



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

CHE741 Adv. Chem. Eng. Thermodynamics

First Semester 2024-2025

Course Catalog

3 Credit Hours. Review of the laws of thermodynamics. Thermodynamic analysis of chemical engineering processes. Phase and chemical equilibria. Fugacities of gas mixtures, liquid mixtures, and solids. Solution theories. Uses of equations of state. Prediction of fluid thermodynamic properties

Teaching Method: On Campus

Text Book

Title	Molecular Thermodynamics of Fluid-Phase Equilibria
Author(s)	John Prausnitz , Rudiger Lichtenthaler, Edmundo Gomes de Azevedo
Edition	3rd Edition
Short Name	Textbook 1
Other Information	

Course References

Short name	Book name	Author(s)	Edition	Other Information
Textbook2	Introduction to Chemical Engineering Thermodynamics	John Prausnitz , Rudiger Lichtenthaler, Edmundo Gomes de Azevedo	8th Edition	

Class Schedule & Room

Tentative List of Topics Covered

Weeks	Topic	References
Week 1	Thermodynamic properties of pure gases	From Textbook2

Weeks 2, 3	Residual Properties of pure compounds	From Textbook2
Week 4	Fundamentals of Solution thermodynamics (partial molar properties)	From Textbook 1 , From Textbook2
Weeks 5, 6	Fugacity and fugacity coefficients of pure species and in a	From Textbook 1 , From Textbook2
Weeks 6, 7, 8	Vapor/liquid equilibria of ideal & real systems in the presence and absence of external force field	From Textbook 1 , From Textbook2
Week 9	Vapor-liquid phase equilibria, concept of activity and activity coefficient	From Textbook 1 , From Textbook2
Weeks 10, 11, 12	Models of activity coefficients	From Textbook 1 , From Textbook2
Week 13	LLE, SLE, SVE	From Textbook 1 , From Textbook2
Weeks 14, 15	Chemical equilibrium of reacting systems	From Textbook2

Mapping of Course Outcomes to Program Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
To use the fundamental thermodynamics relation to calculate thermodynamic properties of pure fluids (Vapor Pressure, Accentric Factor, fugacity)	5%	
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	10%	
Use different phase equilibrium models to analyse the vapor-liquid equilibrium (VLE) in the presence and absence of external force fields, calculations for multi-component systems	40%	
Use different phase equilibrium models to analyse the vapor-liquid equilibrium (VLE) in the presence and absence of external force fields, calculations for multi-component systems	20%	
Use the standard Gibbs energy change of reaction to calculate the equilibrium composition of chemically reacting systems	25%	

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

Evaluation	
Assessment Tool	Weight
Mid	50%
Final	50%

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