



सत्यमेव जयते

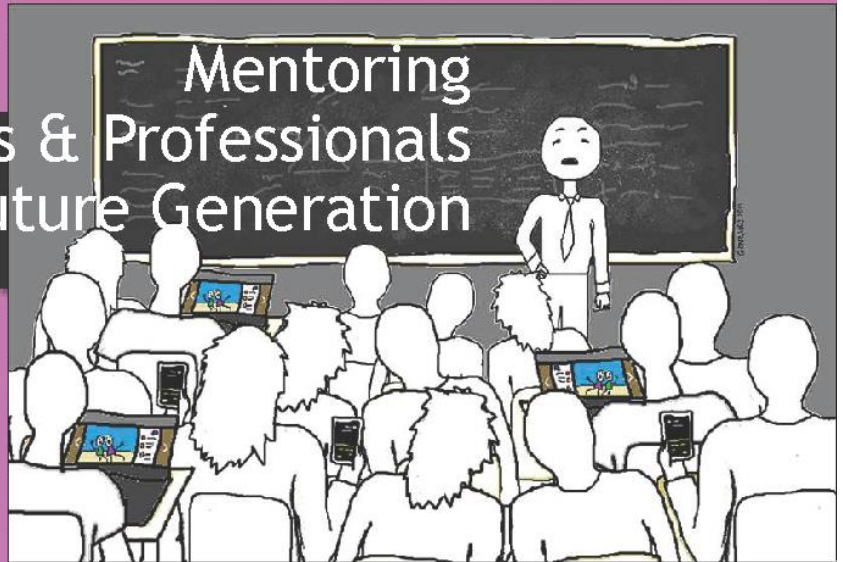


Ministry of Electronics & Information Technology



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



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 Autumn 2021	Starting date	Completion date
Blockchain Technology & Applications	3 Jan	8 Jan 2022	Machine Learning for Computer Vision	21 Feb	4 Mar 2022
Machine Learning for Signal processing & Communication	3 Jan	8 Jan 2022	Numerical & engineering computation, optimization for Physicists, Scientists & Engineers using open-source-SCILAB	21 Feb	4 Mar 2022
Data Science for All	24 Jan	4 Feb 2022	Android programming & applications	7 Mar	12 Mar 2022
Electric Vehicles & mobility	24 Jan	4 Feb 2022	Cognitive approaches & ML 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	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
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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/
IITDM Jabalpur	Online registration at web site of Academy, IITDM Jabalpur- http://ict.iitdmj.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		
Principal Coordinator	Joint- Principal Coordinators	
Prof. Aparajita Ojha, IIITDMJ Jabalpur aojha@iiitdmj.ac.in M:94258 00334	Prof. Amey Karkare, IIT Kanpur, karkare@iitk.ac.in M: 953 268 9131	Dr. Emmanuel S. Pilli, MNIT Jaipur espilli.cse@mnit.ac.in M: 954 965 8131
Joint- Principal Coordinators		
Dr. Peddoju Sateesh Kumar, IIT Roorkee sateesh@cs.iitr.ac.in M: +91 9412528151	Dr. Prabhat Kumar, NIT Patna prabhat@nitp.ac.in M:8406001700	
MODULES TOPICS-		
<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Truffle, Ganache and Metamask for Network based Dapp Development • Permissionless & Permissioned/ Private & Enterprise level Blockchains • Hyperledger Fabric & Chaincode, Storage in Blockchain, Data Encryption, 	<ul style="list-style-type: none"> • 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

Prof. Ratnajit Bhattacharjee, IIT Guwahati ratnajit@iitg.ac.in M: 9954498116	Dr. Bharat Gupta, NIT Patna, bharat@nitp.ac.in M:93314 06964	Dr. S. J. Nanda, MNIT Jaipur, sjnanda.ece@mnit.ac.in M: 954 9654 237
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Joint- Principal Coordinators

Dr. Dheeraj Kumar, IIT Roorkee dheeraj.kumar@ece.iitr.ac.in M: 9412528151	Dr. Argyadip Roy, IIT Guwahati, arghyadip@iitg.ac.in M: 789 6233 561	Dr. Rakesh Ranjan, NIT Patna rr@nitp.ac.in M: 9334385016
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MODULES TOPICS-

<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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
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3. Data Science for All

