics Course Syllabus			
Course Title	Engineering Thermodynamics		
Course Code	MEE 2301	**No. of Credits**	3
Department	All departments	**College**	Engineering
Pre-requisites Course Code	Physics I and lab	**Co-requisites Course Code**	
Course Coordinator(s)	Assist. Prof. Dr. Hussein A. Mohammed		
Email	Hussein.mohammed@komar.edu.iq	**IP No.**	129
Other Course Teacher(s)/Tutor(s)	None		
Class Hours	Every Monday (11:00-12:20 pm) - Room 208/Section 1 Every Wednesday (1:00-2:20 pm) - Room 211/Section 2		
Office Hours	Monday/Tuesday/Wednesday (3:30pm-5:00 pm) or by making an appointment via email Office location is in the third floor-Room 310		
Course Type	College Requirement		
Offer in Academic Year	Fall 2014		

COURSE DESCRIPTION

This course provides the basic fundamental of thermodynamics for engineering application & problem solving. The topics covered include the first and second laws of thermodynamics, closed system and control volume analysis, entropy, reversible and irreversible processes, properties of pure substances. Application to engineering problems includes refrigeration/heat pump cycles.

COURSE OBJECTIVES

Students will:

1. Learn to analyze energy transfer and transformation in systems using fundamental concepts of properties of materials, work, heat, internal energy, entropy, equilibrium, and relations derived from the First and Second Laws of Thermodynamics.
2. Learn the methods to measure thermodynamic properties and estimate values for properties using property tables and relations.
3. Learn to carry out thermodynamic analysis of engineering devices and systems such as piston-cylinders, compressors, turbines, pumps, heat exchangers, heat engine cycles, and refrigeration cycles using energy, and entropy relations.
4. Learn applications of thermodynamic concepts in Civil, Environmental & Petroleum Engineering such as sustainable energy technologies, energy conservation, and maintaining the global environment.

COURSE LEARNING OUTCOMES

After participating in the course, the students should be able to:

1. Identify thermodynamic properties of pure substances from Thermodynamics Property Tables [ABET Program Outcome A].
2. Calculate thermodynamic properties of ideal gases using the ideal gas equation of state and compressibility charts [ABET Program Outcome E].
3. Develop mass, energy and entropy balance equation for closed and open systems [ABET Program Outcome E].
4. Solve thermodynamics problems of closed and open systems arrangement from the standpoint of the first and second law [ABET Program Outcome E].
5. Recognize reversible, irreversible and impossible heat engines, refrigerators and heat pumps based on the Carnot principles [ABET Program Outcome A].
6. Chart the T-s diagram of Rankine cycles and of refrigeration cycles and solve for the thermal efficiency [ABET Program Outcome E].
7. Explain current sustainability issues and its relationship to thermodynamics and energy [ABET Program Outcome G&H].
8. Design simple thermodynamic systems [ABET Program Outcome B & C].

GUIDELINES ON GRADING POLICY

A	95-100%	**C**	70-74%
A-	94-90%	**C-**	65-69%
B+	87-89%	**D+**	60-64%
B	83-86%	**D**	55-59%
B-	80-82%	**D-**	50-54%
C+	75-79%	**F**	0-49%
W	Withdrawal	**I**	Incomplete

Note: Passing Grade is 65% and above

COURSE CONTENT

Course topics include:

- Introduction and Basic Concepts
- Energy, Energy Transfer, and General Energy Analysis
- Properties of Pure Substances
- Energy Analysis of Closed Systems
- Mass and Energy Analysis of Control Volumes
- The Second Law of Thermodynamics
- Entropy
- Vapor Power Systems
- Refrigeration and Heat Pump Systems
- Gas Mixtures and Psychrometrics
- Relative Humidity and Comfort

COURSE TEACHING AND LEARNING ACTIVITIES

This course will be carried out in 3 hours, 2 times lecture per week. The semester has 15-instructional weeks followed by one week of exam. Course instructor will:

- Utilize power point presentation to present the course information.
- The board space to solve problems with students.
- There will be in class group work, where student will do in class exercises and turn the assignment to the instructor.

