



TRANSPORT PHENOMENA IN MATERIALS

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IIT Madras

TYPE OF COURSE : Rerun | Core | PG

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

EXAM DATE : 17 Nov 2019

INTENDED AUDIENCE : Undergraduate students of Metallurgical / Materials Engineering and related disciplines.

PRE-REQUISITES : Mathematics courses at 1st year UG level.

INDUSTRIES APPLICABLE TO : Tata Steel, JSW, Vedanta, Aditya Birla Group, Murugappa Group, Amalgamations Group, TCS etc.,

COURSE OUTLINE :

This course will introduce the concepts of fluid flow, heat transfer and mass transfer with behavior and processing of engineering materials as the focus.

ABOUT INSTRUCTOR :

Gandham Phanikumar doctoral work is on heat transfer, fluid flow and solute transfer during laser processing of dissimilar metals. After joining IIT Madras in 2005, he has been teaching a UG core course on transport phenomena for several years. His research continues to involve concepts of transport phenomena in materials processing.

COURSE PLAN :

Week 01 : Mathematical foundations of transport phenomena, introduction to subscript notation & tensors

Week 02 : Control volume formulation and concept of balance

Week 03 : Navier-Stokes equations, exact solutions for simple geometries

Week 04 : Friction factors, empirical relations in fluid flow

Week 05 : Application of fluid flow solutions to materials processing

Week 06 : Introduction to high temperature materials

Week 07 : Exact solutions for heat transfer problems

Week 08 : Empirical correlations, heat transfer coupled with fluid flow

Week 09 : Mass Balance equations, governing equations

Week 10 : Diffusive mass transfer, exact solutions for simple geometries

Week 11 : Solute transfer during phase change

Week 12 : Convective mass transfer correlations, Similarity across transport phenomena