सत्यमेव जयते

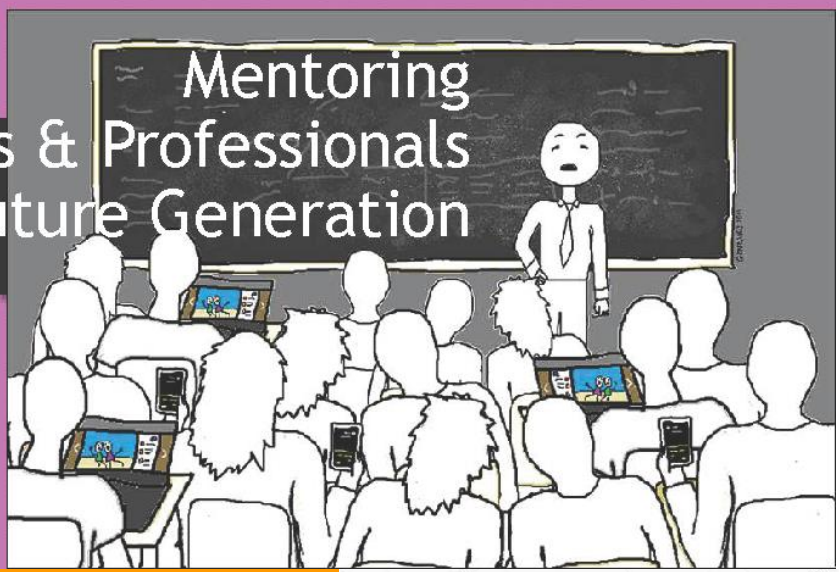
National Knowledge Network

Ministry of Electronics & Information Technology

Digital India
Power To Empower

Government of India Initiative for Employability Enhancement

Mentoring Academicians & Professionals for Future Generation



- *Faculty Training*
- *Training and Consultancy 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**

Programme brochure for 2022

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 at 07 (seven) premier and leading institutions viz. IIT Guwahati, IIT Kanpur, NIT Warangal, NIT Patna and IIITDM Jabalpur (all five under Category-A); and IIT Roorkee, MNIT Jaipur (both under Category B). The Ministry had earlier setup two ICT Academies at Tamil Nadu and Kerala respectively. After internal reviews in Ministry, revised cost and targets for the Electronics and ICT Academies in both the Categories for a period of seven years 4 months are as follows.

Category	Total Outlay	Internal Revenue	Grants-in-Aid from	Training Target Total
Category-A & B: 7- Academies	Rs. 87.7 crore	Rs. 10.4 crore	Rs. 77.3 crore	92,800

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. Each Academy would be provided funding support up to financial year 2021-22 and is expected to generate revenue by charging fee and taking up other activities to meet the recurring cost in a gradual manner and become self-sustainable by March 2022. All these Academies will cater to the requirements of identified neighboring States and UTs also. 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

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 2022). All these Winter courses will be offered through online live web-conferencing, with instructor led 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, this Winters, Jan - Mar 2022, each of 6/10 days duration.

Names of courses in Winters 2022	Starting date	Completion date	Names of courses in Winters 2022	Starting date	Completion date
Blockchain Technology & Applications	3 Jan	8 Jan 2022	Numerical & engineering computation, optimization for Physicists, Scientists & Engineers using open-source-SCILAB	21 Feb	4 Mar 2022
Machine Learning for Signal processing & Communication	3 Jan	8 Jan 2022	Android programming & applications	7 Mar	12 Mar 2022
Electric Vehicles & mobility	24 Jan	4 Feb 2022	AI & Machine Learning for IoT/EDA	7 Mar	19 Mar 2022
Natural Language Processing	7 Feb	18 Feb 2022	Research Methodology	14 Mar	19 Mar 2022
RISC-V VLSI Implementation Flow: RTL2GDS	7 Feb	12 Feb 2022	Designing With FPGAs (Intel)	14 Mar	19 Mar 2022
IoT & Applications (smart systems)	14 Feb	19 Feb 2022	Scientific Computation and GUI Development Using MATLAB	21 Mar	31 Mar 2022
Machine Learning for Computer Vision	21 Feb	4 Mar 2022	Data Science for All	22 Mar	1 Apr 2022

Following are the programmes being offered as Self-Paced in this Winter, Jan - Mar 2022, by IIT Kanpur Academy.

Introduction to Compilers	Programming in Python	Computer System Security	Smart Grid Technology	https://ict.iitk.ac.in

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 ICT Tools and techniques for 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 academy. Selected participants will be communicated through email / notified in E&ICT Academy websites. There is no limit on number of participants, however, only first 1000 participants would enjoy duplex both way video/audio. Rest of the participants would enjoy receiving video/audio but may not raise queries in real-time.

Course duration:

Each course is designed as 3 credit equivalent for 35-40 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 3½ hours per day.

Accommodation & Travel

There is no provision as well as 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 all sessions, submission of assignments and clearing the test(s) by all the paying participants.

