Jointly Organized by
Electronics & ICT Academies

IITR, NITW, MNIT Jaipur
http://www.mnit.ac.in/eict

# Online Programme on Fundamentals of MOS Device Physics

09-20 Feb 2026

Faculty Development Programme
Electronics & ICT Academy under aegis of

Ministry of Electronics and Information Technology
Government of India

meity.gov.in/content/schemes-projects

**Chairman, EICT Academy & Director MNIT Jaipur**
Prof. Narayana Prasad Padhy

**Chief Investigator**, EICT Academy
Prof. Vineet Sahula, ECE

**Coordinator,** EICT Academy
Dr. Satyasai Jagannath Nanda, ECE

**Co- Chief Investigators**, EICT Academy
Prof. Lava Bhargava, ECE
Prof. Pilli Emmanuel Shubhakar, CSE
Dr. Ravi Kumar Maddila, ECE

**Objective (Electronics & ICT Academy-Phase II)**
1)To conduct specialized FDPs for faculty/mentor training in line with the vision of MeitY by promoting emerging areas of technology and other high-priority areas that are pillars of both the "Make in India" and the "Digital India" programs.
2) To promote synergy and collaboration with industry, academia, universities and other institutions of learning, especially in emerging technology areas.
3) To support the National Policy on Electronics 2019 (NPE 2019) which envisions positioning India as a global hub for ESDM sector, including MeitY Schemes/policies such as Programme for Semiconductors and Display Fab Ecosystem; India AI; National Programme on AI, Production Linked Incentive Scheme for IT Hardware & Large-Scale Electronics Manufacturing; EMC; SPECS; Chips to System (C2S); etc.
4) To promote standardization of FDPs through Joint Faculty Development Programmes.
5) To support the vision of the National Education Policy (NEP 2020), which mandates that Indian educators go through at least 50 hours in professional development programmes per year.
6) To design, develop & deliver specialised FDPs on emerging technologies/ niche areas/ specialised modules for specific research areas for Faculty in Higher Education Institutions (HEI), besides FDPs on multi-disciplinary areas connected with ICT tools and technologies and other digital hybrid domains, covering a wide spectrum of engineering and non-engineering colleges, polytechnics, ITIs, and PGT educators.

An intensive 40 Hours Training Programme in online mode is being organized for faculty and doctoral students of engineering and technological institutions. It is also open to working professionals from industry/organizations. The main theme of training program will be oriented around exploring the state of the art methods for Fundamentals of MOS Device Physics.

**Experts/Speakers-** A blend of academic excellence from IITs, NITs, and IIITs, together with practical perspectives from industrial leaders.

**Programme Modules:**

| |
|---|
| **Module 1:** Semiconductor Material Fundamentals: Energy Band Theory: Intrinsic vs. Extrinsic semiconductors, Fermi-Dirac distribution, and the concept of "Work Function, Carrier Dynamics: Drift and diffusion mechanisms; mobility ($\mu$) and the impact of temperature and doping concentration, Poisson's Equation: Governing the electrostatic potential and charge distribution within a semiconductor |
| **Module 2**: The MOS Capacitor (The Core Structure): Operating Modes: Visualizing and calculating Accumulation, Depletion, and Inversion (Weak vs. Strong), The Threshold Voltage ($V_{th}$): Physical derivation of $V_{th}$ and the impact of fixed oxide charges and interface states, Capacitance-Voltage ($C-V$) Analysis: Understanding Low-Frequency (LF) vs. High-Frequency (HF) curves to diagnose oxide quality and substrate doping, |
| **Module 3:** MOSFET Theory & Operation: Gradual Channel Approximation (GCA): Deriving the Square-Law model for Linear and Saturation regions, Body Effect: How substrate biasing shifts the threshold voltage ($V_{th}$), Subthreshold Conduction: Physics of leakage current when $V_{GS} < V_{th}$ and its critical importance in low-power 2026 electronics, |
| **Module 4**: Advanced Non-Ideal & Short-Channel Effects (SCE): Velocity Saturation: Why modern short-channel transistors don't follow the classic Square-Law, Drain-Induced Barrier Lowering (DIBL): How the drain voltage "robs" gate control in scaled-down nodes, Hot Carrier Effects: Impact of high electric fields on device reliability and aging, Quantum Mechanical Effects: Introduction to tunneling (Gate Leakage) and inversion layer quantization in sub-5nm FinFETs |

**Programme Coordinator:**

| | | |
|---|---|---|
| Dr. Deepak Bharti, MNIT Jaipur, Jt-PC | fdp.academy@mnit.ac.in | 9549659762 (M) |
| NITW, Jt-PC | Prof. Sanjeev Manhas, IIT Roorkee, PC | |

**Registration:**
Registration is open to faculty, working professionals, industry persons, doctoral, postgraduate and graduate students from India and rest of the world. Participants will be admitted on first-come first-served basis.
Register online at–(http://online.mnit.ac.in/eict/)

**Registration Fee:**

| Mode of programme | Academia (faculty/Students): India/SAARC/Africa | Others: India/SAARC/Africa | Rest of the world |
|---|---|---|---|
| Online | Rs. 500/- | Rs. 1000/- | US $ 60/- |

(A) Fee once paid will not be refunded back.
(B) The fee covers online participation in the programme, tutorial notes and examination, certification charges etc.
(C) The registration amount may be paid through online mode - NEFT / UPI / Cards / SWIFT, provided at the registration portal.
(D) Detailed schedule will be shared after receiving registration form.
→ For queries, **email us at** fdp.academy@mnit.ac.in

**MNIT Jaipur** one of the oldest NITs, the institute has a rich heritage of sixty years producing world class engineers, managers, architects and scientists. Ranked 43rd nationally in the NIRF ranking-2024 (Engineering), the institute offers learning opportunities for undergraduate, postgraduate students, and researchers in various domains. Having a lush green campus of over 317 acres within the heart of the pink city, close to Jaipur International Airport, the campus offers a safe and lively environment. A world class teaching infrastructure, state-of-art laboratories welcome you at the campus. The institute has a vision to impart education of international standards and conduct research at the cutting edge of technology.