Ministry of Electronics & Information Technology

Digital India
Power To Empower

Government of India Initiative for Capacity Building and Skill Development

Mentoring
Academicians & Professionals
for Future Generation

- *Faculty Training*
- *National Policy on Electronics 2019 (NPE 2019)*
- *National Education Policy (NEP 2020)*
- *Services for Industry*
- *Technical Incubation and Entrepreneurship*
- *Continuing Education for Students & Professionals*

IIT Guwahati	IIITDM Jabalpur	MNIT Jaipur	IIT Kanpur	NIT Patna	IIT Roorkee	NIT Warangal

Training Programmes in Winters 2025

India is fast emerging as a world power in Information, Communications Technology and Electronics (ICTE) sectors. To complement its growth and further development, there is an ever-increasing need for trained professionals with specialization in this space. This includes training of professionals not only in existing and changing technologies but also in the fields of R&D and electronics manufacturing. This will specifically be aimed at the ICTE sector to create a substantial resource pool of talent and generate ample opportunities for entrepreneurs. Ministry of Electronics & Information Technology (MeitY) has approved a scheme and setup Electronics and ICT Academies phase-II at 14 premier and leading institutions viz. IIT Guwahati, IIT Kanpur, NIT Warangal, NIT Patna and IIITDM Jabalpur, IIT Roorkee, MNIT Jaipur, 03 CDAC centres (Hyderabad, Mohali, Patna) and 03 NIELIT centres (Aurangabad, Calicut, Gorakhpur) and ICT Academy TN, Chennai. The outlay as 100% GIA, for period 2024-2029 is as follows.

Category	Total Outlay	Training Target Total (Faculty members)
14 Academies	Rs. 94.69 crore	1,35,000

These Academies are aimed at faculty/mentor development and upgradation to improve the employability of the graduates, diploma holders in various streams, through collaboration of States/Union Territories. The target beneficiaries are faculty Members in Engineering/ Science / Arts/ Commerce colleges/ academic institutions, including Trainers in Polytechnic, ITIs, and other PGT educators, including those candidates who are permitted to teach in these institutions.

Brief information about all the Academies is available at:
https://meity.gov.in/esdm/scheme-financial-assistance-setting-electronics-and-ict-academies

Activities of the Academies
- Faculty development for
    — Specialized training with hands-on on basic and advanced level topics for Engineering streams and
    — Domain based training on use of ICT tools and techniques for non-engineering streams
- Training and consultancy services for industry
- Curriculum development for industry
- Continuing Education programme for students / working professionals/ un-employed
- Design, Develop and Deliver specialized modules for specific research areas
- Providing advice and support for technical incubation and entrepreneurial activities
- To support the National Policy on Electronics 2019 (NPE 2019) which envisions positioning India as a global hub for ESOM sector
- To support the vision of the National Education Policy (NEP 2020

About Winter Courses
Online Training Programmes in core areas of Electronics and Information & Communication Technology (ICT) streams have been planned by academies for delivery during Winters (i.e., Jan-Mar 2025). All these Winter courses will be offered through online live web-conferencing, with instructor led live talks delivered by eminent experts from IITs, NITs, IIITs and other premier institutes/industries, even from within our country and abroad. Participants would be able to join online to web-conferencing platform using video/audio. For registration participants need to apply to any participating academy online through its website, as mentioned in details of respective programme,

How to apply:
* For a particular programme, a participant is encouraged to apply to respective coordinator at anyone of the seven Academies, participating in that programme.
* Government of India norms will be followed for SC/ST/EWS category participants.
* The application form is to be submitted in the online mode to the coordinator of the respective academy.
Note: Refer, programme offering Academies websites for complete contact address and other details of Winter courses.

Following programmes are being offered online jpintly bny EICT Academies in these Winters, Jan - Mar 2025. Each of the programmes is of 10 days duration (40 contact hours).

Names of courses in Winters 2025	Starting date	Completion date	Names of courses in Winters 2025	Starting date	Completion date
Generative AI and use cases (Weekends- Sat, Sun)	11 Jan	2 Feb 2025	VLSI Design using Open source tools	10 Feb	21 Feb 2025
Data Science for All	20 Jan	31 Jan 2025	Advanced Optimization Techniques using MATLAB	17 Feb	28 Feb 2025
Semiconductor Fabrication & Packaging Technology	20 Jan	31 Jan 2025	Intricacies of Analog & Mixed Signal design	17 Feb	28 Feb 2025
Cyber security (Dark Web)	20 Jan	31 Jan 2025	IoT Applications with Sensors, Embedded Systems, and Data Analytics	17 Feb	28 Feb 2025
AI and Deep Learning (Weekends- Sat, Sun)	1 Feb	23 Feb 2025	Quantum Computing (IBM)	17 Feb	28 Feb 2025
Technology enabled Teaching, Learning & process for Institutes	3 Feb	14 Feb 2025	Biometrics Security in the Generative AI Era	1 Mar	12 Mar 2025

There are many programmes offered by EICT Academy IIT Kanpur, as Self-Paced/Live in these Winters Jan - Mar 2025.