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- http://ict.iiitdmj.ac.in
MNIT Jaipur	Online registration at web site of Academy, MNIT Jaipur- http://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- http://www.nitp.ac.in/ict
IIT Roorkee	Online registration at web site of Academy of IIT Roorkee- http://eict.iitr.ac.in
NIT Warangal	Online registration at web site of Academy NIT Warangal- http://nitw.ac.in/eict

- 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 – Mar 2022 is as follows.

1. Blockchain Technology & Applications		3 – 8 Jan 2022
EXPERTS/SPEAKERS- (i) Prof. Sandeep Shukla, IIT Kanpur; Prof. Aparajita Ojha, IIITDMJ; Dr Amey Karkare, IIT Kanpur; Shri Santosh Mishra, IAS; Dr Emmanuel Pilli, MNIT Jaipur; Dr Sushma Ruj, ISI Kolkata; Dr Mani Madhukar, IBM, India; Shri Ras Dwivedi, IIT Kanpur; Shri Samir Jain, IIITDM Jabalpur		
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MODULES TOPICS-		
• Introduction to Blockchain, Blockchain Evolution, Bitcoin Blockchain, • Consensus Mechanisms, Proof of Work, Ethereum, Forks in Blockchain, • Smart Contracts, Solidity language, Remix Environment, • Decentralized Applications and Decentralized Autonomous Organizations	• Truffle, Ganache and Metamask for Network based Dapp Development • Permissionless & Permissioned/ Private & Enterprise level Blockchains • Hyperledger Fabric & Chaincode, Storage in Blockchain, Data Encryption,	• Cryptographic Protocols – SHA, RSA and ECC Algorithms • Security and Privacy issues in Blockchain, Government Services, • Use cases, Challenges and Solutions, Research trends in Blockchain

2. Machine Learning for Signal processing & Communication 3- 8 Jan 2022

EXPERTS/SPEAKERS- Prof. Ratnajit Bhattacharjee (IIT Guwahati); Dr. Suresh Sundaram (IIT Guwahati); Dr. Rhythm Grover (IIT Guwahati); Dr. Mitul Kumar Ahirwal (MANIT Bhopal); Dr. Debanga Raj Neog (IIT Guwahati); Dr. Irshad Ansari (IIITDM Jabalpur); Dr. Arghyadip Roy (IIT Guwahati); Dr. Ashish Anand (IIT Guwahati); Dr. Debanga Raj Neog (IIT Guwahati); Prof. M K Bhuyan (IIT Guwahati); Dr. Varun Bajaj (IIITDM Jabalpur); Dr. Amit Vishwakarma (IIITDM Jabalpur); Dr. Rakesh Kumar Jha (IIITDM Jabalpur); Dr. Satyasai Jagannath Nanda (MNIT Jaipur); Dr. Kuldeep Singh (MNIT Jaipur); Dr. Amit Mahesh Joshi (MNIT Jaipur); Dr. G Pradhan, NIT Patna

Principal Coordinators

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MODULES TOPICS-

- Introduction to Machine Learning in Signal Processing and Communication
- Bayesian Learning
- Perception Learning
- Statistical inference and Learning
- Support Vector Machine
- Regression and Classification
- Feature Selection and Dimensionality Reduction
- Clustering
- Blind Signal Separation
- Reinforcement Learning
- Machine Learning in Speech Processing
- Noisy Channel Model and Application in Speech and Language Processing
- Machine Learning in Image Processing
- Machine Learning in Gesture Recognition
- Machine Learning in Biomedical Signals I
- Machine Learning in Biomedical Signals II
- Machine Learning in Radar Signal Processing
- Machine Learning in Resource Allocation in Wireless Networks
- Communication
- Machine Learning in Energy-efficient Communication
- Machine Learning in Internet of Things
- Machine Learning in Edge/Fog Computing Networks
- Machine Learning in Massive MIMO
- Machine Learning in Optical Communication
- Machine Learning in Channel Prediction/Estimation
- Machine Learning in Signal Detection
- Machine Learning in Channel Coding/Decoding
- Deep Learning in Wireless Communication
- Distributed Learning in Wireless

3. Electric Vehicles & mobility — 24 Jan – 4 Feb 2022

EXPERTS/SPEAKERS- Dr. Akshay Kumar Rathore, Concordia University, Canada; Prof. Gopa Kumar IISC Bangalore; Prof. Vinod Khadkikar, MIT, UAE; Prof. B. G. Fernandes, IIT Bombay; Dr. Sandeep Anand IIT Bombay; Prof. L. Umanand, IISc Bangalore; Prof. Mohan Lal Kolhe P, University of Agder, Norway; Prof. Bhim Singh, IIT Delhi; Dr. Aprova Yadav IIT Roorkee

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MODULES TOPICS-

• Overview of electric vehicles in India • EV history, battery technology, and National mobility mission 2022 • Electric Propulsion System	• Vehicle subsystems: EV power-train • Power electronics interface for EV • EV charging and control (Unidirectional, Bidirectional, and Wireless)	• PFC Rectifier and DC-DC converter technology for EV as an application. Vehicle to Grid and Grid to Vehicle (V2G and G2V)

