Ministry Of Higher Education and Scientific Research
AL-Mustansiriyah University/College of Engineering/Mechanical Eng. Department

Course Plan

Course No.: 50603502 **Course Name:** Advanced thermodynamics

Academic Year: 2018-2019 **Time Division:** 3hr. Theoretical.

Prerequisites:
50603502 – Advanced thermodynamics

Course Description

Advanced thermodynamics**.**

Course Intended Outcomes:

At the end of the course, students are expected to learn:

- Understand the basics of thermodynamics
- Understand the thermodynamics Laws
- Understand the relations
- Understand the thermodynamics application

Course Outline:

Week	Topics Covered	Notes
1	**Review of basic Concepts of Thermodynamics** a. Microscopic Approaches & Macroscopic b. thermodynamics System c. Processes and state d. Equilibrium	
2&3	**Review of basic Thermodynamics Laws** a. Zeroth law of thermodynamics b. First Law of thermodynamics c. Second Law of thermodynamics d. Third law of thermodynamics (Nernst Law)	
4	**Entropy** a. Entropy is a state function b. Entropy changes and reversibility c. Entropy calculations	
5&6	**Thermodynamics Relations** a. Entropy equations (T.ds Equations) b. Equations for Internal energy and Enthalpy c. Coefficients of expansion and compression and compressibility charts d. Specific Heat Capacities	

	e. Joule-Thomson Coefficient	
7&8	**Gases and vapour Mixtures** a. Mixing laws (Gibbs - Dalton laws) b. Volumetric analysis of gas mixture c. Mixture relationships ,specific heats enthalpy ,entropy of mixtures d. Gas and vapor mixture e. Real gases mixture (Kay's rule)	
9	**Reacting gases mixture**	
10& 11	**Ideal and Real Gases** a. Equation of state for perfect gas b- Real gases c. Van der Wall's (VW) equation of state d. Limitation of VW equation e. Virial Equation of state f. RedlichKwong (RK) equation of state g. Beattie Bridgeman equation of state h. Law of corresponding	
12 & 13	**Exergy Analysis** a. Introducing Exergy b. Evaluating Exergy and Exergy aspects c. Closed system Exergy balance. d. Flow Exergy e. Exergy rate balance for control volume f. Exergetic efficiency (second law efficiency)	
14	**Thermocouple Applications** a. Heat flow and electricity flow b. See- beck coefficient c. Palter coefficient d. Thomson coefficient e. Thermocouple applications	
15	**Introduction to statistical thermodynamics**	

References :

1- "Advanced Thermodynamics Engineering", Kalyan Annamalai and I. K. Puri, CRC press, 2008, Washington D.C.

2- "Engineering Thermodynamics", "Advanced Thermodynamics",etc….)

Marking:

First Semester				Final Exam
Activity	1st exam	2nd exam	3 d exam	70%
5%	5%	7.5%	7.5%	

Assignments and/or Projects:

Assignment/Project	Description	Due Date	Marking
Case study	There are 2 case studies in the semesters	During the course	5

Instructor information:

Lecture Room: [Group Msc.01] Time: Sun., 8:30-11:20
Instructor's Name: Dr.Maathe A.Theeb Office No.: **13**
E-Mail:maathe_a@yahoo.com

NOTES:

- ***Office Hours: Other office hours are available by appointment.***
- ***The content of this syllabus not be changed during the current semester.***

Lecturer Signature **Chairman Signature**