



APPLIED THERMODYNAMICS FOR ENGINEERS

PROF. DIPANKAR N. BASU

Department of Mechanical Engineering
IIT Guwahati

TYPE OF COURSE : New | Core | UG

COURSE DURATION : 12 weeks (29 Jul'19 - 18 Oct'19)

EXAM DATE : 16 Nov 2019

PRE-REQUISITES : Fundamentals of Thermodynamics

INTENDED AUDIENCE : Undergraduate students of Mechanical Engg and similar branches; Faculty members associated with Mechanical Engineering; Practicing engineers associated with Thermal Industries (such as Power, Automobile, Airconditioning etc.).

INDUSTRIES APPLICABLE TO : Any industry associated with the design, development & operation of thermal equipment, such as power stations, automobiles, airconditioning etc.,

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 :

Dr. 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 PhD from Indian Institute of Technology, Kharagpur in 2011. He served as an Assistant Professor at IEST Shibpur for four years before joining IIT Guwahati. His principal research interest is in the field of Nuclear Thermalhydraulics, Two-phase flow, Supercritical heat transfer and Microchannel heat transfer. He is currently working on computational tool development for simulation of flows with free-surfaces and fluid-structure interaction. He has co-authored more than 70 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