4. Natural Language Processing 7 – 18 Feb 2022

EXPERTS/SPEAKERS- (i) Prof. Pushpak Bhattacharya, IIT Bombay (ii) Dr. Asif Ekbal, IITP (iii) Dr. Sriparna Saha, IITP; (iv) Dr. Atul Gupta, IIITDMJ (v) Dr. J. P. Singh, NITP (vi) Dr.Namita Mittal, MNITJ,

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MODULES TOPICS- To be Announced (IIT Guwahati)

- **Intro and text classification -** Processing Text using Perl • Use of Regular Expressions • Elements of Morphology • Character N-gram Based Text Mining • Text Classification
- **Language modeling and sequence tagging-** texts as sequences of words. language modeling and use for suggests in search, machine translation, chat-bots, etc predict a sequence of tags for a sequence of words. part-of-speech tags, named entities or any other tags • Probabilistic Modeling • N-grams Model • HMM Model • Sum-product Algorithms
- **Vector Space Models of Semantics-** higher abstraction for texts: vectors representing meanings traditional models of distributional semantics, cover modern tools for word and sentence embeddings, such as word2vec, FastText, StarSpace
- **Syntactic Processing-** Phrase Structure and Natural Language Syntax • Chart Parsing and CYK Algorithm • Probabilistic Context-Free Grammars
- **Sequence to sequence tasks-** a sequence to sequence task: machine translation, summarization, question answering, a general encoder-decoder-attention architecture
- **Dialog systems-** task-oriented dialog systems like Apple Siri or Amazon Alexa. main building blocks of such systems namely Natural Language Understanding (NLU) and Dialog Manager (DM)
- **Unification-based NLP and Semantics-** • First-order Predicate Logic and Resolution • Classical and Feature-structure Unification • Unification-based Grammars

5. RISC-V VLSI Implementation Flow: RTL2GDS 7 – 12 Feb 2022

EXPERTS/SPEAKERS- Prof. M. Balakrishnan, Prof. Anshul Kumar, IIT Delhi, Prof. Preeti Ranjan Panda, IIT Delhi; Prof. V. Kamakoti, IITM (consent awaited); Mr. Gaurav Jalan, Founder SpicaWorks, Bengaluru

Open source-based design flow talks are all industry speaker-driven.

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MODULES TOPICS-

- Transistor to Processor Level Simulation and Verification
- Digital Blocks constituting RISCV Processor
- Digital Design to Processor ISA
- RISCV Instruction Set Architecture
- ISA Simulators
- Simulation and Verification of RISCV ISA
- RISCV Processor Design from Ground Up
- Visualization of Processor blocks via Synthesis
- Overview of RTL2GDS flow in processor design
- Tapeout SignOff for Processor: What does it mean?
- Power Performance Area Tradeoffs in RISCV Processor Design
- RISC V Job Market

All Modules will be covered using hands-on tutorials of RISC-V implementation in open source tool flow.

6. IoT & Applications (smart systems) 14 – 19 Feb 2022

EXPERTS/SPEAKERS- Prof. S. K. Sinha, IISc Banglore; Prof. Ratnajit Bhattacharjee, Dr. Rishikesh Dilip Kulkarni, Dr. Arghyadip Roy, Prof. M Khatuna, Dr. Moumita Patra, Dr. Debanga Raj Neog, Dr. Arijit Sur, IITG; Dr. Ankush Sharma, IIT Kanpur; Dr. Ferdous Ahmed Barbhuiya, IIIT Guwahati; Prof. Santosh Biswas, IIT Bhillai; Dr. Amit M. Joshi, MNIT Jaipur; Dr. Ashok Kumar Das, IIIT Hyderabad; Mr. Narang Kishore, NIT Patna;

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MODULES TOPICS-

- Overview of IoT: Evolution and technologies used in IoT
- IoT embedded system, sensors and components (2 lectures)
- Communication Technologies for IoT (2 Lectures)
- IoT Protocols: Data and Network (2 Lectures)
- IoT Security
- Edge Computing and IoT
- Cloud Computing and IoT
- Wearables and IoT
- IoT application in Smart Home
- IoT application in intelligent transportation system
- IoT for Healthcare
- IoT in Smart Farming
- IoT based geo-hazard monitoring and early working systems
- Smart grid and IoT
- 5G and IoT
- IoT Standardization

7. Machine Learning for Computer Vision 21 Feb – 4 Mar 2022

EXPERTS/SPEAKERS- Prof. Shantanu Chaudhury, Director IIT Jodhpur; Dr. Suresh Sundaram, IITG; Prof. H. Fujiyoshi, Chubu Univ. Japan; Prof. Barbara Zitova, Acad Sci. Czech Republic; Dr. Amit Sethi, IITB; Prof. Sumantra Dutta Roy, IITD; Prof. P. Guha, Prof. Aparajita Ojha, IIITDM Jabalpur, Dr. Santosh Viparthi, MNIT Jaipur