24 Jan – 4 Feb 2022

EXPERTS/SPEAKERS- Prof Amey Karkare IITK, Prof DVLN Somayajulu-IITDMK, Prof RBV Subramnyam NIT-W, Dr Atul Gupta IIITDMJ, Dr T Ramakrishnu 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 cict@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 mpps@nitp.ac.in M: 9431200106

MODULES TOPICS-

<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Data Processing: Dimensionality Reduction, Principal Component Analysis. Machine Learning basics: Regression, Classification – Decision Trees, Naive Bayesian Classifier, Clustering, Handling Large Datasets: MapReduce 	<ul style="list-style-type: none"> 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
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4. 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. Arova Yadav IIT Roorkee

Principal Coordinator	Joint- Principal Coordinators	
Dr. Arun Verma, MNIT Jaipur arun.ee@mnit.ac.in M: 954 965 0188	Dr. Amitesh Kumar, NIT Patna amitesh.ee@nitp.ac.in M-7840809129	Dr. D K Dheer, NIT Patna dkdheer@nitp.ac.in M-6206398829

MODULES TOPICS-

<ul style="list-style-type: none"> • Overview of electric vehicles in India • EV history, battery technology, and National mobility mission 2022 • Electric Propulsion System 	<ul style="list-style-type: none"> • Vehicle subsystems: EV power-train • Power electronics interface for EV • EV charging and control (Unidirectional, Bidirectional, and Wireless) 	<ul style="list-style-type: none"> • PFC Rectifier and DC-DC converter technology for EV as an application. Vehicle to Grid and Grid to Vehicle (V2G and G2V)
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IIT Guwahati

IITDM Jabalpur

MNIT Jaipur

IIT Kanpur

NIT Patna

IIT Roorkee

NIT Warangal



5. Natural Language Processing

7 – 18 Feb 2022

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

Principal Coordinator

Dr. J P Singh, NIT Patna
ips@nitp.ac.in
 M: 8521159014

Joint- Principal Coordinators

Dr. Raksha Shama, IIT Roorkee
raksha.sharma@cs.iitr.ac.in
 M: 8879261844

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

Joint- Principal Coordinators

Prof. Atul Gupta, IIITDM Jabalpur
atul@iiitdmj.ac.in
 M: 9425152499

Dr. Namita Mittal, MNIT Jaipur
nmittal.cse@mnit.ac.in
 M: 954 965 4394

Dr. G. Pradhan, NIT Patna
gdp@nitp.ac.in
 M: 7979065008

Dr. Mahipal Jadeja
mahipaljadeja.cse@mnit.ac.in
 M: 7376157421

Dr. Bhaskar Mondal, NIT Patna
bhaskar.cs@nitp.ac.in
 M: 87978 77789

MODULES TOPICS- To be Announced (IIT Guwahati)

<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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
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6. 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.

Principal Coordinator

Dr. Gaurav Trivedi, IIT Guwahati
trivedi@iitg.ac.in
M: 99544 98116

Joint- Principal Coordinators

Dr. C. Periasamy, MNIT Jaipur
cpsamy.ece@mnit.ac.in
M: 954 965 4235

Joint- Principal Coordinators

Dr. Sangeeta Singh, NIT Patna
sangeeta.singh@nitp.ac.in
M:9993102487

Dr. Pankaj Kumar, NIT Patna
pankajjha@nitp.ac.in
M:7004727085

MODULES TOPICS-

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| <ul style="list-style-type: none"> • Simulations and Characterization for Libraries | <ul style="list-style-type: none"> • Input-Output Files: Lib Files, General files needed in complete flow | <ul style="list-style-type: none"> • Placement Basics and Settings |
| <ul style="list-style-type: none"> • Design Basics: Circuit, Architecture and System Level | <ul style="list-style-type: none"> • Layer and Power Planning | <ul style="list-style-type: none"> • DRC LVS and Extraction |
| <ul style="list-style-type: none"> • Constraints and Synthesis: Input-Output Constraints, Complex SoC Constraints | <ul style="list-style-type: none"> • Floorplanning | <ul style="list-style-type: none"> • Low Power Flow Basics |
| | <ul style="list-style-type: none"> • Delay Calculations and System Implications | <ul style="list-style-type: none"> • Sign Off |
| | <ul style="list-style-type: none"> • Setup and Hold Discussion | |