Self paced programmes		
Compiler Design, Analysis & Optimization	Full Stack Development with PhP & MySQL	Basic Programming using Python
Deep Learning with Generative AI for Computer	Linux	Cyber Security

Target Beneficiaries:

Interested Faculty/students of engineering/other institutions & professionals from our country as well as from outside India are eligible to attend these **Winter** courses. Additionally, faculty of non-engineering background are also invited to attend FDP on Technology Enabled Teaching Learning Process & Institutes. Industry persons and student participants are also invited to attend the aforesaid programmes to upgrade their skills.

Availability of seats at each offering Academy:

Participants will be selected based on first-cum-first-serve   basis by organizing the academy. Selected participants will be communicated through email / notified in E&ICT Academy websites. There is no limit on the number of participants, however, the only first 1000 participants would enjoy duplex both way video/audio abe to raise queries in real time. The rest of the participants would enjoy receiving video/audio in webcast mode.

Course duration:

Each course is designed as 3 credits equivalent for 40 hours (Theory Lectures, Hands-on/Design orientation/Activity linked problems/Assignments Problem Solving/Case Studies sessions/Quiz Tests). The contact hours are to be spread over 10 days, implying NOT more than 4 hours per day. At times, in order to support working professionals, the programmes are video-cast only at weekends.

Accommodation & Travel

There is no provision as well as no scope for Boarding and Lodging, as all the programmes are being offered ONLINE.

Registration Fee for each Winter Course:

No Registration fee is charged for attending these programmes. However, candidates from India/SAARC/African countries are required to pay a mandatory examination fee of Rs. 500/- (faculty/PhD-scholars/students) OR Rs. 1000/- (others), and US$ 60 or £ 50 from other countries if they desire a certificate of completion of programme. This Certificate for participation as well as for Satisfactory performance will be given to the participants subject to fulfillment of attending the sessions, submission of assignments and clearing the test(s).

Mode of Payment: Preferred mode is ONLINE payment at respective Academy site.

Academy Name	Link for payment
IIT Guwahati	Online registration at web site of Academy, IIT Guwahati- http://www.iitg.ernet.in/eictacad/
IIITDM Jabalpur	Online registration at web site of Academy, IIITDM Jabalpur- **https://ict.iiitdmj.ac.in/**
MNIT Jaipur	Online registration at web site of Academy, MNIT Jaipur- **https://www.mnit.ac.in/eict**
IIT Kanpur	Online registration at web site of Academy, IIT Kanpur - **https://ict.iitk.ac.in**
NIT Patna	Online registration at web site of Academy of NIT Patna- https://nitp-ict.ct.ws/
IIT Roorkee	Online registration at web site of Academy of IIT Roorkee- **https://eict.iitr.ac.in**
NIT Warangal	Online registration at web site of Academy NIT Warangal- http://nitw.ac.in/eict
ICT Academy TN	Online registration at web site of ICT Academy Chennai- https://ictacademy.in/pages/Upfdp.aspx

- Last Date for Submission of Applications is Monday of earlier week from the start date of respective programme.
- The intimation of Selection for participation will be posted on website on Wednesday of previous week.

The details of Online-Winter courses being offered during Jan-March 2025 is as follows.

1. Generative AI and Use cases	11 Jan- 2 Feb (weekends only) 9-11 AM, 12:15-3:15 M on Sat & Sun

EXPERTS/SPEAKERS- Prof Richi Nayak, Queensland University of Technology, Australia
Dr Namita Mittal MNIT Jaipur

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Dr. Namita Mittal, MNIT Jaipur fdp.academy@mnit.ac.in M: 954 965 4394	Dr Rakesh Sanodiya, IIITDM Jabalpur rakesh.s@iiitdmj.ac.in, M: 8770120278	Prof. Raksha Sharma & Prof. Sanjeev Manhas, IIT Roorkee eict@iitr.ac.in M: 9634766397
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Dr. J. P. Singh, NIT Patna jps@nitp.ac.in M: 8521159014	Dr. Hanumant Singh Shekhawat, IIT Guwahati h.s.shekhawat@iitg.ac.in Ph: +91-361-258-3465	

MODULES TOPICS-

- Module 1: Introduction to Gen AI : Introduction to the course and the field of Generative Artificial Intelligence, Discriminative vs Generative Models
- Module 2: Intro to LLMs : Introduction to language models and large language models with transformer models, Using LMs and LLMs for classification