COURSE ASSESSMENT TOOLS

Assessment Tool	Description	Weight
H.W (5)	The H.W will be conducted during the semester; each H.W will be given as scheduled and will be posted on Moodle.	**10%**
Quizzes (6)	Quizzes are scheduled as shown in the semester schedule. Students will take 6 quizzes; the highest 5 quiz grades will be counted towards the final grade.	**10%**
Mid-term Exam	The mid-term exam will be conducted after week 7 of the semester. It will cover the first half of the course contents.	**20%**
Test (1)	This Test will be conducted after week 11 of the semester. It will cover part of the second half of the course contents.	**20%**
Design-Sustainability Project	The design and sustainability project will require the students to work in groups based on their department. The details of the project will be announced during the semester. The students have to present their projects and how they tackle the sustainability issues.	**10%**
Final Exam	The final exam will be designed to cover all the students' learning outcomes for this course, the exam will be closed book except the property tables that will be provided by the instructor.	**30%**

Textbooks:

Thermodynamics, An Engineering Approach, Yunus A. Cengel and Michael A. Boles, McGraw-Hill, 7th Edition, 2007.

References:

1. Fundamentals of Engineering Thermodynamics, Michael J. Moran & Howard N. Shapiro, John Wiley, 6th Edition, 2007

2. Fundamentals of Classical Thermodynamics, Van Wylen, Gordon J., 4th Edition, New York: John Wiley, 1994.

3. Applied Thermodynamics for Engineering Technologists: S.I. units / Eastop, T. D. and McConkey A., 5th Edition, New York, Prentice Hall, 1993.

COURSE POLICY *(including plagiarism, academic honesty, attendance etc)*

KUST Academic Policy
http://sar.komar.edu.iq/files/Student%20hand%20Book%202013.pdf

Attendance Policy:
Students are expected to attend each class for the entire semester. Students are responsible for material present in lectures. Only students with official KUST absence, family crises, and illness are excused from class. Three occasions of lateness count as one absence. The student who misses 10 percent of the classes will be placed on probation.

Make up Policy:
Since all examination are announced in advance, zero grade will be given to any missed examination unless a student's has an acceptable reason, such as illness, for not being able to take the examination during all those days when the examination was announced.

Academic Dishonesty:
Any type of dishonesty (Plagiarism, Copying another's test or home-work, etc) will Not be tolerated. Students found guilty of any type of academic dishonesty are subject to failure in this course, plus further punishment by the University Council.

GUIDELINES FOR SUCCESS

1. Be able to work both independently and in groups.
2. Pay a full attention in the class when the instructor explains the lesson.
3. Understanding more than memorizing will help a lot in passing exams.
4. Working on many problems will help mastering in this course.
5. Try not to miss any lecture and get the missed materials from your friends.

Course calendar: Please check the academic calendar for 2014/2015

Course Schedule

Week	Beg./End Dates	Topics (Chapters)	Course Discussion
1	14/09/ - 18/09/ 2014	**Introduction and Basic Concepts**	NA
2	21/09/ -25/09/ 2014	**Energy, Energy Transfer, and General Energy Analysis**	Quiz #1

3	28/09/ -02/10/ 2014	**Properties of Pure Substances**	Assignment #2
	05/10/-09/10/ 2014	**EID AL ADHA HOLIDAY**	
4	12/10/ -16/10/ 2014	**Properties of Pure Substances (cont'd)**	Quiz #2
5	19/10/- 23/10/ 2014	**Energy Analysis of Closed Systems**	Assignment #3
6	26/10/-30/10/ 2014	**Mass and Energy Analysis of Control Volumes**	Quiz #3
7	02/11/-06/11/ 2014	**Mass and Energy Analysis of Control Volumes (cont'd.)**	Assignment #4
	09/11/-13/11/ 2014	**MID TERM EXAMINATION**	
8	16/11/ - 20/11/ 2014	**The Second Law of Thermodynamics**	Quiz #4
9	23/11/-27/11/ 2014	**Entropy**	Assignment #5
10	30/11/- 04/12/ 2014	**Entropy (Cont'd)**	Quiz #5
11	07/12/- 11/12/ 2014	**Vapor Power Cycle**	Quiz #6
12	14/12/- 18/12/ 2014	**Refrigeration and Heat Pump Systems**	NA
	14/12/- 18/12/2014	**TEST**	

13	21/12/- 25/12/ 2014	**Gas Mixtures and Psychrometrics**	NA
	28/12/- 01/01/2014	**NEW YEAR HOLIDAY**	
14	04/01/- 08/01/ 2015	**Relative Humidity and Comfort**	NA
15	**11/01/-15/01/ 2015**	**REVIEW WEEK**	
16	**17/01/-22/01/ 2015**	**FINAL EXAMINATION**	