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

IIT Guwahati

IITM Jabalpur

MNIT Jaipur

IIT Kanpur

NIT Patna

IIT Roorkee

NIT Warangal



7. IoT & Applications (smart systems)

14 – 19 Feb 2022

EXPERTS/SPEAKERS- from IITs/NITs/IIITs and industry- TBA

Dr. Ankush Sharma, IIT Kanpur

Principal Coordinators		Joint- Principal Coordinators	
Prof. Ratnajit Bhattacharjee, IIT Guwahati ratnajit@iitg.ac.in M: 9954498116	Dr. Bharat Gupta, NIT Patna, bharat@nitp.ac.in M:93314 06964	Dr. Ankush Sharma, IIT Kanpur ansharma@iitk.ac.in M:945 866 8705	
Joint- Principal Coordinators			
Prof. Lava Bhargava, MNIT Jaipur lavab@mnit.ac.in M: 954 965 4231	Dr, Meenakshi Rawat, IIT Roorkee meenakshi.rawat@ece.iitr.ac.in M: +91 9412528151	Dr. Suyel Namasudra, NIT Patna suyel.cs@nitp.ac.in M: 9707046535	Dr Neelam Dayal, IIITDM Jabalpur neelam.dayal@iiitdmj.ac.in M: 9473619501
MODULES TOPICS-			
• TBA	•	•	

IIT Guwahati

IIITDM Jabalpur

MNIT Jaipur

IIT Kanpur

NIT Patna

IIT Roorkee

NIT Warangal



8. 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 Viparthy, MNIT Jaipur

Principal Coordinator	Joint- Principal Coordinators		
Prof. Aparajita Ojha, IIITDM Jabalpur aojha@iiitdmj.ac.in M:94258 00334	Dr. Meenakshi Tripathi, MNIT Jaipur mtripathi.cse@mnit.ac.in M: 954 965 4393 Dr. Satyendra Chauhan sschouhan.cse@mnit.ac.in M: 89542 21599	Prof RBV Subramanyam, NIT Warangal rbvs66@nitw.ac.in M-9491346969	
Joint- Principal Coordinators	Dr. R. Balasubramanian, IIT Roorkee bala@cs.iitr.ac.in M: +91 7078627392	Prof. M. P. Singh, NIT Patna mpps@nitp.ac.in M: 9431200106	Dr. Suyel Namasudra, NIT Patna suyel.cs@nitp.ac.in M: 9707046535

MODULES TOPICS-

<ul style="list-style-type: none"> Introduction to Image Processing and Computer Vision (CV) Digital Image and Computer Vision, Main Goals and challenges of the CV, Structure of Human Eye and Vision, Color Models, Image Processing Goals and Tasks. Traditional approaches in CV Feature Extraction using local patterns and their applications to Image Processing and CV: SIFT, HOG, LBP, Natural Image Classification, Image Enhancement, edge Detection, Segmentation. Image denoising Introduction to Artificial Intelligence (AI) and Machine Learning (ML) AI and ML, Supervised and Unsupervised Learning, Traditional ML approaches, 	<ul style="list-style-type: none"> Neural Network as a learning machine, Machine learning. Applications in computer vision. Image classification, Image segmentation, etc Applications of ML in Medical Images Challenges in Medical image processing, ML for Medical Image processing, Medical image segmentation, classification and survival prediction, Medical image denoising, Medical image retrieval Introduction to Deep Learning (DL) Basic differences between Conventional ML and DL approaches Feedforward Neural Networks (NN), Backpropagation, Stochastics gradient method and variants, regularization, 	<ul style="list-style-type: none"> and optimization, Vanishing /exploding gradient problem. Introduction to Convolutional Neural Network The Convolution Operation, the Basic architecture of a Convolution Neural Network, Pooling and Batch Normalization layers, CNNs as feature extractors, Image classification using CNN, Image Enhancement and Segmentation. CNN architectures for CV State of the Art CNN Architectures, CNN for Image Enhancement and Segmentation. Applications of CNN in face recognition Face Detection and Recognition using CNN, Siamese Network, and Triplet Loss.
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9. 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)

Principal Coordinator	Joint- Principal Coordinators	
Dr. Bharat Gupta, NIT Patna, bharat@nitp.ac.in M:93314 06964	Dr. Menka Yadav, MNIT Jaipur menka.ece@mnit.ac.in M: 954 965 0791	Prof. Sanjeev Manhas eict@iitr.ac.in M: +91 9412528151
Joint- Principal Coordinators		
Dr. Rakesh Ranjan, NIT Patna rr@nitp.ac.in M: 9334385016	Dr. Kuldeep Singh, MNIT Jaipur kuldeep.ece@mnit.ac.in M: 99101 01592	