- Module 3: Generative models GANs : Introduction to GANs for time-series modelling
- Module 4: Gen AI for Topic Modelling : VAEs and LLMs for topic modelling
- Module 5: Gen AI for Information Extraction : Language Models and LLMs for Information Extraction

- Module 6: Gen AI for User Profiling : LLMs for User Profiling and Evaluation, Using LLMs for Content Evaluation
- Module 7: Gen AI and Safety : Gen AI Risks and Safety Guardrails
- Module 8: Course Summary : Research Directions, Open Session and Discussion

2. Data Science for All

20-31 Jan 2025
12-2 PM, 6-8 PM daily

EXPERTS/SPEAKERS- Consent awaited- Prof. DVLN Somayajulu Director NIT Manipur, Prof. RBV Subramanyam NIT Warangal, Prof. P Radhakrishna NIT Warangal, Prof. T Ramakrishnudu NIT Warangal, Prof. Anand Kumar NITK Surathkal , Prof. V Raveendranath JNTU Kakinada

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MODULES TOPICS-

- **Mathematical Foundations of Data Sciences**: Matrices, Vectors, Vector Spaces, Matrix Decomposition, Singular Value Decomposition, Statistical Measures, Probability basics, density function, variance, conditional probability, Markov Chains

- **Data Processing**: Dimensionality Reduction, Principal Component Analysis.
- **Machine Learning basics**: Regression, Classification – Decision Trees, Naïve Bayesian Classifier, Clustering, Handling Large Datasets: MapReduce

- **R for Data Science**: Data Wrangling, Data Visualization, Programming
- **Python for Data Science**: Normal Python, NumPy, Pandas, Matplotlib
- Deep Learning
- **Scikit, Keras and TensorFlow**: Practice on ML topics

3. Semiconductor Fabrication & Packaging Technology 20-31 Jan 2025
4-8 PM daily

EXPERTS/SPEAKERS- Prof. Sanjeev Manhas , IIT Roorkee   Prof. Tanmoy Pramanik, IIT Roorkee   Prof. Brijesh Kumar, IIT Roorkee   Prof. Arnab Datta , IIT Roorkee   Prof. Pradeep Dixit, IIT Bombay   (Invited Guest Lecture)Dr. Navab Singh, Director MEMS, Institute of MIcroelectronics , Singapore   Industry Lecture by a senior manager in Foundry   Industry Lecture by a senior manager in Foundry

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MODULES TOPICS-

- **Semiconductor fabrication-** The process of manufacturing semiconductor devices, such as integrated circuits (ICs)
- CMOS Fabrication
- Crystal Growth & Cleaning
- Thermal Oxidation & Backend Technology
- Lithography & etching
- Diffusion & Ion Implantation
- Deposition & Etching (PVD, CVD, PECVD)

- **Semiconductor bonding & packaging & testing-** The process of protecting semiconductor devices and connecting them to the external environment
- Assembly and packaging
- Materials used in semiconductor packaging, such as ceramic and plastic
- Wire bonding or flip-chip bonding techniques used to connect components

- Testing the packaged device to ensure it meets performance specifications

4. Cyber security (Dark Web)	20-31 Jan 2025
	9-11 AM, 4-6 PM daily

EXPERTS/SPEAKERS- Dr. Mayank Swarnkar (IIT BHU)   Dr. Mayank Agrawal (consent awaited) (IITPatna)   Prof. K. V. Arya (consent awaited) (ABV-IIITM Gwalior)   Dr. Neelam Dayal (IIITDM Jabalpur)   Prof. Somnath Tripathi (consent awaited) (IIT Patna) Dr. Ramesh B. Battula, MNIT Jaipur Dr. Emmanuel S. Pilli, MNIT Jaipur

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MODULES TOPICS-

- **Overview of Cyber Security and Security Fundamentals** - Basic Cryptography and its importance in Cyber security, Cryptography Hash functions
- **Analysis of different attacks with hands-on**: DNS Scanning, Port Scanning, Phishing, Command Injection, SQL Injection, XSS
- AI and ML for Cyber Security
- **Web Security** - SQL injection, XSS, CSRF, etc. Web App Penetration Testing, **Cloud Security and Forensics** - Data security in cloud, Big data and cyber security;

- **Network Security** - DNS, ICMP, ARP attacks, IP Sec, BGP Sec, etc., Browser based attacks
- **Software Security** - Buffer overflow, Integer overflow, Format string vulnerabilities
- **Applications** of Cyber Security Mechanisms, Cyber Security Assurance and Law, Cyber Forensics
- System Hacking, Enumeration and vulnerability Scanning

- Multimedia Forensics
- Security over IoT, Blockchain based IOT Security
- **Some optional topics-**
- IDS- Intrusion Detection System
- Wireless Vulnerabilities - 802.11 Wireless Vulnerabilities, Hacking Wi-Fi networks By Passing Windows logon system,
- Security Tools - DVWA, Snort, Metasploit , Wireshark, NMAP, Nessus, Openssl, etc.

