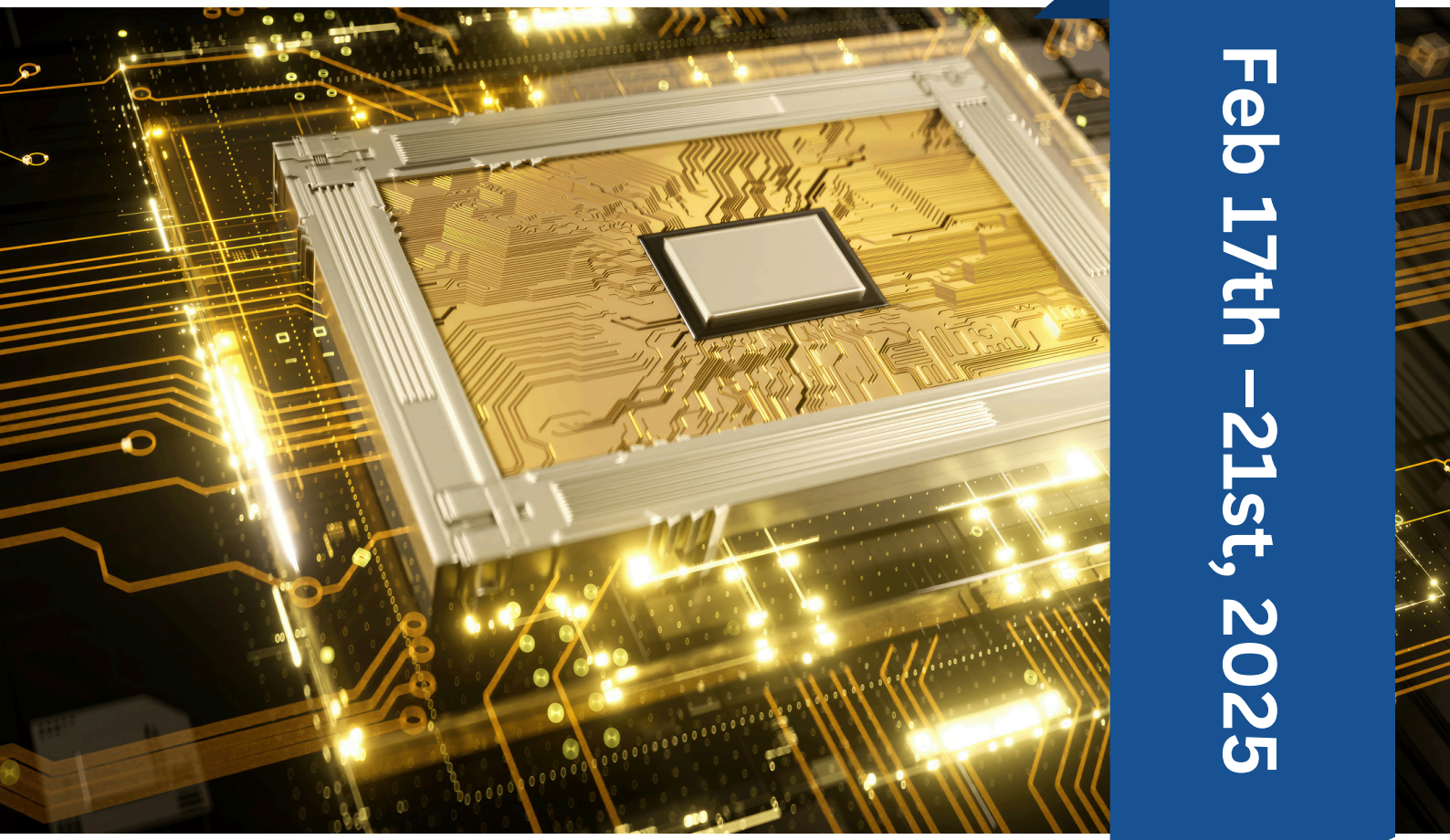
सत्यमेव जयते
Ministry of Human Resource Development

GLOBAL INITIATIVE OF ACADEMIC NETWORKS

GIAN Course

on

2-Dimensional Materials for Future Microelectronics



Feb 17th –21st, 2025

Jointly Organized by

Department of Electronics and Communication

&

Department of Physics

University of Allahabad

Prayagraj-211002

इलाहाबाद विश्वविद्यालय
QUOT RAMI TOT ARBORES
यावत्यः शाखास्तावन्तो वृक्षाः

Co-Ordinator's:

Dr.Lucky Agarwal	**Course Coordinator**
Prof. Pratima	**Course Coordinator**
Prof. Bhoomika R. Kar	**Local coordinator, GIAN, UoA**

Overview

The study of synthesis generally, and 2-D material specifically, is an interdisciplinary enterprise. Thus, course will draw attention on research in physics, chemistry, electronics and related disciplines. Lectures will comprise empirical articles, review, and opinion/perspective papers that will introduce students to methodology and research questions currently under investigation in development of science. Students are encouraged to consider the role of research findings in policy issues.

