



MEMBRANE TECHNOLOGY

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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 & Applications (Taylor & Francis, USA). He has an h-index of 27 and i10 index of 57 along with more than 2950 citations. He has supervised twelve PhD students and fifteen more are currently pursuing their PhD research under his supervision. He is involved in various sponsored and consultancy projects, four of which are currently running. He is an Editor of Journal of Chemistry; Associate Editor of The Journal of Institution of Engineers (India) Series: E; Associate Editor of Research Journal of Environmental Sciences; Review Editor of Frontiers in Bioenergy and Biofuel and Editorial board member of various journals. He is a Fellow of Royal Society of Chemistry, UK and fellow of Institution of Engineers, India. He is also Member of Society of Chemical Industry, London; Member of Canadian Society for Chemical Engineers and Life Member of Indian Institute of Chemical Engineers. He has served IITG in various capacities as Chairman of Cultural board and Head of Career Development Centre.

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 and Nanofiltration

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