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MODULES TOPICS-

• Introduction to Image Processing and Computer Vision (CV), Main Goals and challenges of the CV, Image Processing Goals and Tasks.	• Neural Network as a learning machine, forward and backward propagation, Applications in computer vision. Image classification.	• Introduction to Convolutional Neural Network , The Convolution Operation, Basic architecture of a Convolution Neural Network, Pooling and Batch Normalization layers,
• Traditional approaches in Image Processing, Feature Extraction and their applications to Image Processing: Natural Image Classification, Image Enhancement, edge Detection, Segmentation. Image denoising	• Training Neural Networks, optimization, regularization,	• CNNs as feature extractors, Image classification using CNN,
• Introduction to Artificial Intelligence (AI) and Machine Learning (ML) AI and ML, Supervised and Unsupervised Learning, Traditional ML approaches,	• Introduction to Deep Learning (DL) Basic differences between Conventional ML and DL approaches, Challenges in training deep neural networks, Vanishing /exploding gradient problems	• State of the Art Deep CNN Architectures, CNN for Image Enhancement and Segmentation. • Autoencoder for Feature Extraction and Image Enhancement Applications of CNN in agriculture, Medical image analysis and Satellite Imagery • Recent Trends in ML for CV

8. Numerical & engineering computation, optimization for Physicists, Scientists & Engineers using open-source- SCILAB 21 Feb – 4 Mar 2022

EXPERTS/SPEAKERS- From IITs/NITs/IIITs and industry, research organizations- (i) Prof. Kannan Moudgalya, IITB (consent awaited), (ii) Chaitanya Kancharla, ESI-SCILAB; (iii) Experts from INRIA/SCILAB (CONSENT Awaited)

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MODULES TOPICS-

- (i) **Solving set of equations-** Perform computations like matrix, vectors; Gaussian elimination & iterative methods, ill-conditioned systems, iterative methods; nonlinear equations
- (ii) **Large Matrix analysis and large Eigen value problem-** Eigenvalues & eigenvectors- Gerschgorin theorem, iterative method, Sturm sequence, QR method, Singular value problems
- **Random numbers** Simulation & Applications
- **Open-source & traditional technical computing**
- Solving ordinary differential equations (ODE); plotting 2D and 3D plots; diagram creation
- **Xcos-** Model-based simulations using Xcos.
- Introduction to Discrete Probabilities with Scilab
- Introduction to constrained and unconstrained optimization; optimality conditions.
- Writing functions in Scilab and scripting
- Building an interactive GUI
- **Linear algebraic equations, fast computation,** Pade & rational approximation
- **Numerical approximations** of functions - Taylor's polynomial, least-square approximation, Chebyshev series/polynomial, splines,
- Fourier coefficients, Fourier series, trigonometric interpolation, DFT, FFT; Compression
- Application development; Industry real-time Use Cases

9. Android programming & applications 7 – 12 Mar 2022

EXPERTS/SPEAKERS- TBA

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MODULES TOPICS-

- **MOBILE APP DEVELOPMENT INTRODUCTION**

Chapter 1 :

JAVA Concepts • OOPs Concepts • Inheritance in detail • Exception handling • Packages & interfaces • JVM & .jar file extension • Multi-threading (Thread class & Runnable Interface)

Chapter 2 :

SQL • DML & DDL Queries in brief

Chapter 3 :

- Introduction to Android • Setting up development environment • Dalvik Virtual Machine & .apk file extension • Fundamentals - • Basic Building blocks - Activities, Services, Broadcast Receivers & Content providers• UI Components - Views & notifications • Components for communication -Intents & Intent Filtes • Android API levels (versions & version names)

- **ANDROID APPLICATION DEVELOPMENT**

Chapter 11 :

Styles & Themes • styles.xml • Drawable resources for shapes, gradients (selectors) • Style attribute in layout file • Applying themes via code and manifest file • Examples

Chapter 12 :

Linkify • Web URLs, Email address, text, map address, phone, Open Web Browser

Chapter 13 :

Adapters and Widgtes • Adapters - • a. ArrayAdapters • b. BaseAdapters • Recycler View • Gallery using adapters

Chapter 14 :

Content Providers • SQLite Programming • SQLiteOpenHelper • SQLiteDatabse - Getting Data from Database

Chapter 15 :

• Toast

Chapter 16 :

- Camera • Taking pictures • Media Recorder • Rendering previews

- **ANDROID SOFTWARE DEVELOPMENT KIT (SDK)**

Chapter 4 :

Application Structure (in detail) • AndroidManifest.xml • Uses-permission & uses-sdk • Resources & R.java • Assets • Layouts & Drawable Resources • Activities and Activity lifecycle • First sample Application Course

Chapter 5 :

- Emulator-Android Virtual Device • Launching emulator • Debugging in Android Application• Logcat usage • Introduction to DDMS • Hello World App • Creating your first project The manifest file Layout resource Running your app on Emulator • Second App - (switching between activities) • Develop an app for demonstrating the communication between Intents

- **ANDROID APPLICATION DEVELOPMENT**

Chapter 17 :

Threads • Threads running on UI thread (runOnUiThread) • Worker thread • Handlers & Runnable • AsynTask (in detail) • Examples

Chapter 18 :

Services • Overview of services in Android • Implementing a Service • Service lifecycle

Chapter 19 :

Multimedia in Android • Simple video playback

Chapter 20 :

Location Based Services and Google Maps • Using Location Based Services • Finding current location and listening for changes in location • Working with Google Maps • Showing google map in an Activity