5. AI and Deep Learning	1 – 23 Feb 2025 (Weekends) 12-5 PM every Sat, Sun

EXPERTS/SPEAKERS- Dr. R. Balasubramanian, IIT Roorkee, Prof. Santosh Kumar Vipparthi, IIT Ropar, Dr. Subrahmanyam Murala, Trinity College, Dublin, Prof. Pritee Khanna, PDPM IIITDM Jabalpur, Dr Amit Vishwakarma, PDPM IIITDM Jabalpur, Dr Shivram Dubey, IIIT Allahabad

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MODULES TOPICS-

- Module 1: Brief introduction to AI and machine learning, Neural networks, Logistic regression, Forward and backward propagation, Vanishing and exploding gradient problems. Regularization and optimization.
- Module2: Convolutional neural network (CNN), Activation maps, Standard CNN architectures and emerging networks. CNN

- for classification and regression problems, Concept of transfer learning.
- Module3: Sequence modeling: Recurrent Neural Network (RNN), LSTM and GRU, Attention models and transformer networks. Applications of sequence models, Large language models –ChatGPT

- Module4: Different types of deep neural networks, vision transformers, Applications of Deep neural networks in different domains, Explainability of deep learning models.
- Module5: Generative modelling using deep neural networks, autoencoders and variational autoencoders, Generative Adversarial Networks and their applications

6. Technology-enabled Teaching, Learning & process for Institutes 3-14 Feb 2025
8-10 AM, 6-8 PM daily

EXPERTS/SPEAKERS- From IITs/NITs/IIITs and industries/organization

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MODULES TOPICS-

- **Use of ICT & AI**- Effective use of ICT/AI for transforming pedagogy and empowering students; Empowerment through Communication skills
- **Online/blended Learning**- Adopting online/blended-learning in teaching learning process
- **MooC**- Use of MooC for contents management, class organization,

assessment; MooC's deployment and use; Building Course Website and Google Suite

- **Teaching Learning Tools & e-content generation**- Using tools for teaching learning- interactive whiteboards/smart-screens, video-conferencing, digital content creation, design of instructional material & presentation;
- **Content Dissemination**- Management,

Version Control; ICT tool for English language teaching and learning; Illustration tools and author aids- Visio

- **Computer Based Training (CBT)** - CBT for letters generation, certificate preparation, report writing, Presentation and posters preparation, Spreadsheets & evaluation, Research Resources & Bibliography Management etc.

7. VLSI Design using Open source tools — 10 – 21 Feb 2025

EXPERTS/SPEAKERS- from IITs/NITs/IIITs and industries/organizations

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MODULES TOPICS-

- Introduction to VLSI design flow
- Introduction to High Level Synthesis, Intel HLS Compiler and System Integration, HLS Implementation, Software design with the new HLS Component system   Introduction to Intel SoC FPGAs, Basic SoC lab demo with hands on

- High level synthesis- scheduling, binding
- Logic synthesis- two level, multilevel logic optimization, encoding
- Sequential circuit optimization, FSM synthesis, retiming, state encoding
- Library binding
- Physical design- partiioning, placement, floor planning, global & channel routing

- Layer and Power Planning
- Delay Calculations and System Implications
- Setup and Hold Discussion   Placement Basics and Settings
- DRC LVS and Extraction
- Low Power Flow Basics
- Sign Off
-

8. Advanced Optimization Techniques using MATLAB
17-28 Feb 2025
4-8 PM daily

EXPERTS/SPEAKERS- Prof. N. P. Padhy, Director MNIT Jaipur, Fellow INAE Prof. Ganapati Panda, Fellow INAE, Fellow NASI, Former Dy. Director and Prof. Emeritus, IIT Bhubaneswar, Dr. Nithin V. George, Associate Professor, Dept. of Electrical Engineering, IIT Gandhinagar, Dr. Pyari M. Pradhan, Assistant Professor, Dept. of Electronics and Communication Engg., IIT Roorkee Dr. Sitanshu Sekhar Sahu, Assistant Professor, Dept. of Electronics and Communication Engg., Birla Institute of Technology Mesra Dr. Jagdish Chand Bansal, Associate Professor, Dept. of Mathematics, South Asian University, New Delhi Dr. Sriparna Saha, Associate Professor, Dept. of Computer Science and Engineering, IIT Patna Dr Prashant K. Jain, IIITDMJ Dr. Satyasai Jagannath Nanda, MNIT Jaipur

