



CHEMICAL ENGINEERING THERMODYNAMICS

PROF. SASIDHAR GUMMA

Department of Chemical Engineering
IIT Tirupati

INTENDED AUDIENCE : B.Tech in Chemical Engineering

INDUSTRIES APPLICABLE TO : Chemical process industries including IOCL,HPCL,BPCL,GAIL,ONGC,etc.

COURSE OUTLINE :

This course will deal with evaluation and application of the laws of thermodynamics with respect to physical and chemical processes. Real gas behavior,solution thermodynamics,phase and reaction equilibria will be discussed.It will lay foundation for other chemical engineering courses such as mass transfer,chemical reaction engineering etc.It will demonstrate the application of the fundamental concepts of thermodynamics to a wide variety of processes occurring in Chemical Engineering. It will enable the students to develop skills necessary to make appropriate assumptions in specific Chemical Engineering problems.

ABOUT INSTRUCTOR :

Prof. Sasidhar Gumma joined the department of Chemical Engineering at IIT Tirupati in January 2020, after teaching at Indian Institute of Technology Guwahati for more than 15 years. His research interest is in development of nanoporous materials for targeted applications in chemical processes industry. While at IIT Guwahati, his group studied the structure and property relationships between these materials and their affinity to certain chemical species. Efforts were made to enhance the selective affinity by functionalizing them with suitable chemical ligands, controlling their pore structure and/or incorporating additional nanoparticles into their structure. He was involved in industrial projects such as the development of hydrocarbon separation process for OIL India Limited, development of amine absorption process for NTPC and GAIL, modeling of hollow fiber membrane contactors for BHEL, development of catalyst for coal liquefaction, and development of oxygen enriching adsorbents for DRDO. His interest in pedagogical methods for teaching engineering resulted in an openware course module for Chemical Reaction Engineering and a Mass Online Course (MOOCs) in Chemical Engineering Thermodynamics.

COURSE PLAN :

Week 01 : First Law and its applications

Week 02 : Entropy and the second law

Week 03 : Equations of state

Week 04 : Generalized correlations

Week 05 : Solution Thermodynamics

Week 06 : Ideal solutions and Excess properties

Week 07 : Phase equilibria and Raoult's law properties

Week 08 : Gamma-phi formulation

Week 09 : Thermodynamic consistency

Week 10 : Reaction Equilibria

Week 11 : Multi-reaction equilibria

Week 12 : Reaction equilibria in heterogeneous systems