

Thursday  
 First  
 11/11  
 Second  
 12/1/21  
 Final  
 11/11

0904342 Thermodynamics (2)

3 Credit Hours

		1	2	3	4	5	6	7	8	9	10	11
3	Thermodynamics (2)	3		1		2			1			

0904342 Thermodynamics (2) 3 Credit Hours

**Prerequisite: 0904341**

Review of basic laws and principles. Irreversibility and availability, Vapor and air power and refrigeration cycles. Mixtures of real gases and vapors. Psychrometry. Combustion. Elementary chemical kinetics.

**Course Objectives:**

- Allowing the students to use the laws of thermodynamics in analyzing various systems e.g. power, refrigeration and combustion systems.
- Introduce the students to the basics of refrigeration methods and psychrometric chart.
- Calculate the heat released from a combustion process of any fuel.
- Calculate the equilibrium constant and temperature and concentrations for a combustion process.
- Introduce the student to some thermodynamic relations that relates various thermodynamic properties.

**Course Outcomes:**

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

- Identify several power cycles in power plants, refrigeration and internal combustion engines [PO1, PO5].
- Identify basic mixture concepts and properties [PO1, PO5].
- Identify basic concepts of psychrometry [PO1, PO5].
- Identify basic concepts and properties of real gases [PO1, PO5].
- Apply basic concepts in the calculation of various cycle efficiencies [PO3, PO7, PO8].
- Analyze various power cycles and find the effect of various parameters on those cycles [PO1, PO5, PO6, PO7, PO8].
- Identify basic concepts of availability and irreversibility [PO1, PO5].
- Apply basic concepts of availability and irreversibility on thermal systems [PO5, PO6, PO7, PO8].
- Identify basic concepts of combustion [PO1, PO5].
- Apply basic concepts of combustion [PO3, PO6, PO7, PO8].
- Identify basic concepts of chemical kinetics [PO1, PO5].
- Apply chemical kinetics to find the adiabatic flame temperature [PO5, PO6, PO7, PO8].

**Recommended book**

- Thermodynamics: an engineering approach, by Yunus Cengel, Seventh Ed., McGraw-Hill [Text Book]

**Course Contents:**

**Chapter (09):** Gas Power Cycles.

**Chapter (10):** Vapor Power Cycles.

**Chapter (11):** Refrigeration Cycles.

**Chapter (12):** Thermodynamic Property Relations.

**Chapter (13):** Gas Mixtures.

**Chapter (14):** Gas-Vapor Mixtures and Air-Conditioning.

**Chapter (15):** Chemical Reactions.

**Chapter (16):** Chemical and Phase Equilibrium.

**Chapter (08):** Exergy: A Measure of Work Potential (If Time Permits).

● **Student Assessment method:**

30 Marks      Mid-Term Exam  
20 Marks      Quizzes (4 quizzes)  
50 Marks      Final exam.

● **Lecture schedule:**

Vapor power cycles	: 3 weeks
First Quiz	
Air standard power cycles	: 2 weeks
Second Quiz	
Refrigeration cycles	: 2 weeks
Mid-Term Exam	
Gas mixtures	: 2 weeks
Third Quiz	
Thermodynamic relations	: 1 week
Chemical reactions	: 3 week
Fourth Quiz	
Phase & chemical equilibrium	: 2 weeks

● **The student should notice the following:**

1. Maximum number of missed lectures allowed is 7 only.
2. Entrance to lecture room is not allowed after 10 minutes.
3. Close your mobile before entrance to the lecture room.
4. All exams/tests/quizzes are closed-book. Extra sheet containing equations will be supplied.
5. Homework/Projects will not be accepted after the stipulated time.
6. Revision of the following topics is necessary: Steam Tables, First Law for open and closed systems, and entropy.
7. There will be no makeup for the quizzes.
8. The makeup for the Mid-Term exam will be conducted at the end of the course. The syllabus will include more material.
9. A total of FOUR quizzes will be given and the average of all four will be taken.

● **Office Location and hours:**

My office is located in the second floor along with Industrial Engineering staff offices. My office number is C-207. My Personal website is:

<http://fetweb.ju.edu.jo/staff/me/jyamin/index.html>

<https://www.facebook.com/jehad.ahmadyamin>

The office hours are announced on the door. For any suggestions, comments or questions please contact personally or by e-mail: yamin@ju.edu.jo

11-12 any day

*jehad.yam@gmail*