



**MUTAH UNIVERSITY**  
**Faculty of Engineering**  
**Department of Chemical Engineering**



**Thermodynamics of Chemical Engineering (1)**

**COURSE SYLLABUS**

Course Code	Course Name	Credits	Contact Hours
0404343	Thermodynamics of Chemical Engineering (1)	3	3T

**INSTRUCTOR/COORDINATOR**

<b>Name</b>	Associate Prof. Dr. Emad El Qada
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**TEXTBOOK**

<b>Title</b>	Introduction to Chemical Engineering Thermodynamics
<b>Author/Year</b>	Smith, J.M., Van Ness, H.C., Abbott, M.M. and Swihart, M.T. / 2018
<b>Other Supplemental Materials</b>	
<b>Title</b>	Thermodynamics: An Engineering Approach
<b>Author/Year</b>	Çengel Y.A. and Boles, M.A./ 2015
<b>Electronic Materials</b>	

**SPECIFIC COURSE INFORMATION**

**A. Brief Description of the Content of the Course (Catalog Description)**

Introduction to chemical engineering thermodynamic through studying applications of the first law of thermodynamics, conservation of energy, flow and non-flow processes, work calculations, Applications of the second law of thermodynamics, reversible and irreversible processes, entropy relations.

**B. Pre-requisites (P) or Co-requisites (C)**

P: Principles of Chemical Engineering (2) (0404228)  
Industrial Physical Chemistry (0404213)

**C. Course Type (Required or Elective)**

Required

## SPECIFIC GOALS

### A. Specific Outcomes of Instruction

**By the end of this course, the student should be able to:**

**CLO1-** Understand the scope of thermodynamics and introduce the fundamental concepts of thermodynamics: **equilibrium, state functions, the thermodynamic state of a system, internal energy, heat, work, enthalpy and heat capacities (SLO 1).**

**CLO2-** State and apply the principle of conservation of energy to a closed- and open –systems **(SLO 1).**

**CLO3- Understand phase diagram {(SLO 1), (SLO 6)}.**

**CLO4-** Distinguish and define different types of processes: isothermal, isobaric, isochoric, adiabatic, reversible and irreversible processes **(SLO 1).**

**CLO5-** Carry out PVT calculations for a pure substance using the appropriate equation of state (ideal gas law, the virial equation of state, cubic equation of state, the SRK, PR and RK equations), or generalized correlation for gases and liquids **{(SLO 1), (SLO 6)}.**

**CLO6-** Explain and calculate the following terms: sensible and latent heat, standard heat of reaction, standard heat of formation and standard heat of combustion **(SLO 1).**

**CLO7-** Introduce the concept of entropy, heat engine and heat pump **(SLO 1).**

**CLO8-** Apply the second law to some familiar processes **(SLO 1).**

**CLO9-** Calculate ideal and lost work **(SLO 1).**

### B. Student Outcomes Addressed by the Course

1	2	3	4	5	6	7				
✓					✓					

## BRIEF LIST OF TOPICS TO BE COVERED

List of Topics	No. of Weeks	Contact Hours
Introduction	2	6
The First Law and Other Basic Concepts	3	9
Volumetric Properties of Pure Fluids	3	9
Heat Effects	3	9
The Second Law of Thermodynamics	3	9
<b>Total</b>	<b>14</b>	<b>42</b>

<b>METHODS OF ASSESSMENT</b>			
<b>No.</b>	<b>Method of assessment</b>	<b>Week and Date</b>	<b>%</b>
<b>1</b>	Mid-Term Examination	8	<b>30</b>
<b>2</b>	Homework	3, 6, 9	<b>10</b>
<b>3</b>	Quizzes	4, 7, 10	<b>10</b>
<b>4</b>	Final Examination	15, 16	<b>50</b>
Total			<b>100</b>