



Global Initiative of Academic Networks (GIAN) is a new program in Higher Education approved by the Ministry of Human Resource Development, Govt. of India. It is aimed at tapping the talent pool of scientists and entrepreneurs, internationally to encourage their engagement with the institutes of Higher Education in India so as to augment the country's existing academic resources, accelerate the pace of quality reform, and elevate India's scientific and technological capacity to global excellence. In order to garner the best international experience into our systems of education, enable interaction of students and faculty with the best academic and industry experts from all over the world and also share their experiences and expertise to motivate people to work on Indian problems. Punjabi University, Patiala is one of the several distinguished institutes of higher education selected across India for conducting courses under this program. The University is delighted to announce the second course entitled as

Miniaturised Total Analysis Systems

(Course Code : 196051M01)

1.0 Overview:

Thirty years after the introduction of the miniaturised total analysis systems (μ TAS), also referred to as Labon a Chip, has successfully introduced microscale solutions to resolve many challenges in life sciences. Its original scope was the miniaturisation of chemical analysis systems, aiming for the creation of systems thatcombine the ease of use of a sensor with the richness of (bio)chemical information that only benchtop chemical analysis instrumentation can provide. The microfluidic systems underpinning the early developments of these systems, however, have found a myriad of applications beyond separation science, partially driven by the high level of geometrical commonalities between cells and cellular systems and the 50-500 μ m channels. While the scope of this lecture series is on the original analytical scope of the field, itsrelevance to the cell biology community is warranted by the shared underpinning physics, design, and manufacture aspects.

The Lab on a Chip research field is transdisciplinary, and hosts scientists with backgrounds ranging from physics and fluid dynamics to cell biology and neuroscience. This course provides an umbrella, providing insight in the analytical and manufacturing aspects by creating insight opportunities and restrictions in the design underpinned by physical principles of miniaturisation, microfabrication, and application. With 3D printing playing an important and growing role in the manufacture of these devices, particularly in the research prototyping, a strong focus on the different 3D printing approaches will be provided.

Objectives

The primary objectives of the course are as follows:

- i) Exposing participants to the fundamentals of microfluidics, microfabrication, and separation science
- ii) Providing an understanding of the impact of the manufacturing approach on design, integration, and cost of prototyping and upscaling,
- iii) Building in confidence and capability amongst the participants in the analysis of existing systems to reverse-engineer the application, (bio)chemical, fluid dynamic, and manufacturing-induced challenges and solutions
- iv) Providing exposure to practical problems and their solutions in Point of Care analysis
- v) Enhancing the capability of the participants in the selection of the appropriate analytical andmanufacturing path for addressing an analytical challenge with a lab on a chip solution.

The Faculty:



PROF. Dr. ROSANNE MARIEKE GUIJT Deakin University Geelong Waurn Ponds Campus, Australia Prof. (Dr.) Rosanne Marieke Guijt, Deakin University Geelong Waurn Ponds Campus, Australia is a full-time Professor. Her main scientific research is the development and application of miniaturised instrumentation across life sciences, with a focus on portable and field deployable analytical instrumentation. Her current research ranges from the fundamental instrument and chip design using computational fluid dynamics to the application of the microfluidic system to point of care analysis, food safety and bioprocess monitoring, as well as security screening of explosive residues and environmental monitoring. She also has an interest in the development of manufacturing methods for functionally integrated microfluidic devices, including injection molding and 3D printing. Her strength lies in building and leading teams to work together at the disciplinary interface, combining complementary expertise to solve practical problems. Her research is innovative and has high impact; over the past 5 years, 71% was published in Q1 journals. She has published over 130 journal articles. She is interested in strategies to enhance performance by focusing on deep learning and creativity. At a postgraduate level. She leads a study implementing gratitude practice in RHD supervision, with as result in enhanced productivity and reduced stress levels for students and supervisors.

Prof. (Dr.) Ashok Kumar Malik is a Professor of Chemistry in the Department of Chemistry, Punjabi University, Patiala (India). He has more than 30 years of research in academia. Prof. Ashok Kumar Malik did his Ph.D. in 1991 from Punjabi University, Patiala, Punjab, India. After this, he was awarded the prestigious AvH research fellowship for postdoctoral studies in Germany. He has also worked as an invited scientist in UCM, Madrid, Spain and as visiting Professor in Valencia University, Valencia, Spain and Hanyang University, Seoul. He was awarded the senior executive research fellowship by the Australian Research Council. He has published more than 200 research papers and several reviews and book chapters to his credit. He has been sanctioned for various national and international research projects for his research activities. At present, he has been sanctioned GIAN and VAJRA projects. He has participated in more than 15 international conferences in India and abroad. He has guided 20 Ph.D. students and 8 are doing Ph.D. with him. His main research activities include environmental, separation science, and mass spectrometry.



