



SMALL SCALE INTENSIFIED TWO PHASE PROCESSING

December 02 – December 06, 2024



Overview

Two-phase flow in small scale systems finds wide applications in chemical, petrochemical, food, hydrometallurgical, pharmaceutical and biochemical industries. Extraction, aromatic nitration, emulsification and separation are the name of a few examples of such applications. Transport processes in the conventional size devices suffer from the disadvantage that they have higher diffusion length. This, in turn, reduces the rate of transport processes, which results in lower efficiency and longer residence time. Scaling down the devices overcomes this disadvantage. Heat and mass transfer coefficients in miniature devices are 2 to 3 times higher than conventional ones because of their high surface-to-volume ratio and shorter diffusion length. Because of these advantages, miniature devices are potent solutions for intensified extraction and purification of different compounds and applying different solvents.

Hydrodynamics in small scale devices influences the transport rate. However, hydrodynamics of miniature reactors are quite different from those in large scale ones. With reduction of dimension surface tension force become more important than gravitational. This in turn results in different distributions of two-phase flows in miniature geometries as compared to macro geometries. Relative significance of gravitational, surface, viscous and inertia to each other are required for analysing and understanding the flow physics. Therefore, proper understanding of hydrodynamics in small scale devices is important to design the system efficiently. This course gives a detailed understanding of the fundamentals of liquid-liquid two phase flows in small channels and discusses in depth various processes carried out in small channels.

Objectives

The primary objectives of the course are as follows:

- i) Expose participants to the fundamentals of two phase flows in small channels particularly liquid-liquid ones
- ii) Discuss different tools and technique for measurement of different flow variables in such channels
- iii) Provide exposure to practical problems and their solutions, through case studies and hands on experiments
- iv) Enhancing the capability of the participants to design small scale devices for different transport applications

Experts in the field of two phase flow will conduct the course which will be planned and offered as per the norms set by the GIAN programme. Course participants will be provided exposure to all the related topics through lectures and hands-on exercises. Case studies and group assignments will also be shared to stimulate research motivation of participants.

<p style="text-align: center;">Modules</p>	<p>A: Duration : December 02 – December 06, 2024 (05 days)</p> <p>B: Venue : Department of Chemical Engineering Indian Institute of Technology Roorkee</p> <p style="text-align: center; color: blue;">Number of participants for the course module will be limited.</p>
<p style="text-align: center;">You Should Attend If...</p>	<p>Participants from Industry, Research, Government and Non- Government Organizations, Faculty and Students from Institutions all over the world who are interested in the course are welcome to register.</p>
<p style="text-align: center;">Fees</p>	<p>The participation fees for attending the course are as follows:</p> <p>Participants from abroad: US \$ 200</p> <p>Industry: Rs. 7,500/-</p> <p>Officers of Govt. Organizations /NGOs: Rs. 5000</p> <p>Faculty or Scientists of Research / Academic Institutions: Rs. 5000</p> <p>Students of Academic Institutions:- Rs. 1000</p> <p>The above participation fee includes soft copy of all instructional materials, laboratory and computer use for tutorials and internet facility. The participants will be provided with single/double occupancy accommodation on a payment basis at the IITR hostel. Hotel accommodation may also be arranged on a payment basis at nearby places, if requested.</p> <p>For more details, please visit www.iitr.ac.in</p>

The faculty



Prof. Panagiota Angeli,

She is a Professor in the Department of Chemical Engineering at UCL, Deputy Head ED&I, and leads the ThAMeS Multiphase group. She obtained a Diploma in Chemical Engineering from the National Technical University of Athens, Greece, and a PhD on Multiphase Flows at Imperial College London, UK.

She specializes on complex multiphase flows and their application to process intensification and separations. Her research aims to link small scale interactions and interfacial phenomena to macroscopic behaviour of the complex flows and to the development of predictive models. She has developed intensified small channel flow contractors to perform separations and multiphase chemistries with application in the fine chemicals, pharmaceuticals and energy sectors. The experimental investigations have been enabled by original and advanced sensing and measurement techniques, such as micro and high-speed Particle Image Velocimetry (PIV) and ultrasound. Prof. Angeli's work has been supported by substantial UK Research Council and European Union grants and by industry. She has been awarded a RAEng/Leverhulme Trust Fellowship and has participated and chaired UK EPSRC and international (Norway, Sweden, Ireland, Belgium) research funding review panels. She has co-chairs the Multiphase Flow Special Interest Group of the EPSRC funded UK Fluids Network and has published over 200 journal papers.



Dr. Sumana Ghosh

She is an Associate Professor of Chemical Engineering at the IIT Roorkee, Uttarakhand, India. She completed her B. Tech in Chemical Engineering from NIT Durgapur.

She holds a master's degree in Cryogenic Engineering and a Doctorate in Chemical Engineering from the IIT Kharagpur. Her area of research focuses on experimental and numerical two-phase flow and their different applications. Specifically process intensification, transport processes in miniature reactor, flow boiling etc. She has successful collaboration with SERB, BRNS, CSIR, ONGC Energy Centre etc. She has authored over 40 publications. She is awarded with "Institute Research Fellowship-2022" of IIT Roorkee.

Course Coordinator

Dr. Sumana Ghosh
Department of Chemical Engineering
Indian Institute of Technology
Roorkee, Uttarakhand-247667, India

Phone: +91-1332284803 (O)
+91-1332286424 (R)
+91-9634771293

E-mail: sumana.ghosh@ch.iitr.ac.in

Alternate mail id: ghos.sumana@gmail.com

REGISTRATION AND ACCOMODATION REQUEST FORM
(To reach electronically by 30th October, 2024)
SMALL SCALE INTENSIFIED TWO PHASE PROCESSING
December 02 - December 06, 2024,
Department of Chemical Engineering
Indian Institute of Technology Roorkee
Roorkee, Uttarakhand

<p>After Completion, please mail to:</p> <p>Dr. Sumana Ghosh Department of Chemical Engineering Indian Institute of Technology Roorkee Uttarakhand-247667, India</p> <p>Phone: +91-1332284803 (O) +91-1332286424 (R), +91-9634771293 E-mail: sumana.ghosh@ch.iitr.ac.in Alternate mail id: ghos.sumana@gmail.com</p>	<p>Affix passport size photograph</p>
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1. Name of applicant (in block letters): Ms./Mr. /Dr.
2. Status (Mark anyone): Student....., Not a student.....
 - (a) If a Student:
Academic program under which registered currently.....
Date since when registered.....
Name of Academic/ Research Institution.....
 - (b) If not a Student
Nature of employment (Teaching, Research, Govt. service, NGO, Industry).....
Organization where employed.....
Employed since.....
Designation.....
Academic qualifications.....
3. Full Postal Address for Communication:

4. E-mail id:
5. Phone numbers: Mobile....., Landline.....

Date:

Signature of applicant

Note:

- (i) Application should reach Chemical Engineering Department Office at the above address latest by 30th October, 2024. Scanned copy may be sent by e-mail.
- (ii) The seats are limited and will be filled generally on the first come first serve basis. Decision of the course coordinator will be final in this regard.
- (iii) Please start your travel to Roorkee to attend the course only if you have received a formal confirmation.