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MODULES TOPICS-

- **Fundamental of Optimization-** Unconstrained and Constrained Optimization, Linear Programming, Graphical Method, Symmetric Dual Problems, Simplex Method, Derivative based Optimization, Newton's Method, Least Mean Square Method.
- **Nature Inspired Optimization-** Multi-modal function Optimization, Evolutionary Computation (Genetic algorithm, Genetic Programming, Differential Evolution, Social Spider Optimization)

Swarm Intelligence (Particle Swarm Optimization, Ant Colony Optimization, Cat Swarm Optimization, Cuckoo-search, Grey Wolf Optimization, Whale Optimization), Bio-Inspired Optimization (Artificial Immune System, Bacterial Foraging Optimization), Physical Algorithms (Simulated Annealing, Colliding Bodies Optimization, Gravitational Search Optimization).

- **Multi-objective Optimization**, Non-dominated Solutions, Non-dominated Sorted Genetic Algorithm (NSGA-II),

Multi objective Particle Swarm Optimization, Many-objective Optimization, NSGA-III.

- **Applications-** Benchmark mathematical function optimization, Linear and Nonlinear System Identification, Dynamic System Identification, Communication Channel Equalization, Device Modeling, Forecasting/Prediction of time series, Data Classification and Clustering, Hybridization of optimization techniques with Neural Networks and Deep Neural Networks, genomic signal processing.

9. Intricacies of Analog & Mixed Signal design

17 – 28 Feb 2025
4-8 PM daily

EXPERTS/SPEAKERS- Prof. Sreehari rao patri, NITW, Prof Gjendranadh, IITH   Prof Saurabh Saxena, IIT Madras, (consent awiaited), Prof Kapil Jainwal, IITH, ,IDr Chitra IIT Kanpur (consent awaited)   Prof Nagendra IITM (consent awaited)

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MODULES TOPICS-

- **Basic MOS Device Physics**
- **Amplifiers**- differential amplifiers, frequency response of amplifiers- common source/gate, Cascode, CMRR, Gilbert cell, Miller effect
- **Noise** in amplifiers, current mirrors,
- **OpAmp**- multistage, OTA, stability & frequency compensation
- **Sample and Hold Circuits**: Basic S/H circuit, effect of charge injection, compensating for charge injection, bias dependency, bias independent S/H.

- **D/A Converter**: – General considerations, Static non-idealities and Dynamic non-idealities; Current-steering DAC – Binary weighted DAC, Thermometer DAC, Design issues, Effect of Mismatches.
- **A/D converter**: – General considerations, static and dynamic non-idealities. Flash ADC – Basic architecture, Design issues, Comparator and Latch, Effect of non-idealities

Interpolative and Folding architectures. Successive Approximation ADC; Pipeline ADC. Over sampling ADC – Noise shaping, Sigma-Delta modulator.
- **PLLs**: Basic Phase-Locked Loop Architecture, Voltage Controlled Oscillator, Divider Phase Detector, Loop Filer, The PLL in Lock, Liberalized Small-Signal Analysis, Second-Order PLL Model , Limitations of the Second-Order Small-Signal Model, PLL Design Example

10. IoT Applications with Sensors, Embedded Systems, and Data Analytics   17 – 28 Feb 2025
4-8 PM Daily

EXPERTS/SPEAKERS- Prof. Rahul Thakur, IIT Roorkee   Prof. Sudeepta Mishra, IIT Ropar (consent awaited)   Dr. Anbumunee Ponnaih, Chief Technical Officer, IBM India (consent awaited)

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MODULES TOPICS-

- Module 1: Introduction and Fundamentals- Introduction to Internet of Things, Introduction to IoT Platforms and Programming Environment
- Module 2: Arduino Basics and Hardware- Introduction to Arduino Hardware, Digital Input/Output, Analog Input/Output

- Module 3: Communication Protocols- Introduction to Serial Communication, Communication Protocols: UART, I2C, SPI
- Module 4: Networking and IoT Integration- Networking in IoT: WiFi and LoRaWAN, IoT and Cloud

- Module 5: IoT Data and Analytics- Data Collection and Analytics in IoT, Experimentation on Tinkercad, IoT Platforms and Programming Environment, Experimentation with Serial Monitor, UART Sensors, Experimentation with Arduino Libraries, Board Manager, Experimentation on Cloud Platform and Database, Experimentation with I2C, SPI Sensors

11. Quantum Computing	17 – 28 Feb 2025
	8-10 AM, 5-7 PM daily

EXPERTS/SPEAKERS- Dr. Mani Madhukar, IBM India & his team

Principal Coordinator	Joint- Principal Coordinators	
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MODULES TOPICS-