In summary, 2-D materials hold tremendous promise for the future of microelectronics, offering unique properties that can revolutionize the design and performance of electronic devices. However, addressing manufacturing challenges and finding practical integration strategies will be key to realizing their full potential in the industry. Each of the complicated topics that will be discussed has the potential to be a semester's worth of study all by itself. Because of this, our goal is to provide you with a general review of the fabrication as well as some insight into the theoretical, empirical, and application difficulties. The course content will be organized into 5 modules, the first module will provide the fundamental knowledge about 2-D materials and related electronic device, the other three will focus on application of 2-D material in bioscience, environmental science, brain computing, and the last one will focus on 3-D integration of 2-D devices.

Objectives	• To provide a comprehensive understanding of the role played by two-dimensional (2D) materials, such as graphene, transition metal dichalcogenides (TMDs), and black phosphorus. • To explore the significance of 2D materials: bio-inspired sensing, neuromorphic computing, and hardware security. • To investigate the significance of 3D integration of 2D devices - current status, challenges, and future opportunities. • Design examples in micro- and nano-technology, practical simulation and test. • To provide an understanding of current research in validation testing, electronics metrology and prognostics/lifetime assessment.
 Lecture Schedule: **Feb 17th to 21st, 2025**	**The course is divided into lectures, tutorials, and hands-on training** **5 Lectures of 3 hour each with following brief details;** • Fundamentals of 2D FETs (transport, contacts, doping, interface, dielectric) • Very-large-scale integrated (VLSI) circuits using 2D FETs • 3D integration of 2D FETs • 2D FETs for bio-inspired computing • 2D FETs for hardware and information security • 2D Straintronic Devices • Machine learning aided chemosensing using 2D FETs **5 Tutorials/hands on training of 2 hour each with following brief detail;** • Tutorial 1: Demonstration on pre-fabricated semiconductor-based devices. • Tutorial 2: Demonstration on Synthesis of nanoparticles by Wet Chemical method • Tutorial 3: Demonstration of exfoliation of flakes to create hetero-stack. • Tutorial 4: Hands-on session on synthesis of metal oxide nanoparticles by sol-gel route. • Tutorial 5: Hands on session on synthesis of conducting polymer- based nanocomposite

Evaluation	Participants will be evaluated through Assignments/Quiz. After successful completion of the course, all participants will get participation certificates. Number of participants for the course will be limited to Fourty (40).
Registration Fee	The participation fee for the course is as follows: **Students and Research Scholars: Rs.1000** **Faculty/Academic Professionals: Rs. 4000** **Industry Professionals: Rs.5000** **Participants from abroad: $ 100** The above fee includes all instructional materials and 24 hours free internet facility. Note: The last date for registration is **20th December 2024.** 
Course Venue	For Theory Session: Department of Electronics and Communication, UoA, Prayagraj. For Tutorial Session: Department of Physics, UoA, Prayagraj. 
You Should Attend If…	• Enthusiasts in the fields of microelectronics, 2-Dimensional materials etc. • Chemical Process Engineer, Material Scientists. • Students or Faculty from academic institutions. • Scientists and product developers from Industry/Research organization. • Industrialist working in the area of semiconductor and microelectronics.
Things to remember	• No TA, DA will be provided to the participants. Participants have to arrange their own accommodation. However, limited shared accommodation may be made available (subject to availability) in the Institute Executive Centre/ Guest Rooms of Hostels on request on first come first serve basis. • **SEATS are Limited to 40** 

Registration Process

Step 01

Participants need to register themself for the course by filling the Google form. Click the link below and fill the Google form: **https://forms.gle/PtfhCD9brsRMja1SA**
Last Date for the submission of Google form is **20th December 2025**.

Step 02

Participant will be shortlisted as per the set norms. The shortlisted participants will be intimated before 25th December 2024.

Step 03

After shortlisting, the registration fee needs to be deposited online in the institute account, The link for payment will be shared to the shortlisted participants via an email.

