



**MECHANICAL
ENGINEERING**

RADIATIVE HEAT TRANSFER



PROF. ANKIT BANSAL

Department of Mechanical and Industrial Engineering
IIT Roorkee

TYPE OF COURSE : New | Elective | PG

COURSE DURATION : 8 weeks (28 Jan'19 - 22 Mar'19)

INTENDED AUDIENCE : ME/MS/PhD

EXAM DATE : 31 Mar 2019

PRE-REQUISITES : Heat Transfer

INDUSTRIES APPLICABLE TO : BHEL Steel Industry NTPC and other power companies

COURSE OUTLINE :

This course offers a comprehensive treatment of Radiative heat transfer. The course starts with standard optics on Radiative transfer and radiant exchange between surfaces and introduces modern state-of-the-art topics including Radiative properties of gases and particles, P-N approximation, the Monte Carlo method and the prediction of radiation transfer in absorbing, emitting, and scattering media.

ABOUT INSTRUCTOR :

Dr Ankit Bansal received his PhD from the Pennsylvania State University in Mechanical Engineering with specialization in Radiative Heat Transfer. He has worked as Assistant Professor at IIT Mandi for two years from 2012-2014. For last three years he has been working as Assistant Professor in the Mechanical and Industrial Engineering Department of IIT Roorkee. He has taught courses on Thermodynamics, Fluid Mechanics, Gas Dynamics, Heat Transfer, CFD etc. He has authored more than ten papers in reputed journals.

COURSE PLAN :

Week 01 : Fundamentals of Thermal Radiation, Introduction, Basic Laws of Thermal Radiation, Introduction to Radiative Properties, Radiative Properties of Opaque Surfaces

Week 02 : View Factors, Evaluation Methods, Monte Carlo method

Week 03 : Radiative Exchange between Black surfaces, Radiative Exchange between Gray, Diffuse, Surfaces, Radiative Exchange between Non-Ideal Surfaces

Week 04 : Equation of Radiative Transfer for participating media

Week 05 : Solution Methods: Plane-Parallel Slab, Approximate Methods, Method of spherical harmonics and Discrete Ordinate Method.

Week 06 : Zone method and applications

Week 07 : Radiative Properties of Participating Media: Gas Properties, particle Properties

Week 08 : Spectral Models: Wide band model, Narrow-band models, k-distribution models