- Quantum Measurements Density Matrices: Positive-Operator Valued Measure; Fragility of quantum information: Decoherence
- Quantum Superposition and Entanglement; Quantum Gates and Circuits; No cloning theorem & Quantum Teleportation; Bell's inequality and its implications

- Quantum Algorithms & Circuits; Deutsch and Deutsch–Jozsa algorithms; Grover's Search Algorithm; Quantum Fourier Transform
- Shore's Factorization Algorithm; Quantum Error Correction: Fault tolerance; Quantum Cryptography; Implementing Quantum Computing: issues of fidelity

- Scalability in quantum computing; NMR Quantum Computing; Spintronics and QED approaches
- Linear Optical Approaches; Nonlinear Optical Approaches; Limits of the approaches; Future scope

12. Biometrics Security in the Generative AI Era	1 -12 Mar 2025 (Weekends) 2:30-4:30 PM, 6-8 PM daily

EXPERTS/SPEAKERS- Prof. Phalguni Gupta, Former Professor IIT Kanpur, Prof. Pritee Khanna, IIITDM Jabalpur, Prof. Surya Prakash, IIT Indore, Dr. Kiran Raja, Norwegian University of Science and Technology, Prof. Vilaylaxmi, MNIT Jaipur, Dr. Sambit Bakshi, NIT Rourkela, Dr. Shiv Ram Dubey, IIIT Allahabad, Dr. Harkeerat Kaur, IIT Jammu, Dr. Avantika Singh, IIIT Naya Raipur

Principal Coordinator	Joint- Principal Coordinators	
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Joint- Principal Coordinators		
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MODULES TOPICS-

- Module 1. Introduction to Biometric Systems
- Introduction to Biometric Systems, Biometric System Evaluation, Machine Learning and Deep Learning Models for Biometric Recognition
- Module 2. Generative AI and Its Impact on Biometrics
- Introduction to Generative AI, Variational Autoencoders, Generative Adversarial Networks (GANs), Attack Landscape on Biometric Recognition, Deepfake Generation and Detection

- Module 3. Enhancing Biometric Security Using AI
- Biometric Template Protection Techniques, Countermeasures against Attacks using AI, Vision Transformers for Biometric Recognition, Explainable AI and Biometric Signal Processing

- Module 4: Regulatory, Ethical, and Privacy Challenges
- Biometric Systems - Breaches and Best Practices, Privacy and Security in Generative AI Biometrics, Future Trends and Research Directions
- Hands-on sessions on Biometric Authentication System, attack detection, and Deepfake Generation and Detection

Various courses from IIT Kanpur in Intelligent Self-Paced Education (iSPED) mode are being offered in this the period from January till March 2025. The courses are available to faculty for free for a limited duration under FDP. Participants may please ignore the price mentioned on the URL for the courses and join the courses of their choice.

13. Introduction to Compilers
(https://ict.iitk.ac.in/product/introduction-to-compilers/)

Principal Coordinator

EICT Academy IIT Kanpur,
fdp@eicta.iitk.ac.in

MODULES TOPICS-

• Introduction	• Overview of Compiler Phases	• Lexical Analysis
• Syntax Analysis	• Top-Down Parsing	• Bottom-up Parsing
• LR Parsers	• Semantic Analysis	• Attributes
• Type Systems	• Symbol Table	• Intermediate Representation
• Runtime Systems	• Code Generation	

14. Python Programming – A Practical Approach
(https://ict.iitk.ac.in/product/python-programming-a-practical-approach//)

Principal Coordinator

EICT Academy IIT Kanpur,
fdp@eicta.iitk.ac.in

MODULES TOPICS-

• Introduction	• Parts of A Function	• Abstract Data Types
• The Programming Cycle for Python	• Execution of A Function	• Classes
• Interacting with Python Programs	• Keyword and Default Arguments	• Special Methods
• Elements of Python	• Scope Rules	• Class Example
• Type Conversion	• Strings	• Inheritance
• Expressions	• Indexing and Slicing of Strings	• Inheritance and OOP
• Assignment Statement	• More Slicing	• Iterators
• Arithmetic Operators	• Tuples	• Recursion
• Operator Precedence	• Unpacking Sequences	• Simple Search
• Boolean Expression	• Lists	• Estimating Search Time
• Conditionals	• Mutable Sequences	• Binary Search
• Expression Evaluation	• List Comprehension	• Estimating Binary Search Time
• Float Representation	• Sets	• Recursive Fibonacci
• Loops	• Dictionaries	• Tower Of Hanoi
• For Loop	• Higher-Order Functions	• Sorting
• Nested Loops	• Sieve of Eratosthenes	• Selection Sort
• Break and Continue	• File I/O	• Merge List
• Function	• Exceptions and Assertions	• Merge Sort
	• Assertions	• Higher-Order Sort
	• Modules	

