



ADVANCED THERMODYNAMICS

PROF. NANDA KISHORE

Department of Chemical Engineering
IIT Guwahati

TYPE OF COURSE : New | Core | PG**COURSE DURATION** : 12 weeks (27 Jan' 20 - 17 Apr' 20)**EXAM DATE** : 26 Apr 2020**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 :

Dr. 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:** Estimation of Thermodynamic Properties
- Week 2:** Potential Energy Functions and Intermolecular Forces
- Week 3:** Molecular Theory of Corresponding States
- Week 4:** Gaseous Mixtures and Fugacity
- Week 5:** Virial Coefficients from Potential Functions
- Week 6:** Liquid Mixtures and Fugacity
- Week 7:** Models for Activity Coefficients using Excess Gibbs Energy
- Week 8:** Vapor – Liquid Equilibrium of Non-Ideal Systems – 1
- Week 9:** Vapor – Liquid Equilibrium of Non-Ideal Systems – 2
- Week 10:** Liquid – Liquid Equilibrium
- Week 11:** Vapor – Liquid – Liquid Equilibrium
- Week 12:** Solid – Liquid Equilibrium