Optical microsystems for applications in optical engineering

Overview: The present and future measurement and sensing instruments require miniaturized optical systems with more degrees of freedom to meet greater demand in their performance. Such optical systems consists of optics of micro scale and are typically fabricated by lithographic process similar to microelectronics. Micro optics can be refractive and diffractive depending on its functioning principle. They can also be hybrid utilizing both the principles, refraction and diffraction, to achieve the desired performance goal. In the last decade there have been technological advances in precision optical technologies whereby new design, manufacturing and testing procedures for such optics are developed. There is a need for optical engineers and scientists to learn about the recent scientific and technological developments and aware about the challenges involved in incorporating such optics in the optical systems

Tentative Dates	19th – 23rd February 2019
Objective	• To understand the latest design approaches of micro and diffractive optics • Expose the participants in order to identify the most suitable fabrication process for micro and diffractive optics as per their applications • A performance analysis and metrological testing methods for micro-diffractive optics • A special emphasis is placed on the industrial applications of micro-diffractive optics for sectors such as space, medical, illumination and semiconductor
Host Institute / Venue	Indian Institute of Technology (IIT), Delhi
Participants	Limited to 40
Who Should Attend	❖ Executives, Engineers and researchers from optical manufacturing; Government organizations including R&D laboratories. ❖ Students at all levels (B Tech/MSc /M Tech/PhD) and Faculty from reputed academic institutions and technical institutions
Course Registration Fees	The participation fees for taking the course is as follows: **Research Scholars / Students** Rs.5000/- **Faculty:** Rs.10000/- **Working Professionals:** Rs.15000/- **Participants from Abroad:** US $ 500 The above fees **(inclusive of GST)** and includes the use of all instructional materials assigned for the course and laboratory equipment usage charges.

Registration Process	**Step 1: GIAN web Portal Registration:** Register in the GIAN portal i.e. http://www.gian.iitkgp.ac.in/GREGN/index by paying Rs. 500/- online. Registration to this portal is the one-time affair and will be valid for the lifetime of GIAN. Please note that course fee is separate. **Step 2:** Login to the GIAN portal with the registered User ID and Password. Choose for the Course registration option. Select the course titled "Downstream Processing for Production of Biologicals" from the list and click the "Save" option. Confirm your registration by clicking the suitable option. **Step 3: Course Shortlisting:** Candidates will be intimated through email regarding their selection. **Step 4: Course Fee Remittance:** Once you receive the intimation from the Course Coordinator, the fee (as applicable) need to be paid. The participants will be provided with accommodation (if available) on payment basis. **Mode of payment:** The details of fee payment by Electronic Clearing Service/ RTGS/ Demand Draft in the name of **"IITD CEP ACCOUNT".** 1 Bank Account No. 36819334799 3 MICR Code 110002156 4 Beneficiary IITD CEP ACCOUNTS 5 IFSC Code SBIN0001077 6 MICR Code 110002156 7 SWIFT Code SBININBB547 8 IITD PAN No. AAATI0393L 9 Account Type Saving The participants are required to send the Demand Draft for the registration fee to the Coordinator: **Dr. Gufran S Khan** **Room No. WS-140** **Instrument Design Development Centre** **Indian Institute of Technology Delhi** **Hauz Khas, New Delhi-110016** **Step 5:** Fill up the registration form **(Given in Page no. 5 of this brochure)**, by providing details of the bank transaction. Send the scanned copy of registration form to the Course coordinator at gufranskhan@iddc.iitd.ac.in before **20th January 2019**
Accommodation	The participants (students) may be provided with hostel accommodation, depending on the availability, on payment basis. The faculty & working professional may be provided with faculty guest house accommodation, depending on the availability, on payment basis.