15. Deep Learning with Generative AI for Computer Vision

Principal Coordinator

EICT Academy IIT Kanpur,
fdp@eicta.iitk.ac.in

MODULES TOPICS-

- Evolution of Artificial Intelligence with Deep
- Learning
- Neural Networks and Back Propagation
- Neural Networks-Optimization and
- Regularization

- Basic CNN Architectures
- Transformer Network Attention and Self-
- Attention
- Autoencoders
- GAN and it's Variants for Various

- Applications
- Image and video restoration for
- automated applications
- Human Visual System and Multimedia
- Quality Assessment

16. Cyber Security (https://eicta.iitk.ac.in/cyber-security-fdp/)

Principal Coordinator

EICT Academy IIT Kanpur,
fdp@eicta.iitk.ac.in

MODULES TOPICS-

CISSP– Introduction to Information Security
- Course Introduction
- Security and Risk Management Part-1
- Asset Security
- Security Architecture and Engineering
- Communication and Network Security
- Spotlight
- Identity and Access Management(IAM)
- Security Assessment and Testing
- Security Operations
- Software Development and Security
- Spotlight Video Two

Introduction to Cryptography for Beginners
- What is Cryptography?
- Symmetric and Asymmetric Key for cryptography

- Hashing
- DES and AES Algorithms
- Digital Signature Algorithm
- Rivet-Shamir-Adleman Encryption
- MD5 Algorithm
- Secure Hash Algorithm
- SSL Handshake

Ethical Hacking For Beginners
- Importance of Ethical Hacking
- What is Ethical Hacking?
- Types of Hackers
- Who is an Ethical Hacker?
- Why we need Ethical Hackers
- Skills of an Ethical Hacker
- Ethical Hacking Tools

- Kali Linux Installation
- Metasploit Attack
- Who is a certified Ethical Hacker?
- Why CEH Certification
- Ethical Hacking Certifications
- Ethical Hacking Career
- Areas of Ethical Hacking

Introduction to Cybercrime
- What is Cybersecurity?
- Basic Network Terminologies
- The Rise of Cybercrimes
- What is a Cybersecurity Threat
- Different types of Cyber Attack
- SQL Injection Attack
- Denial-Of-Service(DDOS) Attack
- for Cryptography Brute Force Attack
- Ways to prevent Cyber Attacks