Chapter 21 :

Sensors • How Sensors work • Using Orientation and Accelerometer sensors • Best practices for performance

Chapter 22 :

- Telephony Services • Making calls • Sending messages

- **INTERFACE USABILITY**

Chapter 6 :

Basic UI design • Form widgets • Text Fields • Layouts • [dip, dp, sip, sp] versus px • Examples

Chapter 7 :

Preferences • Shared Preferences • Examples

Chapter 8 :

Menu • Option menu • Context menu • Sub menu • menu from xml • menu via code • Examples

Chapter 9 :

Intents (in detail) • Explicit Intents • Implicit intents • Examples

Chapter 10 :

- UI design • Time and Date • Images and media • Composite • Alert Dialogs & Toast • Popup • Examples

- **ANDROID APPLICATION DEPLOYMENT**

Chapter 23 :

Android Application Deployment on Android Market

Chapter 24 :

Json Parsing in Application

Extra points for discussion :

- Adding Advertisement (Admob) in Android App for making money through App

10. AI & Machine Learning for IoT/EDA 7 – 19 Mar 2022

EXPERTS/SPEAKERS- From IITs/NITs/IIITs and industry, research organizations- (i) Mr. Rohit Sharma, founder and CEO of AI Technology & Systems (AITS) USA; Prof Amita Kapoor, University of Delhi; Mr. Praveen Jain, CTO of AI Technology & Systems (AITS) USA

Principal Coordinator	Joint-Principal Coordinators	
Prof.Vineet Sahula, MNIT Jaipur vsahula.ece@mnit.ac.in M: 954 965 4227	Dr. Bharat Gupta, NIT Patna, bharat@nitp.ac.in M:93314 06964	Dr. Bal Chand Nagar, NIT Patna balchandnagar@nitp.ac.in M: 9993102487

MODULES TOPICS-

• Tensor flows, Keras and datasets; Python libraries, TensorFlow and Keras, to build different kinds of intelligent AI models	• Deep learning for IoT- perceptron, Convolutional NN, Recurrent NN- LSTM, gated recurrent unit; Auto-encoders	• Generative models for IoT- VAEs in TensorFlow, Generative adversarial networks (GAN);
• Data access & distributed processing for IoT- data generation and consumption by IoT devices such as time series, images, and audio; others	• Reinforcement learning for IoT- deep reinforcement learning, Q-learning, Q-network	• Smart IoT systems. real-time data coming from wearable devices
• Machine learning for IoT- learning paradigms, logistic regression, naïve Bayes, decision trees, ensemble learning	• tinyML, numpy, deepC, PyTorch, for hands-on	• Distributed AI for IoT
	• IoT, Edge Devices and MCUs, Projects Discussion and Allocation	• Personal & Home IoT
		• Industrial IoT; smart city

Mr. Rohit Sharma can be reached at - https://www.linkedin.com/in/srohit0 or at Twitter https://twitter.com/srohit

11. Research Methodology — 14 – 19 Mar 2022

EXPERTS/SPEAKERS- From IITs/NITs/IIITs and industry, research organizations- TBA

Principal Coordinator	Joint- Principal Coordinators	
Dr. Gaurav Trivedi, IIT Guwahati trivedi@iitg.ac.in M: 9435582802	Dr. Ravi K. Maddila, MNIT Jaipur rkmaddila.ece@mnit.ac.in M: 954 965 4238	Prof. Ratnajit Bhattacharjee, IIT Guwahati ratnajit@iitg.ac.in M: 9954498116
Joint- Principal Coordinators		
Dr. Bharat Gupta, NIT Patna, bharat@nitp.ac.in M:93314 06964	Prof. Sanjeev Manhas eict@iitr.ac.in M: +91 9412528151	Dr. J. P. Singh, NIT Patna jps@nitp.ac.in M: 8521159014

MODULES TOPICS-

- **Introduction to Research Methodology-** Methodology vs Methods; Qualitative vs Quantitative Research; How to write a Literature Review; Synthesizing the research; Strategies to organize and evaluate sources; How to read a paper efficiently; Writing about Methods and Design; Rationale for the proposed design; Methodology for collecting data
- **Presenting Data and Describing Analysis-** How to use tables and figures to present data; Statistical Tools; Introduce, Conclude and write the Abstract; Write an introduction for a study; Final discussion of all of your data and analysis; Address all of the major points of your research in a few lines
- **Managing and Sharing Research Data-** How your research data can best be shared; Available tools and support to make this process as easy as possible; Improving its reusability of shared data
- **Journal Peer Review Process-**Finding the right journal to publish in; Knowing where your "study" fits into the literature; Using quality measures to help you pick a "good" journal; Representing your research so that the journal sees your paper as a good "fit"; Hands-on Practice
- **Engaging readers with visualizations-** Psychology of reading; How readers read and navigate texts Organize ideas and writings better to touch readers;
- **Research ethics and integrity**
- **Use of Language Support Tools – Grammarly and Draft**
- **Writing for Research Projects to secure research funding**
- **Introduction to Online Teaching**
- **Google Classroom interface**

