



HEAT TRANSFER AND COMBUSTION IN MULTIPHASE SYSTEMS

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PRE-REQUISITES : Combustion, Heat Transfer and Fluid Mechanics

INTENDED AUDIENCE : BE/ME/MSc/PhD

INDUSTRIES APPLICABLE TO : GE, Siemens, HPCL, GTRE

COURSE OUTLINE :

Multiphase systems are ubiquitous to many domains ranging from large scale power generation to microscale surface patterning. The course as outlined aims to offer insights and fundamentals into such multiphase systems. The course will first cover the basics of thermodynamics and transport processes in generalized multiphase systems along with analyses of interfacial transport mechanisms. Subsequently in the later modules, it will offer in depth analyses of transport processes and combustion in specific areas like a.) droplet combustion, b.) droplet evaporation, c.) transport processes in sessile droplets, d.) boiling and e.) sprays. The coverage will benefit people from many industries like gas turbines, solar thermal, micro-nano scale engineering, materials processing to name a few.

ABOUT INSTRUCTOR :

Prof. Saptarshi Basu is a Pratt and Whitney Chair Professor at the Department of Mechanical Engineering, Indian Institute of Science (IISc), Bengaluru. Before joining IISc, Dr. Saptarshi Basu was an Assistant Professor in the Department of Mechanical, Materials and Aerospace Engineering at University of Central Florida from August 2007-May 2010. Dr. Saptarshi Basu received his M.S. and Ph. D. degrees in Mechanical Engineering from University of Connecticut in 2004 and 2007 respectively. Prof. Basu's research includes multiphase transport phenomena in fluid thermal systems, advanced laser diagnostics measurements in thermo-fluid sciences and engineering and Combustion. Further he also works in bio-fluidics, AI based machine learning for pattern detection in evaporating droplet systems and has several contributions in the field during COVID-19. He has taught many courses that includes Thermodynamics, Convective Heat Transfer, Heat Transfer and Combustion in Multiphase Systems.

COURSE PLAN :

Week 1: Introduction to Multiphase systems

Week 2: Fundamentals of interfacial heat and mass transfer

Week 3: Governing equations

Week 4: Transport processes and interface phenomena

Week 5: Heat transfer and Droplet vaporization models

Week 6: Transport phenomena in vaporizing droplets

Week 7: Atomization and sprays,

Week 8: Droplet / Spray combustion and boiling