



# Tailored polymeric membranes for bio-separations and biomedical applications

**December 1-6, 2020**

## ORGANIZED BY

Department of Chemical Engineering  
National Institute of Technology Calicut  
Kozhikode - 673601, Kerala, India

## CALL FOR REGISTRATION AND PARTICIPATION

### INTERNATIONAL FACULTY

#### Prof. Ranil Wickramasinghe

Professor, Ross E Martin Chair in Emerging Technologies  
Membrane Science, Engineering & Technology (MAST)  
Center Director

Ralph E Martin Department of Chemical Engineering  
University of Arkansas  
1475 West Cato Springs Road  
Fayetteville, AR 72701  
USA

### HOST FACULTY

#### Dr. Noel Jacob Kaleekkal & Dr. Prasanna Kumar S Mural

Assistant Professor  
Department of Chemical Engineering  
National Institute of Technology, Calicut, India

### GIAN LOCAL COORDINATOR

#### Dr. Ashok S

Dean (Research & Consultancy)  
National Institute of Technology Calicut  
Kozhikode, Kerala, India

### ABOUT THE GIAN COURSE

MHRD, Govt. of India has launched an innovative program titled "Global Initiative of Academic Networks (GIAN)" in Higher Education, in order to garner the best international experience. As part of this, internationally renowned Academicians and Scientists are invited to augment the Country's academic resources, accelerate the pace of quality reforms and elevate India's scientific and technological capacity to global excellence.

### ABOUT THE DEPARTMENT

Established in 2006, the Department of Chemical Engineering of National Institute of Technology Calicut offers programmes leading to Bachelor's Degree, Master's Degree as well as Ph.D. In addition to these regular programmes, this Department is also actively involved in conducting International Conferences, GIAN, Faculty Development Programmes, Job-oriented Short-term Training Programmes and Continuing Education Programmes for Engineering professionals and academic faculty. The R&D projects undertaken in the past were sponsored by various agencies like the Ministry of Human Resource Development (MHRD), Department of Science & Technology (DST) and the Kerala State Council for Science, Technology and Environment (KSCSTE).

### ABOUT NIT CALICUT

National Institute of Technology Calicut (NITC) is an Institution of National Importance, centrally funded by MHRD and is governed by the NIT Act 2007. Institute has ten departments, three schools and nine research centres. It offers ten UG and thirty PG programmes along with the Ph.D. programme in various fields of Science, Technology and Engineering. Faculties in the various Departments have active with Universities and elite institutions within and outside India for research and have active consultancy for industries. For details see the website: [www.nitc.ac.in](http://www.nitc.ac.in).

### OVERVIEW OF COURSE

Membranes based separations are now being widely accepted for separation and subsequent purification in various biotechnological applications. Specific advantages such as operation at ambient temperatures, low pressures, involving no phase change makes membrane separation technologically viable. In addition, membrane separations are modular and often

scale linearly which is a significant advantage when designing purification trains. The membranes tailored suitably have a high degree of biocompatibility, prevent adsorption, denaturation and degradation of susceptible cells, proteins, biopharmaceuticals or other biologically derived macromolecules.

Integration of membrane processes has reduced time and cut down the number of steps required for bio-separations which increases the throughput by several times while maintaining high efficiency of product recovery. The overview of the topics that will be covered in this course are as follows:

- An introduction to bio-separations, with a detailed focus on protein-based therapeutics. The course will also cover membrane bioreactor design and the advantages it offers for periodic cell/protein harvesting. This will also cover membrane materials and suitable module designs currently used for enrichment or separation of the bio-products with a specific interest in bio-fouling/protein fouling of the membranes and techniques.
- The course will also cover sterile filtration (microbial and particulate-free) which is widely employed in the preparation of therapeutics etc. membrane technology for virus filtration is a powerful technology reducing 90% footprint will also be addressed in detail.
- Several niche applications for membrane absorbers where fast kinetics are advantages will also be a part of the course. Potential applications include DNA and endotoxin reduction, the capture of dilutes in the product, etc. are some of the key areas which will be discussed. Further, an insight into the emerging therapeutics: viral vaccines, virus vectors, liposomes, exosomes will be shared.
- An introduction to biomedical applications and the specific membrane requirements for haemodialysis, blood oxygenators and leucocyte depletion filters.