MODULES TOPICS-

<ul style="list-style-type: none"> • (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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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
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10. Android programming & applications

7 – 12 Mar 2022

EXPERTS/SPEAKERS- TBA

Principal Coordinator

Dr. Gaurav Trivedi, IIT Guwahati
trivedi@iitg.ac.in
 M: 9435582802

Joint- Principal Coordinators

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

Dr. Sandeep Kumar Garg, IIT
 Roorkee
andeep.garg@cs.iitr.ac.in
 M: 9412528151

Joint- Principal Coordinators

Dr Kusum Kumari Bharti, IIITDM
 Jabalpur
kusum@iiitdmj.ac.in
 M: 9406711298

Dr. D. Gopalani, MNIT Jaipur
dgopalani.cse@mnit.ac.in
 M: 954 9654 392
 Dr. Ramesh B. Battula,
rbbattula.cse@mnit.ac.in
 M: 954 965 4395

Dr. Prabhat Kumar, NIT
 Patna
prabhat@nitp.ac.in
 M:8406001700
 Dr Somraju Suvani, NIT Patna
somaraju@nitp.ac.in
 M:9676430356

MODULES TOPICS-

• TBA

IIT Guwahati

IIITDM Jabalpur

MNIT Jaipur

IIT Kanpur

NIT Patna

IIT Roorkee

NIT Warangal



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 ips@nitp.ac.in M: 8521159014	
MODULES TOPICS-					
• TBA		•		•	

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NIT Warangal



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	
MODULES TOPICS-			
• To be announced		•	

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13. Cognitive approaches & ML for IoT/EDA

7 – 19 Mar 2022

EXPERTS/SPEAKERS- From IITs/NITs/IIITs and industry, research organizations- (i) Mr. Rohit Sharma, CEO AI company, USA (consent awaited); Prof Amita Kapoor, University of Delhi (consent awaited)

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-		
<ul style="list-style-type: none"> Tensor flows, Keras and datasets; Python libraries, TensorFlow and Keras, to build different kinds of intelligent AI models Data access & distributed processing for IoT- data generation and consumption by IoT devices such as time series, images, and audio; others Machine learning for IoT- learning paradigms, logistic regression, naïve Bayes, decision trees, ensemble learning 	<ul style="list-style-type: none"> Deep learning for IoT- perceptron, Convolutional NN, Recurrent NN- LSTM, gated recurrent unit; Auto-encoders . Reinforcement learning for IoT- deep reinforcement learning, Q-learning, Q-network 	<ul style="list-style-type: none"> Generative models for IoT- VAEs in TensorFlow, Generative adversarial networks (GAN); Smart IoT systems. real-time data coming from wearable devices Distributed AI for IoT Personal & Home IoT Industrial IoT; smart city

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IIT Roorkee

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14. 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-

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| <ul style="list-style-type: none"> 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, | <ul style="list-style-type: none"> 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, | <ul style="list-style-type: none"> 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. |
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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

Dr. Amey Karkare,
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-

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

Principal Coordinator

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

MODULES TOPICS-

<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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
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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
 M: 953 268 9131

MODULES TOPICS-

<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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
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18. Smart Grid Technology (<https://ict.iitk.ac.in/product/smart-grid-technology/>)

