



ADIABATIC TWO-PHASE FLOW AND FLOW BOILING IN MICROCHANNEL

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Department of Chemical
Engineering
IIT Kharagpur

TYPE OF COURSE : Rerun | Elective | UG/PG

COURSE DURATION : 4 weeks (26 July 2021 - 20 Aug 2021)

EXAM DATE : 26 Sep 2021

PRE-REQUISITES : Basic Knowledge of Fluid Mechanics Preliminary knowledge of multi-phase flow desirable

INTENDED AUDIENCE : Elective Course, UG/PG Course, B Tech /M Tech /Ph.D

INDUSTRIES APPLICABLE TO : BARC, DRDO, Automotive Companies, Thermax

COURSE OUTLINE :

The course is designed to provide the participants a basic idea of multiphase flow and flow boiling heat transfer in microchannels. This is pertinent in the current trend of miniaturization as a means of process intensification and is frequently encountered in pharmaceutical and fine chemical industries, microchip cooling and flow through porous medium. The present course discusses the underlying fluid mechanical principles governing multiphase flow in micro vis-a vis macro domain, influence of operating parameters on flow morphology, different experimental techniques and pattern based analysis relevant in this scale as

well as the uniqueness of flow boiling heat transfer in microchannels.

ABOUT INSTRUCTOR :

Gargi Das is Professor, Department of Chemical Engineering, Indian Institute of Technology Kharagpur, West Bengal. Her area of expertise is Multiphase Flow, Transport phenomena, CFD and Process Intensification and her research investigations comprise of both experimental studies and modelling. She

has published over 50 refereed research papers, authored two books and three book chapters. She has contributed to NPTEL through her video based and web based courses on Multiphase Flow and Thermodynamics and has been teaching Multiphase flow as an elective to the undergraduate, post graduate and doctoral students of various departments.

COURSE PLAN :

Week 1: Introduction to multiphase flow – macro vs micro domain and importance of two phase flow in microchannels.

Week 2: Experimental Investigations of flow morphology - flow visualization and signal

Week 3: Influence of operating parameters – Conduit diameter, Influence of operating parameters –

Week 4: Flow pattern based modelling and flow boiling in microchannels processing

microchannels Part -I, Flow boiling heat transfer in microchannels Part -II, Critical heat flux for boiling in microchannels