



IIT(ISM)
DHANBAD



MALAVIYA MISSION
TEACHER'S
TRAINING PROGRAMME
MMTTC – UGC INITIATIVE

OFFLINE REFRESHER COURSE

DEVICE-CIRCUIT CO-DESIGN

From Emerging Materials to Intelligent Systems

Two-week Offline Faculty Development / Refresher Course

AUG
10-23
2026



Host Institute
Indian Institute of Technology
(ISM) Dhanbad



Venue
Malaviya Mission Teacher Training Centre,
IIT (ISM) Dhanbad



Registration Free



Application deadline: 31 July 2026



COURSE FOCUS

A cross-layer journey from emerging materials and nanoscale device physics to reliable circuit and intelligent system design.



Emerging devices –
2D and carbon nanomaterial FETs



Compact modelling –
SPICE-ready device parameters



Circuit reliability – variability, leakage,
electro-thermal effects



Intelligent systems – low-power IoT
and system implications



PARTICIPANTS WILL LEARN TO



Develop device-aware circuit designs



Analyze cross-layer interactions
from materials to systems



Integrate reliability-conscious strategies
into advanced electronic systems



72
contact
hours



48+24
lecture +
hands-on



CAS /
UGC
recognized



MCQ
assessment



Certificate
on successful
completion



HANDS-ON EXPOSURE



SPICE
simulations



MATLAB-based
modelling



TCAD
demonstrations



Project work
and activities



ELIGIBILITY

Faculty members of universities and colleges under UGC Section 2(f). For Refresher Course admission, FIP participation is a prerequisite and a one-year gap after FIP is required.



RESOURCE PERSONS & EXPERT POOL

Eminent experts from IIT Roorkee, IIT Kharagpur, IIT BHU, IIT Ropar, IIT Patna, IIT Madras, IIT Kanpur, IIT Guwahati, IIT Indore, IIT Delhi, IIT Gandhinagar, IIITDM Kancheepuram, IISc Bangalore, CSIR-CGCRI, Synopsys, ISRO/SCL and IIT (ISM) Dhanbad.



APPLY ONLINE

Register at mmc.ugc.ac.in, select Refresher Course, choose Indian School of Mines (Jharkhand) (10/08/2026–23/08/2026), upload approved NOC, and submit.



Scan to Register



COURSE COORDINATORS

Prof. Manodipan Sahoo
manodipan@iitism.ac.in | +91-9523625566

Prof. Rajeev Kumar Ranjan
rajeev@iitism.ac.in | +91-9471191517



www.iitism.ac.in



Offline Refresher course on

DEVICE-CIRCUIT CO-DESIGN: FROM EMERGING MATERIALS TO INTELLIGENT SYSTEMS

August 10-23, 2026

INDIAN INSTITUTE OF TECHNOLOGY (ISM) DHANBAD

Organizing Committee

Course Coordinator

Prof. Manodipan Sahoo

manodipan@iitism.ac.in

+91-9523625566

Course Co-coordinator

Pof. Rajeev Kumar Ranjan

rajeev@iitism.ac.in

+91-9471191517

Venue

Malaviya Mission Teacher Training Centre, Indian Institute of Technology (ISM) Dhanbad

Website: <https://www.iitism.ac.in/>

About The Refresher Course:

The two-week offline refresher course on *Device–Circuit Co-Design: From Emerging Materials to Intelligent Systems* focuses on bridging the gap between emerging materials, nanoscale device physics, circuit design, and system-level performance. As CMOS scaling reaches its physical limits, modern electronics demands cross-layer optimization rather than isolated design approaches. This course equips participants with the knowledge and tools required to understand and implement integrated co-design methodologies. The program begins with an overview of advanced semiconductor scaling challenges, including short-channel effects, variability, leakage, and reliability concerns. It introduces emerging materials such as 2D materials and carbon-based nanomaterials, highlighting how their electrical and thermal properties influence transistor and interconnect performance. Participants will learn how device-level parameters are translated into compact models suitable for SPICE simulations. The second phase emphasizes circuit- and system-level implications. Topics include variability-aware digital design, analog performance trade-offs, electro-thermal modeling, and reliability analysis. Special attention is given to low-power architectures, and IoT systems, where device non-idealities significantly impact overall efficiency. Hands-on sessions using SPICE, MATLAB-based modeling, and TCAD demonstrations ensure practical understanding of theory-to-implementation workflows. This course is ideal for faculty members, PhD scholars, and researchers in VLSI, nanoelectronics, seeking contemporary expertise in next-generation design methodologies.