EXPERTS/SPEAKERS-

Prof. Ankush Sharma, IIT Kanpur
ansharma@iitk.ac.in

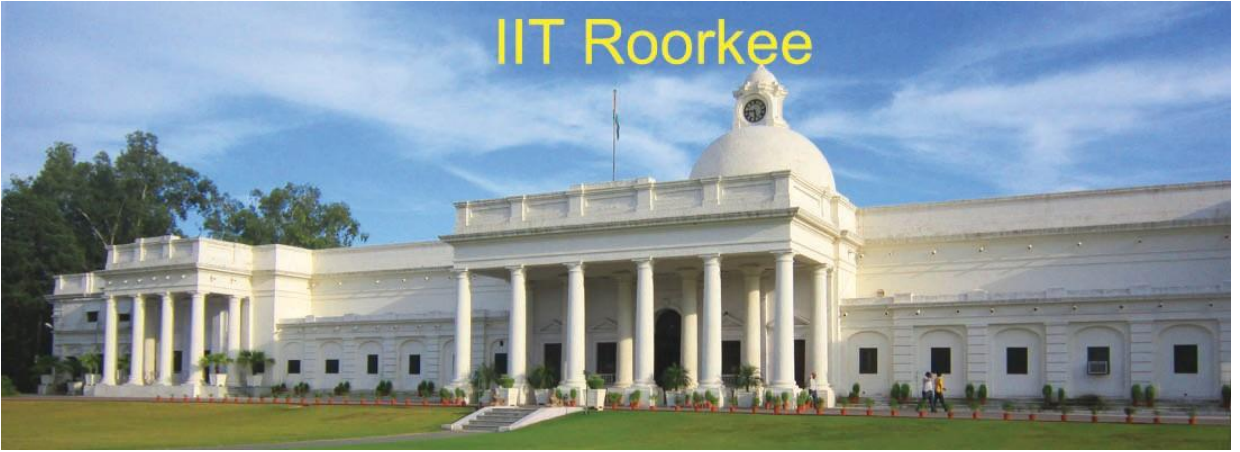
Principal Coordinator

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

MODULES TOPICS-

Smart Grid Overview <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> Conventional Power System Architecture IT Layer Communication Layer Distributed Architecture Design 	Smart Grid Measurement <ul style="list-style-type: none"> Synchrophasor Technology Smart Meters and Advanced Metering Infrastructure Wireless Sensor Network (WSN) GIS/Google mapping Smart Grid Communication <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> IEC 61850 IEC 60870 IEEE C37.118 IEEE 1588 IEC 62351; IEC 61970/ 61968 IEC 62056; DNP 3.0 Interoperability & Associated Standard <ul style="list-style-type: none"> 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



NIT Patna

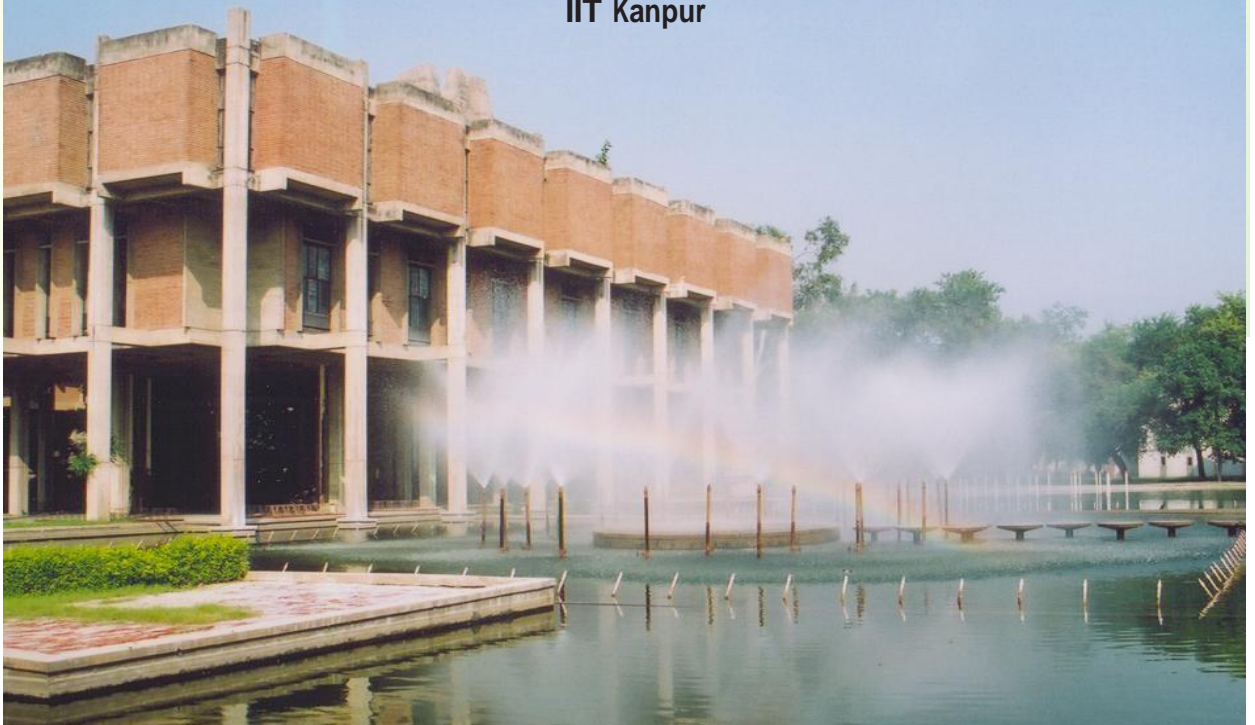




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IIT Kanpur



FARMING DATA

Vast farm data is stored on cloud, fed to advanced analytics engine, and used by agro-input companies to customize serving and farmers to make timely operating decisions to enhance yield and profitability.