Step 04

After online payment of the registration fee, the participants will receive the confirmation mail

About the University

The University of Allahabad is a Central University and was known as the 'Oxford of the East' for its enormous importance as a centre of academics and research. Established on 23rd September 1887, it is the fourth oldest University of India after Calcutta, Bombay and Madras University. The University has had a history of academic and cultural achievements to its credit. Illustrious scholars, scientists, writers and artists like Meghnad Saha, A.N.Jha Firaq Gorakhpuri and Kshitinadranath Majumdar contributed to making the University a centre of thriving academic and cultural activities. The University has shaped the cultural and intellectual debates in this part of the country over several decades.

About the Department
Department of Electronics and Communication:

The Department of Electronics and Communication, J.K. Institute of Applied Physics and Technology is located in the campus of Science faculty of University of Allahabad. Its was inaugurated by late Pt. Jawahar Lal Nehru, on April 4, 1956. This Department took significant strides in establishing for itself a nationwide reputation. The Department conducts courses in the field of Electronics and Communication and Computer Science leading to the degrees of Bachelor of Technology (B. Tech.), Master of Technology (M. Tech.), B. Sc. (Comp. Sc.) and M. Sc. (Comp. Sc.). These courses are designed to meet the current challenging demands of the Nation. The Post graduate course in Computer Science was started in the year 1986. The institute has state-of-the-art laboratories and class rooms. The institute has a very good placement record and the Alumni of University are spread through out the world and are occupying key positions in their field.

Department of Physics:

Department of Physics in the faculty of Science is a vibrant department full of energy and enthusiasm. M.N. Saha established the department in 1923 as its first professor and head and within a decade it became the internationally acclaimed Center of Physics. The department has rich group of theoreticians and experimentalists. In the recent past, the department established new research experimental facilities namely emerging laser based spectroscopic techniques, fabrication of emerging solar cells, synthesis, characterization and applications of nanomaterials in diverse fields. Various theoretical groups in the department are engaged in studies in the field of nuclear and particle physics; condensed matter physics, shock waves and plasma physics. The department offer B.Sc. and M.Sc. and PhD courses in physics.

The Faculty

Prof. Saptarshi Das (SD)

Professor, Pennsylvania State University, USA

Prof. Das is working as a Professor in Department of Engineering Science and Mechanics, Department of Materials Science and Engineering (by Courtesy), Department of Electrical Engineering and Computer Science (by Courtesy), Material Research Institute, Pennsylvania State University, USA. He has done PhD from Purdue University, USA and BE from Jadavpur University, India. He was awarded with Outstanding Research Award - Penn State Engineering Alumni Society (PSEAS) Early CAREER Award - National Science Foundation (NSF), Outstanding Teaching Award - Penn State Engineering Alumni Society (PSEAS), Rustum And Della Roy Innovation In Materials Research Award, Young Investigator Program (YIP) Award – Air Force Office of Scientific Research (AFOSR), Ph.D. Fellowship – International Business Machine (IBM). His google citation is 13004 and h-index is 42

Dr. Lucky Agarwal (LA)
Department of Electronics and Communication,
University of Allahabad, Prayagraj

Dr Lucky Agarwal received his B.Tech degree from Gautam Budh Technical University, Lucknow in 2010, the M.Tech degree in Microelectronics and VLSI and PhD degree in nanotechnology from MNNIT ALLAHABAD in 2014, 2018 respectively. He was awarded with a gold medal for standing first in order of merit in M.Tech. He is currently working as an assistant professor in the department of electronics and communication, J.K. institute of applied physics, university of Allahabad since may 2023. Till now lucky Agarwal has published more than 38 research articles. His research area includes high efficient biodegradable solar cell.

Prof. Pratima (P)
Department of Physics,
University of Allahabad, Prayagraj

Dr Pratima Chauhan is a full professor of Physics in the Department of Physics, University of Allahabad. 12 students have been awarded PhD degree under her supervision. Currently seven students are working towards their PhD degree under her guidance and mentorship. Her research focuses on fabrcation, characterisation, and applications of nano-material. She has published more than 75 papers in journals of international repute. Her academic career is decorated with several reputed awards and funding. She taught at University of Genoa, Italy as a visiting professor in the year 2013. She graduated in Physics (Hons) from the prestigious St Stephens College of University of Delhi in the year 1992. She received her masters degree in Physics with specialisation in Electronics from Department of Physics and Astrophysics , University of Delhi in the year 1994. She has a long experience of teaching at Delhi University Colleges, She was a Post doctoral fellow(CSIR) at National Physical Laboratory, New Delhi, India from 2002 to 2004 before joining University of Allahabad in the year 2004 as an Assistant Professor.

For any queries reach out to-

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