

1.	Title of the course	Microscale Unit Operations
2.	Course number	CH4022
3.	Status of the course	Elective
4.	Structure of credits	3-0-0-3
5.	Offered to	UG
6.	New course/modification to	New course
7.	To be offered by	Department of Chemical Engineering
8.	To take effect from	July 2020
9.	Prerequisite	CoT
10.	Whether approved by the Department	Yes
11.	<b>Course Objective(s):</b> To introduce the principles of miniaturization, microfluidics and lab-on-a-chip modules.	
12.	<b>Course Content:</b> Introduction to forces of microscopic origin; Physics of miniaturization of mechanical, thermal and chemical systems; Fluid dynamics in microchannels: flow of liquids with and without slip, capillarity, two phase flow, preparation of microemulsions; Microreactor; Mixing and separation at microscale; Application to chromatography; Examples of microfluidic structures, connectors, valves and pumps; Fabrication methods and applications of microdevices.	
13.	<b>Textbook(s):</b> 1. Nguyen N T, Wereley S and Shaegh S A M, <i>Fundamentals and Applications of Microfluidics</i> , 3rd Edition, Artech House (2018). 2. Tabeling P, <i>Introduction to Microfluidics</i> , 1st Edition, Oxford University Press (2006).	
14.	<b>Reference(s):</b> 1. Gad-el-Huk M, <i>MEMS: Applications</i> , 1st Edition, CRC Press (2005). 2. McGuire F, <i>Microfluidics Handbook</i> , 1st Edition, NY Research Press (2015). 3. Seiffert S, <i>Microfluidics: Theory and Practice for Beginners</i> , 1st Edition, De Gruyter (2019). 4. Wirth T, <i>Microreactors in Organic Chemistry and Catalysis</i> , 2nd Edition, Wiley-VCH (2013).	