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Department of Chemical Engineering

Thermodynamics II (64336)

Total Credits	3

major compulsory

Prerequisites	P1 : Thermodynamics I (64335) OR Thermodynamics for Chem. Eng.I (64331)

Course Contents

Thermodynamic is a key course for chemical engineering and it serves the needs of the global chemical engineering profession throughout the years to come. This course presents the theoretical foundation for solution thermodynamics and its findings are applied to gas mixtures and liquid solutions, in particular In the fields of petroleum and pharmaceutical industries. The students become familiar in determination of partial properties and property change of mixing for thermodynamic properties. It gives the basic equations for vapor/liquid equilibrium (VLE) and liquid/liquid equilibrium (LLE) calculations. This makes easy to solve engineering problems in gas absorption and distillation

	Intended Learning Outcomes (ILO's)	Student Outcomes (SO's)	Contribution
1	Apply knowledge of mathematics, science, &engineering principles to calculate P, T, compositions in the case of mixtures , fugacities, activity coefficients, excess properties	A	50 %
2	Able to identify, formulate and solve engineering problems in binary and multi component systems, the field of phase equilibria, partial properties, and excess properties	E	50 %

Textbook and/ or Refrences

Text book: Introduction to Chem. Eng. Thermodynamics, Smith, Wan Ness, Abbot 7th, 2005. .McGraw-Hill international editions, ISBN 0-07-124708-4 References : 4. Fundamentals of classical thermodynamics,Version2, Gordon J., Van Wylen, Richard E. Sonntag. 1978 5. Application of thermodynamics: Bernard D. Wood, Addison Wesley Publishing company, 1969. 6. Engineering Thermodynamics: Fundamentals and applications: Francis F. Huang, Macmillan Publishing co., Inc., 1978

Assessment Criteria	Percent (%)
First Exam	20 %
Second Exam	20 %
Quizzes	15 %
Final Exam	45 %

Course Plan

Week	Topic
1_4	Chapter 10: Introduction to vapor liquid equilibrium VLE, The nature of equilibrium The phase Rule, Duhems Theorem and the qualitative behavior of VLE Simple model of vapor liquid equilibrium VLE by Modified Raults law VLe from K value Correlations
5	first
5_8	Chapter 11 Theory of Solution thermodynamics Fundamental Property Relation The chemical potential and phase equilibria Partial properties The ideal gas mixture model Fugacity and fugacity coefficient for pure species Fugacity and fugacity coefficient for species in solution Generalized correlations for the fugacity coefficient The ideal solution model and excess properties
9_13	Chapter 12 Liquid phase properties from VLE data Models for the Excess Gibbs energy

	Property changes of mixing Heat effects of mixing Processes
13	Second exam
14_15	Chapter 14 The Gamma/Phi formulation of VLE VLE from Cubic equation of State Liquid/ liquid equilibrium.
16	Final examination