

COURSE OUTLINE

The course deals with the numerical solution of equations governing fluid flow and would be of interest to engineers and scientists—both aspiring and professional—with chemical/ mechanical/ civil/ aerospace engineering applications. In all these fields, one needs to deal extensively with fluid flow related phenomena and one needs to resolve flow-related features of the processes and equipment. Although the equations governing fluid flow have been formulated more than 150 years ago, it is only in recent years that these are being solved in the practical applications in which the flow occurs. The course deals with the basic techniques that enable the numerical solution of these equations.

COURSE DETAIL

Week .No	Topic
1	Module 1 : An introduction to multiphase flow – concept of slip Module 2 : Flow patterns in macro vis-à-vis microsystems Module 3 : Slug flow and process intensification in reduced dimensions Module 4 : Definition of microchannel based on two phase flow and heat transfer Module 5 : The Mesoscale- importance and special features
2	Module 1 : General experimental techniques for pattern estimation and void fraction measurement Module 2 : Identification of techniques for microsystems Module 3 : Flow visualization – advantages and concerns Module 4 : Impedance probe and signal analysis Module 5 : Optical probe and associated data interpretation
3	Module 1 : Influence of operating parameters – Conduit diameter Module 2 : Influence of operating parameters – Conduit geometry and orientation Module 3 : Influence of operating parameters – Wall wettability characteristics& inlet section Module 4 : Influence of operating parameters – Fluid physical properties Module 5 : Pressure drop characteristics in microchannels
4	Module 1 : Analysis of slug flow Module 2 : Modified analysis for reduced dimensions Module 3 : Flow boiling heat transfer in microchannels Part -I Module 4 : Flow boiling heat transfer in microchannels Part -II Module 5 : Critical heat flux for boiling in microchannels