



CHEMICAL ENGINEERING

TRANSPORT PHENOMENA OF NON-NEWTONIAN FLUIDS



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TYPE OF COURSE : New | Elective | UG/PG

COURSE DURATION : 12 weeks (28 Jan'19 - 19 Apr'19)

INTENDED AUDIENCE : Chemical Engineering,
Biotechnology, Food Engineering, Mechanical Engineering

EXAM DATE : 28 April 2019

PRE-REQUISITES : Fluid Mechanics, Heat Transfer, Mass Transfer

COURSE OUTLINE :

Non-Newtonian fluids are often encountered in our daily life as well as in many industries. Some of the daily-life applications include personal care products such as cosmetics, gels, pastes; food stuffs such as sandwich spreads, ketchup, chocolate, soups, etc. Some of the industrial applications include processing of many polymers, paints and detergents, degassing of polymeric melts and glasses, use of non-Newtonian polymers in enhanced oil recovery, non-Newtonian fluidized beds, wastewater treatment, production of polymeric alloys and ceramics via liquid routes, pharmaceutical products wherein the polymer thickening agents are used to enhance their stability for extended shelf-life, pulp and paper industries, etc. Because of aforementioned overwhelming applications, it is required for both undergraduate and postgraduate students to acquire enough academic experience related to the momentum, heat and mass transfer phenomena associated with non-Newtonian fluids.

ABOUT INSTRUCTOR :

Dr Nanda Kishore completed PhD from Indian Institute of Technology (IIT) Kanpur in 2008 and presently is an Associate Professor in the Department of Chemical Engineering of IIT Guwahati, India, since April, 2014. He has been working in the area of "Transport Phenomena of Bubbles/Drops/Particles in Non-Newtonian Fluids" for last 15 years. After a brief stint as Assistant Professor, Department of Chemical Engineering in National Institute of Technology Warangal, Telangana, he was Brunel Research Fellow from Dec. 21, 2009 to March 31, 2011 at School of Engineering Sciences, University of Southampton, UK. He has published over 65 research articles in various international level reputed journals and published 28 papers in national/international conference proceedings and published 06 book chapters.

COURSE PLAN :

Week 01 : Introduction to Non-Newtonian Fluids

Week 02 : Rheology Measuring Instruments

Week 03 : Equations of Change

Week 04 : Momentum Transfer of Non-Newtonian Fluids

Week 05 : Momentum Transfer of Non-Newtonian Fluids

Week 06 : Flow of Non-Newtonian Fluids through Porous Media

Week 07 : Heat Transfer Phenomena of Non-Newtonian Fluids

Week 08 : Heat Transfer Phenomena of Non-Newtonian Fluids

Week 09 : Mass Transfer Phenomena of Non-Newtonian Fluids

Week 10 : Simultaneous Heat and Mass Transfer with Chemical Reactions

Week 11 : Mass Transfer Combined with Heat Transfer

Week 12 : Boundary Layer Flows of Non-Newtonian Fluids