After attending the refresher course, the participants will independently be able

- ✓ to develop device-aware circuit designs
- ✓ to analyze cross-layer interactions from materials level to systems level
- ✓ to integrate reliability-conscious strategies into advanced electronic systems

Participants: Eligibility Criteria:

- Faculty members working in universities and colleges that are included under Section 2(f) of the UGC Act. The teachers of colleges that do not yet come within the purview of Section 2(f) but have been affiliated to a university for at least three years, will be permitted to participate in the courses. These conditions are applicable only for Residential Training Programmes/Courses.
- For the Refresher course (RC), participation in the FIP is a prerequisite for admission. The teacher may opt for a refresher course after a one-year gap following FIP.

Application Procedure:

- The participants should first register at <https://mmc.ugc.ac.in/> and create an account.
- In the application form, click on **Apply for** and Select **“Refresher Course”** Click on **Centre & Programme Date** and Select **“Indian School of Mines (Jharkhand) (10/08/2026- 23/08/2026)”**. Next Click on **Title** and Select the Programme title that automatically comes from the dropdown option. Fill in the other required details like **Your Subject Area Specialization; Year of Joining; Teaching Experience** and other details.
- Upload the NOC duly signed and approved by the **Head** of your **Institution** by clicking on the **“Choose File”** Button. Finally, click on **Submit** button.

(Sample NOC is available on the website to download (or) click on the link https://mmc.ugc.ac.in/Document/MMTTP_Nomination%20Letter_Format.pdf to download the sample NOC).

- The participants will get a confirmation email after registration.

Salient Features of the Course:

- The Refresher course will be held offline of two weeks duration, with a minimum of 12 working days and 72 contact hours (six hours a day, six days a week). The course will have 48 hours of Lectures by resource persons and 24 hours of Hands-on sessions; project works and other activities. There will be MCQ based assessment examination conducted at the end of the course. A Certificate will be issued to those who have attended all the sessions and have qualified the Assessment examination. This course will be considered for fulfilment of the requirements as laid down by UGC for Career Advance Scheme (CAS).
- Application/registration is free of cost.
- Local hospitality which includes boarding, tea/snacks and working lunch will be provided with the help of sponsor (MMTTC) limited to Rs. 1000/ per working day per participant. Campus Accommodation for outstation participants may be arranged on a first-come, first-served basis (on a payment basis). Complimentary food and refreshments would be provided for the entire duration of the course (for a maximum of 50 participants). No claim of reimbursement of hospitality expenses by the participants will be entertained.
- No TA/DA will be provided to the participants for attending the course. Travelling and other expenses should be borne by participants/sponsoring Higher Educational Institutions (HEI) only.
- Certificate of successful completion of refresher course shall be issued to the eligible participants.

Important Dates:

- Application deadline: **July 31, 2026**

Resource Persons

Name	Affiliated Department and Institute (with full address)
Prof. Anand Bulusu	Department of ECE, IIT Roorkee
Prof. Gorachand Dutta	School of Medical Science and Technology, Indian Institute of Technology (IIT) Kharagpur, Kharagpur, India - 721302
Prof. Sudeb Dasgupta	Department of ECE, IIT Roorkee
Dr. Somenath Roy	FMDD Division, CSIR CGCRI, Kolkata
Prof. Satyabrata Jit	Department of Electronics Engineering, IIT BHU
Prof. Rohit Y. Sharma	Department of Electrical Engineering, IIT Ropar
Prof. Saurabh Pandey	Department of Electrical Engineering, IIT Patna
Prof. Shanthi Pavan	Department of Electrical Engineering, IIT Madras
Prof. Swati Rajput	Department of Electronics Engineering, IIT (ISM) Dhanbad
Prof. Mukul Kumar Das	Department of Electronics Engineering, IIT (ISM) Dhanbad
Prof. Rajalingam Thangavel	Dept of Physics, IIT (ISM) Dhanbad
Prof. Subindu Kumar	Department of Electronics Engineering, IIT (ISM) Dhanbad
Prof. Subham Sahay	Department of Electrical Engineering, IIT Kanpur
Prof. Samarendra Dandapat	Department of Electronics and Electrical Engineering, IIT Guwahati
Prof. Santosh Kumar Vishvakarma	Department of Electrical Engineering, IIT Indore
Prof. Jawar Singh	Department of Electrical Engineering, IIT Patna
Prof. Tapan K. Gandhi	Department of Electrical Engineering, IIT Delhi
Prof. Tarun Agarwal	Department of Electrical Engineering, IIT Gandhinagar
Prof. Kumar Prasannajit Pradhan	Department of ECE, IIITDM Kancheepuram
Dr. Manoj Tiwary	Principal Engineer, Synopsys Technologies, Noida
Mr. Anurag Tyagi	Scientist “Engineer” SG, URSC, ISRO
Dr. Chetan Singh Thakur	Department of Electronic Systems Engineering, IISc, Bangalore
Dr. H. S. Jatana	Former Scientist G & Group Head, SCL, ISRO
Dr. Uday Khambete	Scientist, “Engineer” SF, SCL, ISRO

Eminent experts from premier institutes (IIT, NIT, University, Research labs) will be joining as resource persons.