12. Designing With FPGAs (Intel) 14 - 19 Mar 2022

EXPERTS/SPEAKERS- From IITs/NITs/IIITs and industry, research organizations

Principal Coordinator	Joint- Principal Coordinators	
Dr. Gaurav Trivedi, IIT Guwahati trivedi@iitg.ernet.in M: 9435582802	Dr. Chitrakant Sahu, MNIT Jaipur chitrakant.ece@mnit.ac.in M: 954 965 5371	Dr. Sangeeta Singh, NIT Patna sangeeta.singh@nitp.ac.in M: 9479646111
Joint- Principal Coordinators		
Dr. Deepak Bharti, MNIT Jaipur dbharti.ece@mnit.ac.in M: 95302 03200	Dr. Meena Pachore, NIT Patna meenap.ec@nitp.ac.in M:8989186900	Prof. Sanjeev Manhas eict@iitr.ac.in M: +91 9412528151

MODULES TOPICS-

• Introduction to Intel FPGAs and Quartus tool flow, FPGA design and Implementation hands on Lab – Remote console • 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 • Introduction to High-Speed design and High-Speed Interfaces, Challenges in high speed I/O, Serializer and De-serializer, DDR Interface and Transceiver design flow- Lab demo with hands on	• Embedded System Design using Cyclone V and ARM, SoC EDS design flow, Lab demo and hands on • Mini project using Intel SoC FPGAs

13. Scientific Computation and GUI Development Using MATLAB 21 Mar – 1 Apr 2022

EXPERTS/SPEAKERS- Dr. Pulak Mohan Pandey, Professor, IIT Delhi; Dr. Prashant K. Jain, Professor, IIITDM Jabalpur; Dr. Pavan K. Kankar, Associate Professor, IIT Indore; Dr. Amit Singh, Assistant Professor, MNIT Jaipur; Dr. Mohammad Taufik, Assistant Professor, MANIT Bhopal; Dr. Narendra Kumar, Assistant Professor, NIT Jalandhar; Dr. Ankit Nayak, Assistant Professor, Banasthali Vidyapeeth; Dr. Vilshal Francis, Assistant Professor, LPU Punjab; Dr. R B Pachori, Professor, IIT Indore

Principal Coordinator	Joint- Principal Coordinators	
Dr Prashant K. Jain, IIITDM Jabalpur pkjain@iiitdmj.ac.in M:9425800310	Dr. Bharat Gupta, NIT Patna, bharat@nitp.ac.in M:93314 06964	Dr. Amit M. Joshi, MNIT Jaipur amjoshi.ece@mnit.ac.in M: 954 965 4239
Joint- Principal Coordinators		
Dr. Rajesh Saha, MNIT Jaipur rajesh.ece@mnit.ac.in M: 954 965 1401	Dr. Mukesh Kumar, NIT Patna mukesh.kumar@nitp.ac.in M: 8984142557	

MODULES TOPICS-

- Introduction to MATLAB User Interface, Basic Operations, Using MATLAB as Calculator, Handling Variables, Data Format, Expressions and Matrices, Conditional/logical Statement,
- Execution Control, Loops, Writing Functions,
- Modifying plots using property editor, Automating Plots, Building Graphical User Interface (GUI) Basics, Polynomials, curve fitting, and interpolations, Debugging and Troubleshooting programs,
- Data Input/Output in Various Format, 2D Plotting Visualization Using MATLAB, 3D Plots,
- Development Tools and Programming Techniques, Symbolic Math, Building GUI's with toolbars, sliders, toggle buttons, radio buttons, and other windows GUI options. Generating Executable Files and Stand-Alone Applications, MATLAB Applications demonstration.

14. Data Science for All — 22 Mar – 1 Apr 2022 OR 4 Apr – 15 Apr 2022

EXPERTS/SPEAKERS- Prof Amey Karkare IITK, Prof DVLN Somayajulu-IIITDMK, Prof RBV Subramnayam NIT-W, Dr Atul Gupta IIITDMJ, Dr T Ramakrishnudu NIT-W, Dr Nagesh Bhattu – NIT AP, Dr Anand Kumar- NIT K Surathkal, Industry speakers.

Principal Coordinator	Joint- Principal Coordinators	
Prof. R. B. V. Subramanyam, NIT Warangal rbvs66@gmail.com M: 9491346969	Dr. Atul Gupta, IIITDM Jabalpur atul@iiitdmj.ac.in M: 9425152499	Prof. Amey Karkare, IIT Kanpur, karkare@iitk.ac.in M: 953 268 9131
Joint- Principal Coordinators		
Prof. Sanjeev Manhas, IIT Roorkee eict@iitr.ac.in M: 9412528151	Dr. Arka Prokash Mazumdar, MNIT Jaipur apmazumdar.cse@mnit.ac.in, M: 954 965 9129	Prof. M. P. Singh, NIT Patna mps@nitp.ac.in M: 9431200106

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

Various courses from IIT Kanpur in Intelligent Self-Paced Education (iSPED) mode are being offered in this pandemic period till March 2022. 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.