CONNECTED LIVESTOCK

Sensors monitor animal health and food intake; send alerts on health anomalies or reduction in food/water intake.

SMART DRONES

Survey fields, map weeds, yield and soil variations; enable application of inputs and map productivity. Drones are also used for applying pesticide and herbicide.

AUTONOMOUS TRACTOR

GPS-controlled autonomous tractor charts its route automatically, ploughs the land saving fuel, and reduces soil erosion and maintains soil quality.

CROWD SOURCING

Establish agribusiness communities of practice to share insights or videos/pictures; also share information with other farmers in rural areas.

FLEET OF AGRIBOTS

Agribots tend to crops, weeding, fertilization and harvesting; reduce fertilizer cost up to 90% and eliminate human labor.

SOIL SENSORS

Provides information for ground-truthing irrigation decisions and fine-tuning irrigation practices; avoids under and over-irrigation saving crops from yield loss, water-related diseases, nutrient losses and leach-outs.

WEATHER FORECAST

Enables decisions about when to plant, what area and crop variety to plant, when to apply fertilizers and when to harvest.



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Electronics & ICT Academy at IIT Guwahati Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Sikkim	Prof. T. G. Sitharam director@iitg.ac.in	Prof. Ratnajit Bhattacharjee ratnajit@iitg.ac.in M: 9954498116	Ms Feroza Haque (PM) Email: feroza.haque@iitg.ac.in M: 789 6233 561 Website: www.iitg.ernet.in/eictacad/
Electronics & ICT Academy at IIITDM Jabalpur Madhya Pradesh, Chhattisgarh, Maharashtra	Prof. Sanjeev Jain director@iiitdmj.ac.in M:	Prof. Aparajita Ojha aojha@iiitdmj.ac.in M: +91 9425800334	Email: academyiiitdmj@gmail.com , M: +91 9893443284 Website: http://ict.iiitdmj.ac.in/
Electronics & ICT Academy at MNIT Jaipur Rajasthan, Gujarat, Dadra & Nagar Haveli, Daman & Diu	Prof. A. P. S. Rathore director@mnit.ac.in	Prof. Vineet Sahula ci.academy@mnit.ac.in M: 954 9654 227	Email: academy@mnit.ac.in L: 0141-2715084 M: +91 954 9654 227 Website: http://www.mnit.ac.in/eict
Electronics & ICT Academy at IIT Kanpur UP, Punjab, Haryana, Delhi	Prof. Abhay Karandikar director@iitk.ac.in	Prof. B. V. Phani bvphani@iitk.ac.in M: +91 9451423721	Email: ict@iitk.ac.in M: 0512 679 7787 Website: https://ict.iitk.ac.in/
Electronics & ICT Academy at NIT Patna Bihar, Jharkhand, Odisha, West Bengal	Prof. Pradip Kumar Jain director@nitp.ac.in	Dr. Bharat Gupta bharat@nitp.ac.in M: 9331406964	Email: eictapatna@nitp.ac.in M: + 0612 - 237 1715 Website: http://www.nitp.ac.in/ict
Electronics & ICT Academy at IIT Roorkee Jammu and Kashmir, Himachal Pradesh, and Uttarakhand	Prof. Ajit K. Chaturvedi director@iitr.ac.in	Dr. Sanjeev Manhas eict@iitr.ac.in M: +91 9412528151	Dr. Anurag Vijay Agrawal Email: eict@iitr.ac.in , M: +91 9412528151 Website: http://eict.iitr.ac.in/
Electronics & ICT Academy at NIT Warangal Telangana, Andhra Pradesh, Karnataka, Puducherry, Andaman and Nicobar Islands, Goa	Prof. N.V. Ramana Rao director@nitw.ac.in	Prof. R. B. V. Subramanyam rbsv66@gmail.com M: +91 949 134 6969	Email: eict.nitw@gmail.com M: 0912 101 6547 Website: http://hitw.ac.in/eict/