Ministry of Electronics & Information Technology (MeitY)
Government of India

ELECTRONICS INDIA
Billion Needs Million Chips

Government of India Initiative for Employability Enhancement

- ■ *Faculty Training*
- ■ **Training and Consultancy**
- ■ **Services for Industry**
- ■ **Technical Incubation and Entrepreneurship**
- ■ **Continuing Education for Students & Professionals**

Digital India
Power To Empower

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

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) 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. Estimated cost and targets for the Electronics and ICT Academy in the two Categories for a period of four years are as under:

Category	Total Outlay	Internal Revenue Generation	Grants-in-Aid from Central Government	Training Target (Faculty members)
Category-A	Rs. 25 crore	Rs. 7.50 crore	Rs. 17.50 crore	16,000
Category-B	Rs. 10 crore	Rs. 3.00 crore	Rs. 7.00 crore	6,400

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 is being provided funding support for four years 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 the end of fourth year onwards. All these Academies will cater to the requirements of identified neighbouring States and UTs also. Brief information about all the Academies is available at : http://Meity.gov.in/content/scheme-financial-assistance-setting-electronics-andict-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
- Design, Develop and Deliver specialized modules for specific research areas
- Providing advice and support for technical incubation and entrepreneurial activities

About Winter Courses

Faculty Development Programmes in core areas of Electronics and Information & Communication Technology (ICT) streams have been planned by academies for delivery during Winter (i.e., November - December 2018). All these winter courses will be offered through National Knowledge Network (NKN) by inviting experts from IITs, NITs, IIITs and other premier institutes/industries. In addition, local course coordinators at respective academies /identified remote centres will take care of sessions on design orientation/activity linked problems/ assignments/ case studies and quiz test(s).

These courses will be delivered at E & ICT Academies/identified remote centres through NKN infrastructure. Candidates could apply for training at academy locations or identified centres as per the convenience. For details about identified remote centres, please refer to respective academy websites. The following four courses would be taken up for delivery during forthcoming winter vacation:

S.No.	Course Name	Principal Coordinating - Academy	Co-principal Coordinating - Academy	Proposed Dates From	To
1.	Introduction to Data Structures and Programming in C	IIT Kanpur	NIT Warangal	26.11.2018	30.11.2018
2.	Wireless and Mobile Communication	IIT Guwahati	NIT Patna	3.12.2018	07.12.2018
3.	DSP and Sensors	NIT Warangal	MNIT Jaipur	10.12.2018	14.12.2018
4.	AI and Machine Learning	IIT Roorkee	IIITDM Jabalpur	17.12.2018	21.12.2018

Target Beneficiaries:

Interested Faculty of engineering/technical institutions are eligible to attend these winter courses.

Availability of seats at each offering Academy:

Fifty (50) seats are available for each winter course to be offered at each Academy/Remote Centre. Participants will be selected based on first-cum-first-serve basis by each academy. Selected participants will be communicated through e-mail / notified in E&ICT Academy websites.

Course duration:

Each winter course is designed for 40 hours (Theory Lectures: 20-25 hours, Hands-on/Design orientation/Activity linked problems/Assignments Problem Solving/Case Studies sessions/Quiz Tests: 15-20 hours)

Accommodation:

Boarding and Lodging at Hostels/Guest House will be provided at free of cost only at Identified E&ICT Academies. For details please refer to respective Academy websites. At identified Remote centres only working lunch and snacks will be provided.

Travel:

No Travel Allowance will be paid to the participants.

Registration Fee for each Winter Course:

No Registration fee is charged for attending this programme planned at any designated academies/Remote centres. However, candidate should submit a refundable Demand Draft of Rs.1000/- along with application form and the same will be handed over to the participant on the last day of the training. Satisfactory Certificate will be given to the participants subject to fulfillment of attending all sessions, submission of assignments and clearing the test(s).