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

EXPERTS/SPEAKERS-

Dr. Amey Karkare, IIT Kanpur,
karkare@iitk.ac.in

Principal Coordinator

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IIT Kanpur,
karkare@iitk.ac.in
M: 953 268 9131

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	•

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

EXPERTS/SPEAKERS-

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Principal Coordinator

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MODULES TOPICS-

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

17. Computer System Security (https://ict.iitk.ac.in/product/computer-system-security/)

EXPERTS/SPEAKERS-

Prof. Sandeep Shukla (https://www.cse.iitk.ac.in/users/sandeeps/)

Principal Coordinator

Prof. Amey Karkare, IIT Kanpur,
karkare@iitk.ac.in
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MODULES TOPICS-

- Introduction, Interview with Prof.Sandeep Shukla; Learning objectives, Sample Attacks, The Marketplace for vulnerabilities, Error 404 Hacking digital India part 1 chase
- Control Hijacking, More Control Hijacking attacks integer overflow, More Control Hijacking attacks format string vulnerabilities, Defense against Control Hijacking
- Confidentiality Policies, Confinement Principle, Detour Unix user IDs process IDs and privileges
- VM based isolation, Confinement principle, Software fault isolation, Rootkits, Intrusion Detection Systems
- Secure architecture principles isolation and leas, Access Control Concepts
- Web security landscape, Web security definitions goals and threat models, HTTP content rendering, Browser isolation, Security interface, Cookies frames and frame busting
- Major web server threats, Cross-site request forgery & scripting, Finding vulnerabilities, Secure development
- Basic cryptography, public-key cryptography, RSA public key crypto, Digital signature Hash functions; Email security certificates, Transport Layer security TLS, IP security, DNS security
- Internet infrastructure, Summary of weaknesses of internet security, Link layer connectivity, and TCP IP connectivity

18. Smart Grid Technology (https://ict.iitk.ac.in/product/smart-grid-technology/)

EXPERTS/SPEAKERS-

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Principal Coordinator

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MODULES TOPICS-

Smart Grid Overview

- History of Smart Grid
- Conventional Grid Vs. Smart Grid
- Features of Smart Grid
- Critical Characteristics of Smart Grid
- Smart Grid Elements
- Forces behind Smart Grid Evolution
- Smart Grid Stake Holders
- Smart Grid Building Blocks
- Smart Grid Resources

Smart Grid Architecture & Design

- Conventional Power System Architecture
- IT Layer
- Communication Layer
- Distributed Architecture Design

Smart Grid Measurement

- Synchrophasor Technology
- Smart Meters and Advanced Metering Infrastructure
- Wireless Sensor Network (WSN)
- GIS/Google mapping
-

Smart Grid Communication

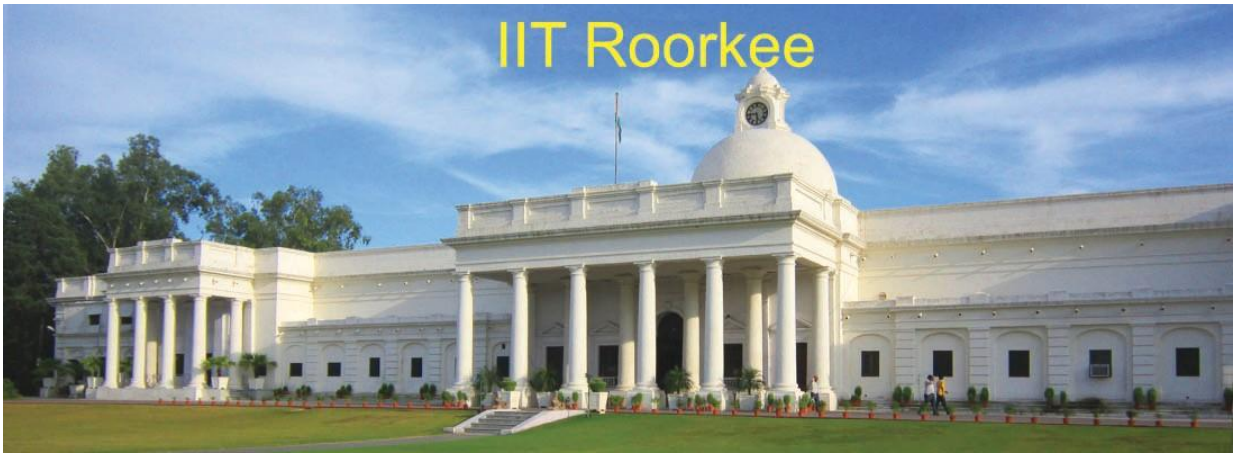
- Wired Communication (e.g., PLCC, Ethernet, Optical Fibre)
- Wireless Communication (e.g., WiFi, Zigbee, GSM/GPRS, WAN)
- Machine to Machine Communication