| Links to Self paced/online-live programmes by EICT Academy by IIT Kanpur		
Cyber Security	Self-Paced	https://eicta.iitk.ac.in/cyber-security-fdp/
Compiler Design, Analysis & Optimization	Self-Paced	https://eicta.iitk.ac.in/compiler-design-analysis-optimization-fdp/
Linux	Self-Paced	https://eicta.iitk.ac.in/linux-fdp/
Full Stack Development with PhP & MySQL	Self-Paced	https://eicta.iitk.ac.in/full-stack-development-with-php-mysql-fdp/
Basic Programming using Python	Self-Paced	https://eicta.iitk.ac.in/basic-programming-using-python-fdp/
Deep Learning with Generative AI for Computer Vision	Self-Paced	https://eicta.iitk.ac.in/deep-learning-with-generative-ai-for-computer-vision-fdp/
IOT with Drone	Online Live	https://eicta.iitk.ac.in/product/iot-with-drone/
Data Analytics using AI	Online Live	https://eicta.iitk.ac.in/product/data-analytics-using-ai/
Generative AI Course	Online Live	https://eicta.iitk.ac.in/product/generative-ai-course/
Data Structures and Algorithms (with Java)	Online Live	https://eicta.iitk.ac.in/product/data-structures-and-algorithms-with-java/
Data Science (ML & AI)	Online Live	https://eicta.iitk.ac.in/product/data-science-mlai/
Introduction to IOT	Online Live	https://eicta.iitk.ac.in/product/internet-of-things/
Cyber Security (On Premises Hacking)	Online Live	https://eicta.iitk.ac.in/product/cyber-security-on-premises-hacking/
Machine Learning with Python	Online Live	https://eicta.iitk.ac.in/product/machine-learning-with-python/
Fundamentals of Python Programming	Online Live	https://eicta.iitk.ac.in/product/fundamentals-of-python-programming/
Advance Excel with Tableau	Online Live	https://eicta.iitk.ac.in/product/advance-excel-with-tableau/
Advance Excel with Power BI	Online Live	https://eicta.iitk.ac.in/product/advance-excel-with-power-bi/
Advance Excel with Data Visualization	Online Live	https://eicta.iitk.ac.in/product/advanced-excel-with-data-visualization/
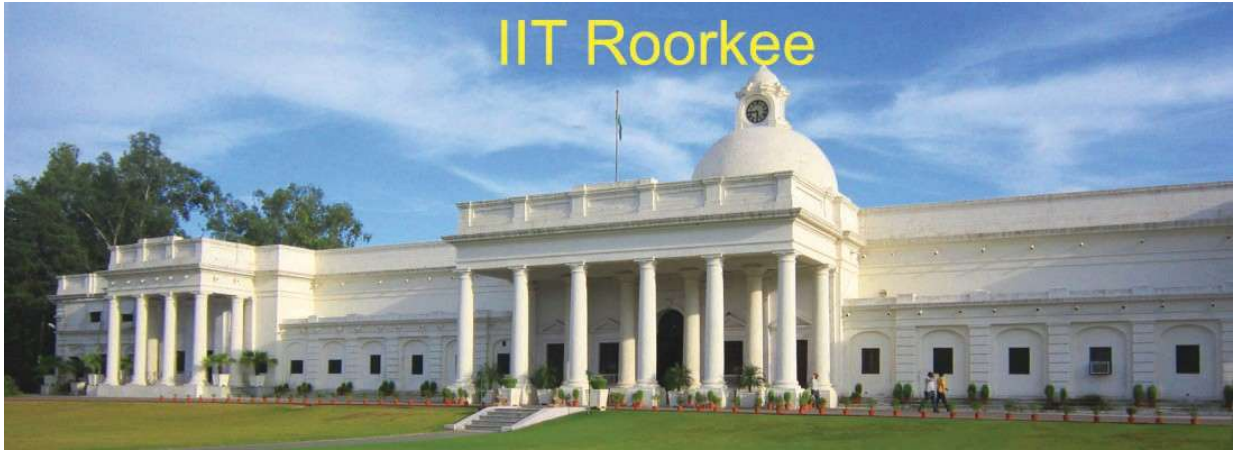
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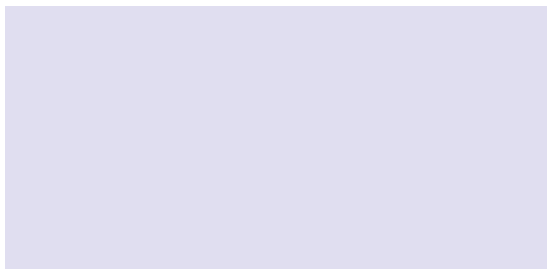
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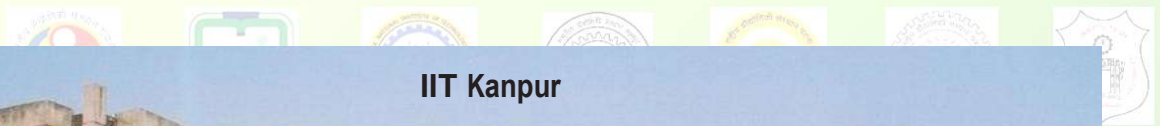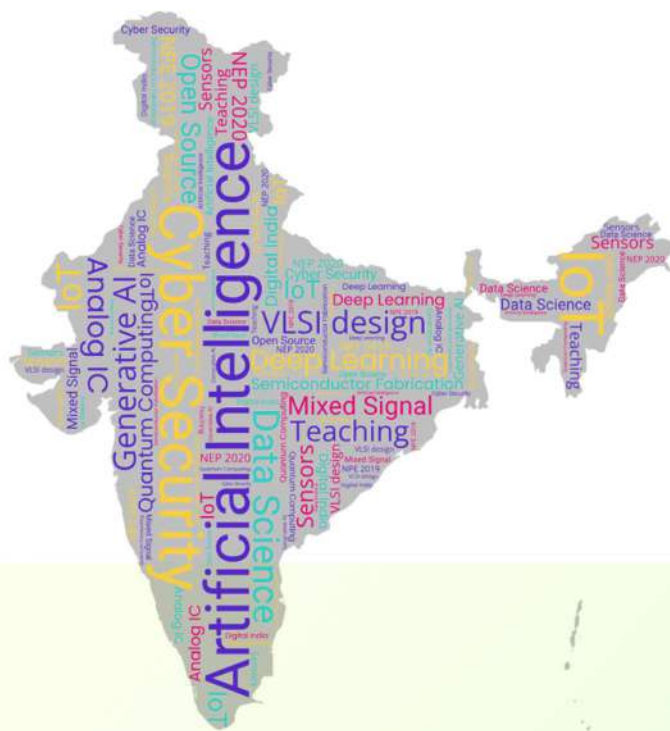
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