TRANSPORT PROCESSES I - HEAT AND MASS TRANSFER

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TYPE OF COURSE : Rerun | Elective | UG/PG
COURSE DURATION : 12 weeks (24 Jan' 22 - 15 Apr' 22)
EXAM DATE : 24 Apr 2022

PRE-REQUISITES : Engineering mathematics including ordinary differential equations, complex variables. Undergraduate course in Unit Operations.

INTENDED AUDIENCE : Chemical Engineering undergraduates & postgraduates equipment.

COURSE OUTLINE :
Physical and chemical transformations of raw materials to products are accomplished in unit operations which involve mixing, heating/cooling, reactions and flow. The efficiency of these processes is critically dependent on the transport of heat and mass carried along with flowing fluid, and across solid/fluid interfaces. The transport across interfaces is entirely due to molecular diffusion, which is the transport in a stationary fluid due to gradients in concentration or temperature. The combination of convection (transport by flowing fluids) and diffusion determine the rate of transport, and the overall efficiency, in unit operations.

ABOUT INSTRUCTOR :
Prof. V. Kumaran completed his B. Tech in Chemical Engineering at IIT Madras in 1987, and received his PhD from Cornell University, USA, in 1992. After a two year postdoctoral assignment at the University of California, Santa Barbara, USA, he joined the Department of Chemical Engineering at the Indian Institute of Science, Bangalore, where he is now a Professor. His areas of research are fluid mechanics, statistical mechanics and dynamics of complex fluids.

COURSE PLAN :

Week 1**:** Dimensional Analysis

Week 2**:** Diffusion.

Week 3**:** Transport in one dimension.

Week 4**:** Spherical & cylindrical coordinates

Week 5**:** Pressure & body forces in fluid flow

Week 6**:** Conservation equations.

Week 7**:** Diffusive transport I.

Week 8**:** Diffusive transport II.

Week 9**:** Forced convection.

Week 10**:** Forced & natural convection.

Week 11**:** Natural convection.

Week 12**:** Transport in turbulent flows.