### PRIMARY OBJECTIVES

- Provide an insight to the participants on various emerging therapeutics and means of bio-separations using membrane-based technologies.
- Understand challenges associated with sterile filtration, virus filtration and identifying the mechanisms involved in bio-fouling/protein fouling and techniques involved in producing anti-fouling membranes.

- Providing exposure to real-time problems and working on practical problems associated with module design and their solutions.
- Augmenting the expertise of the participants to identify the membrane requirements for biomedical applications – hemodialysis, blood oxygenators and filters for leucocyte depletion.

## ABOUT INTERNATIONAL FACULTY

Prof Wickramasinghe obtained his Bachelor's and Master's degrees from the University of Melbourne, Australia in Chemical Engineering. He obtained his PhD from the University of Minnesota, also in Chemical Engineering. He worked for 5 years in the biotechnology/biomedical industry in the Boston area before joining the faculty of Chemical Engineering at Colorado State University. He joined the Department of Chemical Engineering at the University of Arkansas in 2011 where he holds the Ross E Martin Chair in Emerging Technologies and leads the Membrane, Science, Engineering and Technology Center (MAST). Prof Wickramasinghe has published over 100 peer reviewed journal articles, several book chapters and is co-editor of a book on responsive membrane and materials. He is active in AIChE and was the Meeting Program Chair of the 2014 Annual Meeting in San Francisco. He has also served on the Board of Directors of the North American Membrane Society.

Prof Wickramasinghe's research interests are in membrane science and technology. His research focuses on synthetic membrane-based separation processes for purification of pharmaceuticals and biopharmaceuticals, treatment and reuse of water and for the production of biofuels. Typical unit operations include: microfiltration, ultrafiltration, virus filtration, nanofiltration, membrane extraction etc. A current research focus is surface modification of membranes in order to impart unique surface properties. His group is actively developing responsive membranes. These membranes change their physical properties in response to changed environmental conditions. A second research focus is the development of catalytic membranes for biomass hydrolysis by grafting catalytic groups to the membrane surface.

## WHO CAN ATTEND?

- Executives, engineers and researchers from biotechnology, pharmaceutical, chemical and other manufacturing industries, technicians from hospitals and government organizations including R&D laboratories.
- Student students at all levels (BTech/MSc/MTech/PhD) or Faculty from reputed academic institutions and technical institutions.

Certificate of participation will be issued to participants who have registered and attended the entire course.

No refund policy of registration charges.

## HOW TO REGISTER?

**Stage-1:** Web Portal Registration

Visit GIAN Website at the link:

<http://www.gian.iitkgp.ac.in/GREGN/index> and create login User ID and Password. Fill up the blank registration form and do web registration by paying Rs. 500/- online through Net Banking/Debit/Credit card as per instructions given their in. This provides the user with lifetime registration to enroll in any number of GIAN courses offered.

## Stage-2: Course Registration

Login to the GIAN portal again with the user ID and Password already created in Step 1. Click on 'Course Registration' option at the top of Registration form. Select the Course titled "Tailored polymeric membranes for bio-separations and biomedical applications" from the list and click on 'Save' option.

Confirm your registration by clicking on 'Confirm Course'. Also send the filled-in registration form to the contact address.

## REGISTRATION FEE Course Fee (Including GST)

Faculty / Scientists	Rs. 5,000/-
Participants From Industry	Rs. 10,000/-
Students & Research Scholars	Rs. 3,000/-
Students From Abroad	US\$ 300
Other Participants From Abroad	US\$ 400

## REGISTRATION DETAILS

The Registration fee includes instructional materials, tutorials, laboratory, computer use, internet facility, refreshments and working lunch. Accommodation for outstation participants will be charged separately.

No TA/DA will be paid for any participants.

## SELECTION AND MODE OF PAYMENT

Selected candidates will be intimated through email. They have to remit the necessary course fee to the Bank as per the details given below. All faculty and research scholars may be accommodated in the hostel/international hostel on payment basis if they request for it, subjected to availability.

Participants from industry/ research organizations may be provided lodging in the Institute Guest house on payment basis, subject to availability.

## Bank Details for payment

Account Name	: DIRECTOR NIT CALICUT
Account No.	: 35909407299
Bank	: State Bank of India
Branch Code	: CREC, Chathamangalam, Kozhikode
IFSC	: SBIN0002207
MICR Code	: 673002012
SWIFT Code	: SBINPN BB392

Candidates registering early will be given preference in the shortlisting process. For any queries, please contact the host faculty.

## CONTACT DETAILS

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