

# Course: Heat Transfer

**Course Code:** noc20-ch21

**Session:** 2020-21

**Duration:** 12 Weeks

**Assessment procedures:** Weekly Assignment (25%) + proctored certification Exam (75%)

## Curriculum of the Course:

**Week 1 :** Physical Origins and Rate Equations, Units and Dimensions, Relevance, Analysis of Heat Transfer Problems: Methodology, Introduction to Conduction, The Conduction Rate Equation, The Thermal Properties of Matter,

**Week 2 :** The Heat Diffusion Equation, Boundary and Initial Conditions, One-Dimensional, Steady-State Conduction, The Plane Wall, Radial Systems,

**Week 3 :** Conduction with Thermal Energy Generation, Heat Transfer from Extended Surfaces, Introduction to Two-Dimensional, Steady-State Conduction

**Week 4 :** Transient Conduction, The Lumped Capacitance Method, The Plane Wall with Convection, Radial Systems with Convection, The Semi-Infinite Solid

**Week 5 :** The Convection Boundary Layers, Local and Average Convection Coefficients, Laminar and Turbulent Flow, Thermal Boundary Layer Equations and Similarity, The Normalized Boundary Layer Equations, Boundary Layer Analogies

**Week 6 :** External Flow, Convection Calculations, The Flat Plate in Parallel Flow, The Cylinder in Cross Flow, Flow Across Banks of Tubes

**Week 7 :** Internal Flow, Laminar Flow in Circular Tubes: Thermal Analysis and Convection Correlations for Turbulent Flow in Circular, Non-Circular and Concentric Tube Annulus

**Week 8 :** Free Convection, The Governing Equations for Laminar Boundary Layers, Laminar Free Convection on a Vertical Surface, The Effects of Turbulence, Empirical Correlations for External Free Convection Flows and Within Parallel Plate Channels, Combined Free and Forced Convection

**Week 9 :** Boiling and Condensation, Boiling Modes, Forced Convection Boiling, Condensation - laminar and Turbulent Film in Different Geometries, Dropwise Condensation

**Week 10 :** Heat Exchangers, The Overall Heat Transfer Coefficient, Heat Exchanger Analysis: Use of the Log Mean Temperature Difference, Heat Exchanger Analysis: The Effectiveness–NTU Method, Heat Exchanger Design and Performance Calculations

**Week 11 :** Radiation, Fundamental Concepts, Blackbody Radiation, Absorption, Reflection, and Transmission by Real Surfaces, Kirchhoff's Law, The Gray Surface

**Week 12 :** Radiation Exchange Between Surfaces - The View Factor, Blackbody Radiation Exchange, Radiation Exchange Between Opaque, Diffuse, Gray Surfaces in an Enclosure, Radiation Exchange with Participating Media

## List of students enrolled

1	Himanshu Gothwal
2	Hritik Maratha
3	Jatin Dhyawana
4	Prakhar Bhardwaj

5	Rajkumar gangwar
6	Yogendra Singh
7	Vikas Kumar tank