Prof. Ashok Kumar Malik Department of Chemistry, Punjabi University, Patiala

Who can participate?

This course is important and intended for Post-graduate students,M. Phil and PhD research scholars, Postdoctoral research fellows, as well as faculty and scientific staff working in the area of environmental chemistry and environmental preservation in academia, industry and professional laboratories in the public and private sectors. The maximum number of participants is limited to thirty only.

Course	9 days (10-20 th , January 2023)						
duration							
Venue	Punjabi University, Patiala						
Mode	Offline						
Registration	Undergraduate/PG students/M.Phil. ₹ 500/-						
fee	PhD scholars/Postdoctoral fellows: ₹ 1000/-						
	Faculty: ₹ 1500/-						
	Industry-sponsored participants: ₹ 2000/-						
	The participants can pay the fee in cash or alternatively, the participants can pay the fee as a						
	Demand Draft (DD) favoring "The Registrar, Punjabi University, Patiala" payable at Patiala before						
	the last date of registration. The participants are required to send a scanned copy to						
	malik_chem2002@yahoo.co.uk						
	Alternatively payment can be transferred to:						
	Bank Account No.: 40014832301						
	Account Name : GIAN SCHEME PUNJABI UNIV PATIALA						
	Bank : State Bank of Patiala, Punjabi University, Patiala						
	IFSC : SBIN0050009						
	All participants must submit the registration form available as Google Form using the following link:						
	https://docs.google.com/forms/d/e/1FAIpQLSeHDf5mIuVMHKRa7IZ-						
	T5GnOpMj5jLjCWA8rv8g40fZRIUt6w/viewform?usp=pp_url						
	Alternatively, this link can be copied and pasted in your web browser to access the form.						
	The last date for registration is 3 rd January, 2023						
Boarding and	Participants can avail of accommodation during offline mode on the University campus on actual						
Lodging	payment basis.						

For any queries, please contact at: malik_chem2002@yahoo.co.uk (9815551332)

Ashok Kumar

GIAN Coordinator Principal Course Coordinator Prof. Ashok Kumar Malik Department of Chemistry, Punjabi University, Patiala

Annexure

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GIAN Course Miniaturised Total Analysis Systems Lectures Schedule: January10 – January 19, 2023 (9 days)

Module	Day and Date	Time	Торіс	(Resource Porson)
MicroTAS and lab on a chin	$\frac{(Jall., 2023)}{Dov1(10/1)}$	00:30 am 10:00 am	Insuguration	VC
where t AS and tab on a chip	Day1 (10/1)	10:00 am = 11:00 am		
		10.00 alli - 11.00 alli		RU DC
		11:00 am - 01:00 pm		KU
		01:00 pm - 02:00 pm		DC
		02:00 pm - 03:00 pm	Mixing at the microscale	RG
		03:00 pm - 04:00 pm	Examples	RG
Analytical chemistry	Day 2(11/1)	10:00 am - 11:00 am	Liquid chromatography, theory and mass	AKM
			spectrometry	
		12:00 pm - 01:00 pm	Practical Training on HPLC	JSA
			LUNCH	
		02:00 pm - 03:00 pm	Miniaturisation of analytical techniques	RG
		03:00 pm - 04:00 pm	Miniaturisation of Detection [*]	RG
		04:00 pm - 05:00 pm	Miniaturisation of the analytical workflow [*]	RG
Electrophoresis	Day 3 (12/1)	10:00 am - 12:00 pm	Capillary electrophoresis and Electro-osmotic flow	MH
		12:00 pm - 01:00 pm	Free flow electrophoresis [*]	RG
			LUNCH	
		02:00 pm - 03:00 pm	CE on a chip – pinched and gated injection	RG
	Day 4 (13/1)	10:00 am - 11:00 am	In Silico Electrophoresis [*]	RG
		11:30 am - 1:00 pm	In Silico Electrophoresis tutorial	RG
			LUNCH	
		2.00 pm - 5.00 pm	1) Modelling and simulation of electrophoresis	SB
			techniques: with hands-on training using open-	
			source software.	
			2) Isotachophoresis: Theory and applications	
Microfabrication	Day 5 (16/1)	10:00 am - 11:00 am	Microfabrication using clean room technology*	RG
		11:00 am - 12:00 pm	Microfabrication by replication *	RG
			LUNCH	

