



Jordan University of Science and Technology
Faculty of Engineering
Chemical Engineering Department

CHE341 Thermodynamics For Chemical Engineering - JNQF Level: 7

Second Semester 2023-2024

Course Catalog

3 Credit Hours. Heat Effects, phase rule, thermodynamic properties of pure compounds, gas mixtures & Liquid Solutions, Kay's rule, vapor-liquid equilibria. liquid-liquid equilibria, chemical reaction equilibria.

Teaching Method: On Campus

Text Book

Title	Introduction to Chemical Engineering Thermodynamics
Author(s)	Smith, J.M., H.C. Van Ness, and M.M. Abbott,
Edition	7th Edition
Short Name	Chemical Thermodynamics
Other Information	

Course References

Short name	Book name	Author(s)	Edition	Other Information
Chemical Thermodynamics	Study Guide for Chemical Engineering Thermodynamics	Chen W.Y	1st Edition	
Properties of Gases and Liquids	The Properties of Gases and Liquids	Reid, R.C., J.M. Prausnitz, and T.K. Sherwood, "	5th Edition	
Chemical Thermodynamics	Chemical and Engineering Thermodynamics	Sandler, S.	3rd Edition	
Energy , Entropy and Equilibrium	Chemical Engineering Thermodynamics; The study of energy, entropy, and Equilibrium	R.E. Balzhiser, M.R. Samuels & I.D. "Eliassen	1st Edition	
Physical and Chemical Equilibria	Physical and Chemical Equilibrium for Chemical Engineers	Noel de Nevers	1st Edition	

Introductory Chemical Thermodynamics	Introductory Chemical Engineering Thermodynamics	Elliott, J.R., and C.T. Lira,	1st Edition	
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Instructor	
Name	Prof. Fahmi Abu Al-Rub
Office Location	CH1 L2
Office Hours	
Email	abualrub@just.edu.jo

Class Schedule & Room
Section 1: Lecture Time: Sun, Tue, Thu : 13:30 - 14:30 Room: CH2111

Prerequisites		
Line Number	Course Name	Prerequisite Type
222420	CHE242 Engineering Thermodynamics	Prerequisite / Pass

Tentative List of Topics Covered		
Weeks	Topic	References
Week 1	Review lecture of main laws of thermodynamics	From Chemical Thermodynamics , From Chemical Thermodynamics , From Chemical Thermodynamics , From Energy , Entropy and Equilibrium
Week 2	Equation of State (Volumetric Properties of Fluids)	From Chemical Thermodynamics , From Properties of Gases and Liquids , From Chemical Thermodynamics , From Energy , Entropy and Equilibrium
Week 3	Thermodynamic properties of pure gases	From Chemical Thermodynamics , From Chemical Thermodynamics , From Properties of Gases and Liquids , From Chemical Thermodynamics , From Energy , Entropy and Equilibrium , From Introductory Chemical Thermodynamics

Week 4	Residual Properties of pure compounds	From Chemical Thermodynamics , From Chemical Thermodynamics , From Energy , Entropy and Equilibrium , From Introductory Chemical Thermodynamics
Week 5	Estimation of thermodynamic properties of gases by Chart	From Chemical Thermodynamics , From Properties of Gases and Liquids , From Chemical Thermodynamics , From Introductory Chemical Thermodynamics
Week 6	Vapor/liquid equilibrium : Introduction	From Chemical Thermodynamics , From Chemical Thermodynamics , From Chemical Thermodynamics , From Energy , Entropy and Equilibrium , From Introductory Chemical Thermodynamics
Week 7	Vapor/liquid equilibria of ideal & real systems.	From Chemical Thermodynamics , From Chemical Thermodynamics , From Chemical Thermodynamics , From Introductory Chemical Thermodynamics
Week 8	Henry's law & Raoult's law	From Chemical Thermodynamics , From Chemical Thermodynamics , From Physical and Chemical Equilibria , From Introductory Chemical Thermodynamics
Week 9	Estimation of dew & flash points of mixtures & solutions	From Chemical Thermodynamics , From Energy , Entropy and Equilibrium , From Physical and Chemical Equilibria , From Introductory Chemical Thermodynamics
Week 10	VLE from K-values	From Chemical Thermodynamics , From Energy , Entropy and Equilibrium , From Physical and Chemical Equilibria , From Introductory Chemical Thermodynamics
Week 11	Fundamentals of Solution thermodynamics (partial molar properties)	From Chemical Thermodynamics , From Properties of Gases and Liquids , From Energy , Entropy and Equilibrium , From Physical and Chemical Equilibria , From Introductory Chemical Thermodynamics
Week 12	Analytical and graphical solution of partial molar properties	From Chemical Thermodynamics , From Energy , Entropy and Equilibrium , From Physical and Chemical Equilibria , From Introductory Chemical Thermodynamics

Week 13	Fugacity and fugacity coefficients of pure species and in a mixture.	From Chemical Thermodynamics , From Energy , Entropy and Equilibrium , From Physical and Chemical Equilibria , From Introductory Chemical Thermodynamics
Week 14	Liquid-liquid phase equilibria, concept of activity and activity coefficient.	From Chemical Thermodynamics , From Energy , Entropy and Equilibrium , From Physical and Chemical Equilibria , From Introductory Chemical Thermodynamics
Week 15	Concept of Chemical equilibrium of reacting systems	From Chemical Thermodynamics , From Energy , Entropy and Equilibrium , From Physical and Chemical Equilibria , From Introductory Chemical Thermodynamics
Week 16	Effect of temperature on chemical equilibrium	From Chemical Thermodynamics , From Energy , Entropy and Equilibrium , From Physical and Chemical Equilibria , From Introductory Chemical Thermodynamics

Mapping of Course Outcomes to Program Outcomes and NQF Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
To use the heat capacities and heats of reaction to calculate various heat effects of ideal and real gases (1) [1SO1] [1L7K1]	5%	
To use the fundamental thermodynamics relation to calculate thermodynamic properties of pure fluids (Vapor Pressure, Accentric Factor, fugacity (1) [1SO1] [1L7K1]	15%	
To apply the concepts of partial molar properties to calculate the partial molar volume, partial molar enthalpy, and partial molar entropy of substances in aqueous solutions and gas mixtures (1) [1SO1] [1L7K1]	15%	
CLO4: To use different phase equilibrium models to analyse the vapor-liquid equilibrium (VLE) calculations for multi-component systems (6) [1SO6] [1L7S3]	35%	
CLO5: To use VLE experimental data to fit different activity coefficient models (6) [1SO6] [1L7S3]	10%	
To use the standard Gibbs energy change of reaction to calculate the equilibrium composition of chemically reacting systems (1) [1SO1] [1L7K1]	20%	

Relationship to Program Student Outcomes (Out of 100%)						
SO1	SO2	SO3	SO4	SO5	SO6	SO7
55					45	

Relationship to NQF Outcomes (Out of 100%)	
L7K1	L7S3
55	45

Evaluation	
Assessment Tool	Weight
ex1	30%
ex2	30%
final	40%

Policy	
Course Policy	<p>Home works: Each assignment is due one week later.</p> <p>Cheating: Not tolerated. University rules will be strictly applied</p> <p>Attendance: Attendance is very important for the course. Students missing more than 10% of total classes (5 lectures) are not allowed to enter the FINAL Exam according to university regulations.</p>

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