



APPLIED THERMODYNAMICS FOR ENGINEERS

PROF. DIPANKAR N. BASU

Department of Mechanical Engineering
IIT Guwahati

PRE-REQUISITES : Fundamentals of Thermodynamics

INTENDED AUDIENCE : Undergraduate students of Mechanical Engg. and similar branches; Faculty member associated with Mechanical Engg.; Practicing engineers associated with thermal industries.

COURSE OUTLINE:

Thermodynamics is a subject of fundamental interest to Mechanical engineers and therefore is always taught in the 2nd or 3rd semester. Present course can be viewed as the next step, where the thermodynamic principles will be employed to discuss about different power producing & absorbing cycles. Properties of pure substance will be discussed, along with the thermodynamic property relations, thereby enabling the participants to estimate all relevant thermodynamic properties at any particular state of point. Subsequently the gas & vapor power cycles will be analyzed, followed by the principles of cogeneration & combined cycles. Then the refrigeration cycles will be introduced, followed by a discussion on the selection of refrigerants. The properties of gas mixtures and gas-vapor mixtures will also be discussed, leading to psychrometry & psychrometric processes. The course will be completed with a brief introduction to the chemical equilibrium.

ABOUT INSTRUCTOR :

Prof. Dipankar N. Basu is an Associate Professor in the department of Mechanical Engineering at Indian Institute of Technology Guwahati since June 2012. He received his undergraduate and postgraduate degree from Jadavpur University, Kolkata, and completed his Ph.D. from Indian Institute of Technology Kharagpur in 2011. He served as an Assistant Professor at IEST Shibpur for nearly four years before joining IIT Guwahati. His principal research interest is in the field of nuclear thermalhydraulics, two-phase flow, supercritical heat transfer, optimization of thermal systems and microchannel heat transfer. He is currently working on computational tool development for simulation of flows with free-surfaces. He has co-authored more than 65 referred journal and conference publications and also a book chapter on supercritical natural circulation loop. He is a regular reviewer of many reputed international journals and also associated with several sponsored projects.

COURSE PLAN :

Week 1: Review of Thermodynamic Principles

Week 2: Thermodynamic Property Relations

Week 3: Properties of Pure Substances

Week 4: Air Standard Cycles

Week 5: Real Cycles for Reciprocating Engines

Week 6: Gas Turbine Cycles

Week 7: Vapor Power Cycles

Week 8: Cogeneration & Combined Cycles

Week 9: Refrigeration Cycles

Week 10: Gas Mixtures

Week 11: Gas-vapor Mixtures

Week 12: Chemical Reactions