



ADVANCED THERMODYNAMICS

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PRE-REQUISITES : UG Level Thermodynamics Course

INTENDED AUDIENCE : Chemical Engineering, Biotechnology, Petroleum Engineering, Polymer Engineering and Food Engineering

INDUSTRIES APPLICABLE TO : Oil and Gas Industries, Chemical Industries, Polymer Industries, Biochemical Industries

COURSE OUTLINE :

In any chemical process, often one encounter interaction between phases where transfer of species takes place from one phase to other. There exists several situations of vapor-liquid, liquid-liquid, vapor-liquid-liquid, solid-liquid equilibria in chemical engineering processes. Often these situations are dealt with assumption of ideal behavior and binary systems but in reality non-ideality and multicomponent mixtures exists and accordingly one has to deal with such situations. This course offers step-by-step understanding of required thermodynamic properties to handle such equilibrium cases and explore possible ways of solving problems associated with non-ideality in VLE, LLE, VLLE and SLE for multicomponent mixtures.

ABOUT INSTRUCTOR :

Prof. Nanda Kishore completed PhD from Indian Institute of Technology (IIT) Kanpur in 2008 and presently is a professor in the Department of Chemical Engineering of IIT Guwahati, India. He was Brunel Research Fellow from Dec. 21, 2009 to March 31, 2011 at School of Engineering Sciences, University of Southampton, UK. He was a visiting researcher in Department of Chemical and Processing Engineering, University of Surrey, Guildford, United Kingdom from June 2016 to July 2016. He received Young Scientist Research Award in 2016 from DAE-BRNS; IEI Young Engineers Award for the year 2015; Young Scientist Research Grant from Science and Engineering Research Board of Department of Science and Technology, Government of India, 2013.

COURSE PLAN :

Week 1: Introduction of Phase Equilibria

Week 2: Estimation of Thermodynamic Properties

Week 3: Potential Energy Functions and Intermolecular Forces

Week 4: Molecular Theory of Corresponding States

Week 5: Intermolecular Interactions and E.o.S

Week 6: Gaseous Mixtures and Fugacity

Week 7: Liquid Mixtures and Fugacity

Week 8: Models for Activity Coefficients using Excess Gibbs Energy

Week 9: Vapor – Liquid Equilibria of Multicomponent Non-Ideal Systems

Week 10: Liquid – Liquid Equilibria of Multicomponent Non-Ideal Systems

Week 11: Vapor – Liquid – Liquid Equilibria of Multicomponent Non-Ideal Systems

Week 12: Solid – Liquid Equilibria of Non-Ideal Systems