Tentative Lecture Plan

	Sessions	Duration	Teaching Faculty
Day 1	Fundamentals of geometrical optics, Optical engineering of imaging systems, Design criteria of good imaging	2 hours	Prof. Stefan Sinzinger
	Tutorial 1 : Problem solving session with examples: Exercises on fundamental geometrical optics and imaging applications	2 hours	Prof. Stefan Sinzinger/ Dr. Meike Hofmann
Day 2	Overview of diffractive and micro optics, Novel characteristic of diffractive optics, performance analysis of microlenses	1 hour	Prof. Stefan Sinzinger
	Design criteria of diffractive elements, Diffraction efficiency analysis of binary (Amplitude and Phase) and multi-level diffractive optics	1 hour	Dr. Gufran S.Khan
	Tutorial 2 : Problem solving session with examples: Design of hybrid optics for achromatisation, Exercises on diffraction efficiency analysis of binary and multi-level diffractive optics	2 hours	Prof. Stefan Sinzinger/ Dr. Meike Hofmann
Day 3	Fabrication technology of micro and diffractive optics, Lithography techniques: Photolithography, direct lithography writing, interferometric exposure, gray scale lithography, e-beam lithography	1 hour	Prof. Stefan Sinzinger
	Direct machining, replication techniques, dynamic methods of developing micro optics, manufacturing methods of plastic micro optics	1 hour	Dr. Gufran S.Khan
	Tutorial 3: Problem solving session with examples: Design exercises of diffractive optics, calculation of phase profile, transition points and etch depth; resolution limits of optical and e-beam lithography	2 hours	Prof. Stefan Sinzinger Dr. Meike Hofmann

Foreign Guest Faculty

Prof. Stefan Sinzinger

Prof. Stefan Sinzinger is Professor at Illmenau University of Technology. He is a leading expert in the field of microoptics and optical systems engineering; solid publication record; 15 years of experience as university professor, teaching in physical optics, optical engineering and Optronik (opto mechatronics); outstanding track record in interdisciplinary collaborative research projects reaching from basic research to applied industrial projects; international network in science and industry; experience as co-founder and executive officer in spin-off companies. He is recipient of young scientist award "Bennigsen-Foerder Preis"of the state of Nordrhein-Westfalen, IENA fair award, Edmund optics research and innovation award.

Day 4	Measurement and characterization of micro optics; profilometry, interferometry, array testing	1 hour	Prof. Stefan Sinzinger
	Application of diffractive optics as null element in opticalmetrology, testing of aspheric and freeform optics, absolute testing	1hour	Dr. Gufran S. Khan
	Tutorial 4 : Problem solving session with examples: Design of diffractive null element for aspheric and freeform optics in reflection and transmission mode	2 hours	Prof. Stefan Sinzinger Dr. Meike Hofmann
Day 5	Applications of micro optics, array illuminators, beam shaping, microoptical manipulation of atoms	1 hour	Prof. Stefan Sinzinger
	Adaptive optics and wavefront sensing with Shack Hartmann Sensor	1 hour	Dr. Gufran S. Khan
	Tutorial 5:Design of wavefront sensor of required dynamic range, Demonstration of Shack Hartmann Sensor	2 hours	Dr. Gufran S. Khan

Course Co- ordinator

Dr. Gufran Sayeed Khan

Dr. Gufran S. Khan is an Associate professor at the Instrument Design Development Centre, IITD, Delhi. Prior joining IITD he has worked as scientist in CSIO-CSIR Chandigarh, and Post-doctoral Fellow at Marshall Space Flight center (NASA-MSFC), Huntsville, Alabama, USA. His research area covers Diffractive and aspheric optics, Metrology of Aspheric and freeform optics by using Computer Generated Holograms, Computer controlled polishing process, Fabrication of Aspheric surface using SPDT, Development of optics for X-Ray astronomy. He is recipient of International Max Plank Research school (IMPRS) fellowship.

GIAN COURSE REGISTRATION FORM

(19th February 2019 to 23rd February 2019)

NAME: ……

DESGINATION: ……

ORGANIZATION: ……

ADDRESS: ……

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EMAIL ID: ……

MOBILE NO. ……

COURSE NAME: ……..

Fees payable to "IITD CEP ACCOUNT" , SBI , IIT DELHI

TRANSACTION NO. (e-transfer/RTGS/NEFT) ……..

DEMAND DRAFT NO.(If paid by Demand Draft)……

Place : ……

Date : …… **Signature of the Applicant:** ……