Smart Grid Standards and Protocols

- IEC 61850
- IEC 60870
- IEEE C37.118
- IEEE 1588
- IEC 62351; IEC 61970/ 61968
- IEC 62056; DNP 3.0

Interoperability & Associated Standard

- Interoperability issues in Smart Grid and its solutions
- Common Information Model
- Multispeak
- Green Button
- SunSpec
- SEP 2.0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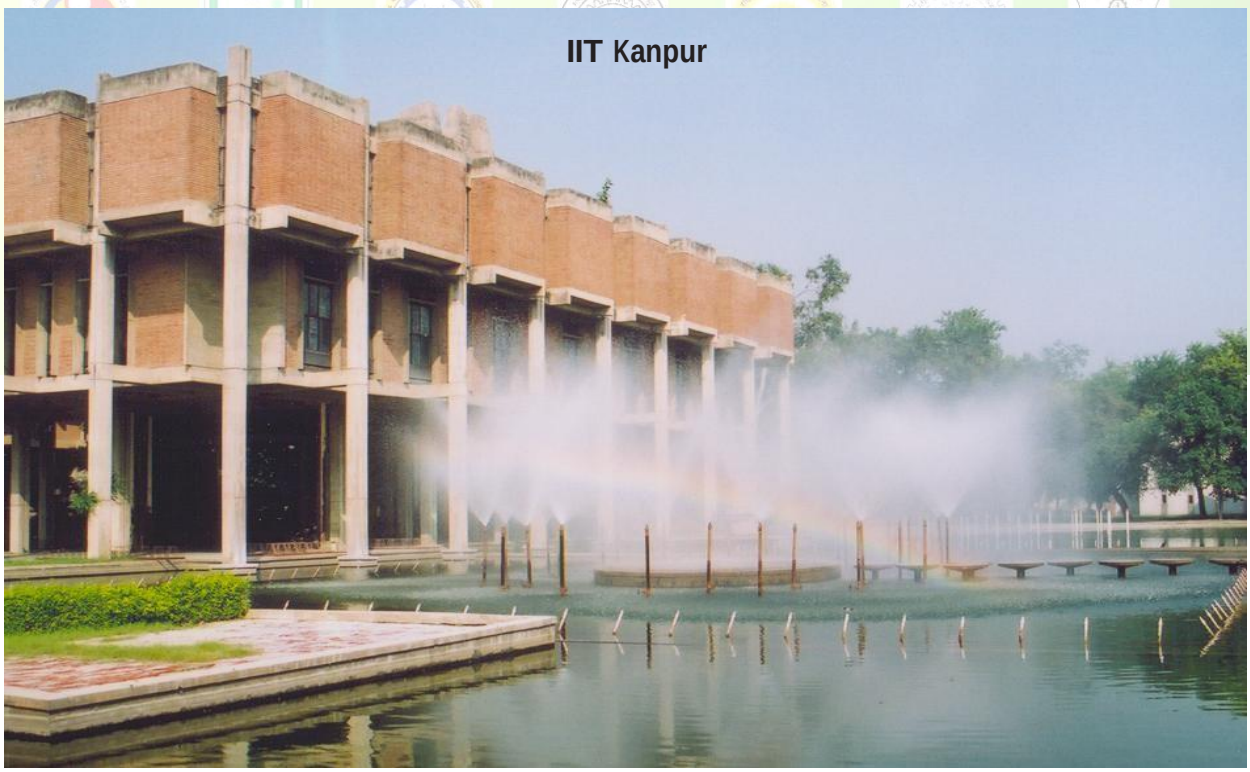
IIT Guwahati

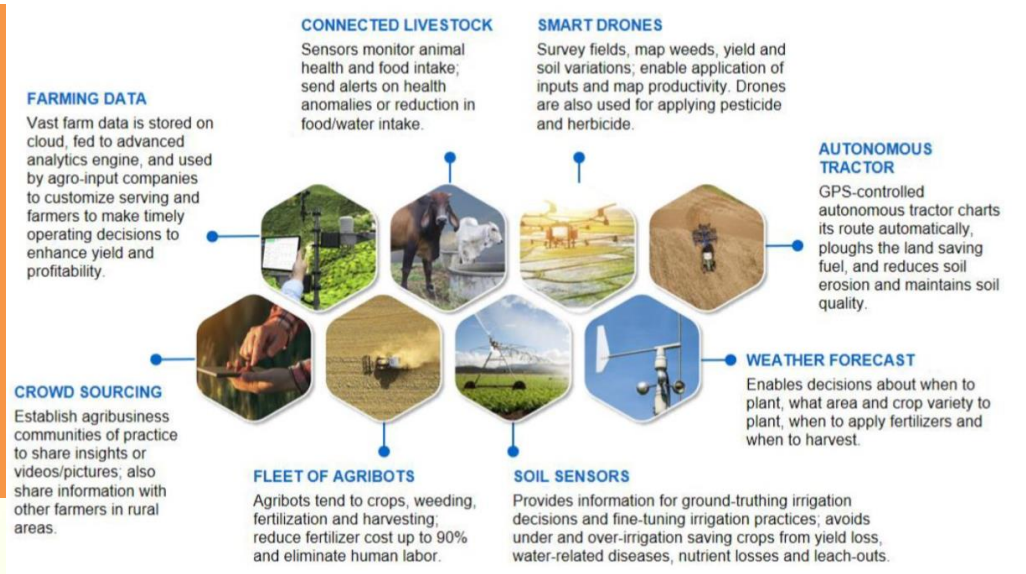

NIT
WARANGAL


MNIT Jaipur
MNIT


NIT Patna

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





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