MEMBRANE TECHNOLOGY

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TYPE OF COURSE : Rerun | Elective | UG/PG
DURATION COURSE : 12 weeks (24 Jan' 22 - 15 Apr' 22) :
EXAM DATE :23 Apr 2022

INTENDED AUDIENCE : Final year BE/B.Tech., ME/M.Tech./MS and PhD students

INDUSTRIES APPLICABLE TO : All industries that require downstream processing using membrane such as Refineries, Pharmaceutical industries, food and beverage industries etc.

COURSE OUTLINE :

This course will provide an insight to the membrane based separations that is an integral part of the down-stream processing of various industries. The course begins with introducing the development of membranes and discussing the basics which is followed by detail discussion on membrane materials and their properties. This course then deals with various methods of membrane preparations and their characterization. How separations (transport mechanism) takes places using membranes has been covered extensively. Further, principles of various membrane processes such as reverse osmosis, microfiltration, ultrafiltration, dialysis, liquid membrane, pervaporation, etc. has been covered along with their applications in different industries. The course will enable students to develop necessary skills to design appropriate membrane based separation technique as per the need.

ABOUT INSTRUCTOR :

Prof. Kaustubha Mohanty has obtained his PhD degree in Chemical Engineering from Indian Institute Technology Kharagpur and is currently working as a Professor of Chemical Engineering at Indian Institute Technology Guwahati. He has more than 12 years of teaching and research experience at IIT Guwahati. His key research areas are biofuels, bioseparation, biological wastewater treatment, membrane technology, ionic liquids, and microalgae biorefinery and biomass pyrolysis. He has published more than 120 research papers in peer-reviewed journals and co-edited one book on Membrane Technology and Applications (Taylor & Francis, USA).

COURSE PLAN :

Week 1**:** Overview and membrane materials

Week 2**:** Material properties and preparation of phase-inversion membranes

Week 3**:** Preparation of composite, inorganic membranes and MF characterization

Week 4**:** MF and UF characterization and membrane transport

Week 5**:** Porous and non-porous membrane transport and Osmosis concepts

Week 6**:** Reverse Osmosis-Nanofiltration and Ultrafiltration basics

Week 7**:** Ultrafiltration basics, transport models, applications

Week 8**:** Micellar-enhanced and affinity UF, bioseparation, Microfiltration basics, transport, fouling and applications

Week 9**:** Problems and solutions based on RO, UF & MF, Dialysis

Week 10**:** Electrodialysis, Pervaporation, Problems and solutions based on ED, PV

Week 11: Liquid Membranes, Gas separation, Membrane Distillation

Week 12: Facilitated Transport, Membrane contactors and other membrane processes