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		2:00 pm - 03:00 pm	Functional integration	1.5.5
	Day 6 (17/1)	10:00 am - 11:00 am	Paper microfluidice	RG
		11:30 am - 1:00 pm	Paper microfluidics totacial	RG
				RG
		2.00 pm - 3.0 pm	Introduction to 3D printers	DC
20 1.1. 0.1.		3.00 pm - 5.00 pm	Tutorial on 3 D printers (Hands on Training)	BS
3D printing of microfluidics	Day 7(18/1)	10:00 am - 12:00 pm	Types of printers	BS
		12:00 pm - 01:00 pm	3D printed microfluidics	RG
			LUNCH	RG
		02:00 pm - 03:00 pm	Focus on DLP	- PC
		03:00 pm - 04:00 pm	Functional integration by 3DP	RG
Point of Need Testing	Day 8 (19/1)	10:00 am - 12:00 pm	Nucleic acid testing	RG
		12:00 pm - 01:00 pm	Proteins	RG
			LUNCH	
		02:00 pm - 03:00 pm	Bacteria and cell separation	PG
		03:00 pm - 04:00 pm	Reverse engineering a microfluidic solution to a clinical problem	RG
	Day 9 (20/1	10:00 am - 11:00 am	Examination	
		11:00 am - 12:00 pm	Discussion	RG
		12:00 pm - 01:00 pm	Valedictory	RG
			- accuración y	RG
				1

RG : Prof. Rosanne Guijt, PSK : Prof. Philippe Schmitt Kopplin, AKM: Prof. Ashok Kumar Malik, SB: Prof. Supreet Bahga, JSA: Dr. Jatinder Singh Aulakh

Vice Chancellor Punjabi University, Patiala, Seal

Prof. Arvind, Vice Chancellor

Signature of the Head of Indian Institution

des him/her with life time registration to enroll in any number of the GIAN courses offered. <u>Stage –</u> se Registration (Through GIAN Portal): Log in to the GIAN portal with the user ID and Password

ick on "Course Registration" option given at the top of the registration form.

Select the Course titled "**Miniaturised Total Analysis Systems**" :Course Code: 196051M01 from the list and click on "Save" option. Confirm your registration by Clicking on "Confirm Course". PAYMENT MODE: DD for registration fee in favor of <u>The Registrar, Punjabi University, Patiala</u> payable through any Nationalized Bank at Patiala. DD should reach to Prof. Ashok Kumar Malik at the address given below.

DETAILS OF REGISTRATION

 Name (in Block letters)

 Designation /Highest Qualification

 Department

 Institute Name

 PIN

 Telephone

 Mobile

 Email

 Accommodation required?

 DD Number

 Bank Name

 CATEGORY OF PARTICIPANT:

 (Faculty/student/Research Scholar)

 I agree to attend the course for the entire duration.

LOBAL INITIATIVE OF ACADEMIC NETWORKS (GIAN) Ministry of Human Resource Development Government of India

PUNJABI UNIVERSITY, PATIALA



GIAN COURSE ON

Miniaturised Total Analysis Systems

Course Code : 196051M01

9 days (10th - 19th, January 2023)

Department of Chemistry

Punjabi University,

Patiala - 147002

Punjab

REGISTRATION FORM

Those who registered online in GIAN portal shall pay the registration fee as detailed below. Others who are not registered online are hereby instructed to Register themselves in GIAN portal and Registration fee has to be paid as detailed below.





PUNJABI UNIVERSITY, PATIALA



GIAN COURSE ON

Miniaturised Total Analysis Systems

Course Code : 196051M01

9 days (10th - 19th, January 2023)

Department of Chemistry Punjabi University, Patiala – 147002 Punjab

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<u>Stage – 1:</u> Web (Portal) Registration: Visit GIAN Website at the link: <u>http://www.gian.iitkgp.ac.in/GREGN/index</u> 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.

This provides him/her with life time registration to enroll in any number of the GIAN courses offered. <u>Stage –</u> <u>2:</u> Course Registration (Through GIAN Portal): Log in to the GIAN portal with the user ID and Password created.

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from the list and click on "Save" option. Confirm your registration by Clicking on "Confirm Course".

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DETAILS OF REGISTRATION

Name (in Block letters)		
Designation /Highest Qualification		
Department		
Institute Name		
PIN		
Telephone		
Mobile		
Email		
Accommodation required?	YES / NO	
DD Number		
Bank Name		
CATEGORY OF PARTICIPANT:		
(Faculty/student/Research Scholar)		
I agree to attend the course for the entire duration.		
Signature of the participant		
Date:	Signature of the sponsoring authority with seal:	
Place:		

The scanned copies of duly filled registration form and DD must reach by e-mail/post on or before 12th Jan. 2018 to "**Prof. Ashok Kumar Malik, Department of Chemistry, Punjabi University, Patiala - 147 002, Punjab.**"

The hard copies of Registration form and DD shall be submitted in person at the time of course attendance

Alternatively payment can be transferred to:

Bank Account No.: 40014832301 Account Name : GIAN SCHEME PUNJABI UNIV PATIALA Bank : State Bank of Patiala, Punjabi University, Patiala IFSC : SBIN0050009