Mode of Payment:

Academy Name	Payment through DD
NIT Warangal	Demand Draft in favor of "Electronics and ICT Academy, NITW" payable at NIT Warangal
IIT Guwahati	Demand Draft in favor of "Registrar, IIT Guwahati" Payable at Guwahati
IIITDM Jabalpur	Demand Draft in favor of "Electronics and ICT Academy, IIITDMJ" payable at Jabalpur
MNIT Jaipur	Demand Draft in favor of "Electronics and ICT Academy, MNIT Jaipur" Payable at Jaipur
IIT Kanpur	Demand Draft in favor of "Director, IIT Kanpur" Payable at Kanpur
NIT Patna	Demand Draft in favor of "Director, NIT Patna" payable at Patna
IIT Roorkee	Demand Draft in favor of "Dean SRIC IIT Roorkee" payable at Roorkee

How to apply:

* A duly filled in application form in the prescribed form signed by the Head of the Institute to which the candidate belongs (along with demand draft) should reach by post to the local coordinator of the participating academy.

* Government of India norms will be followed for SC/ST category participants.

* The application form along with the DD can also be submitted in the online mode to Local Coordinator of the respective academy.

Note: Refer offering Academies websites for complete postal address and other details of winter courses.

Last Date for Submission of Applications and Intimation of Selection:

	Introduction to Data Structures and Programming in C (26-30, November 2018)	Wireless and Mobile Communication (3-7, December 2018)	DSP and Sensors (10-14, December 2018)	AI amd Machine Learning (17-21, December 2018)
Last Date for Submission of application form	**19th November 2018**	**26th November 2018**	**3rd December 2018**	**10th December 2018**
Selection list Intimation by E-mail/Display in web site	**22nd November 2018**	**28th November 2018**	**5th December 2018**	**12th December 2018**

The following are the details of winter courses being offered during November - December 2018:

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Course 1: Introduction to Data Structures and Programming in C

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(Offered during 26th - 30th November, 2018)

Principal Coordinator - Academy	Support Coordinator - Academy	Participating Academies and Local Coordinator Details	
Amey Karkare karkare@cse.iitk.ac.in M: 95326 89131 **IIT Kanpur**	*Prof. D.V.L.N. Somayajulu* eict.nitw@gmail.com M: 091210 16547 **NIT Warangal**	**IIT Kanpur - *Amey Karkare*** karkare@cse.iitk.ac.in	M: 95326 89131
		NIT Warangal - *Dr. K. Ramesh* kram@nitw.ac.in	M: 98494 32598
		MNIT Jaipur - *Dr. E. S. Pilli* espilli.cse@mnit.ac.in	M: 95496 58131
		NIT Patna - *Dr. M. P. Singh* mps@nitp.ac.in	M: 7368803352

Module details of Introduction to Data Structures and Programming in C

S.No.	Module Name	Topics
1.	**Introduction to programming**	Structure of C program, writing and executing the first C program, Syntax and logical errors in compilation, Expressions and Arithmetic, Standard I/O in C, Fundamental data types, Variables and memory locations, Storage classes. Conditional Expressions, Statements, and Branching. Functions.
2.	**Iteration and Recursion**	Use of while, do while and for loops, Nested loops, use of break and continue statements. Recursive Functions, Self vs Mutual Recursion, Iteration vs Recursion.
3.	**Arrays**	Array notation and representation, Manipulating arrays, 1 Dimensional vs Multidimensional arrays. Strings, Passing arrays to functions.
4.	**Pointers**	Concept of memory and its address, Pointers and applications, Introduction to dynamic memory allocation (malloc, calloc, realloc, free).
5.	**Data Structures**	Abstract Data Type (ADT), Stack, Queue, Linked List, Binary Tree. Comparison and Applications of Data Structures.
6.	**Complexity**	Notion of asymptotic runtime, Order of an algorithm
7.	**Analysis of Algorithmic Complexity**	Examples of computing Algorithmic Complexity
8.	**Sorting and Searching**	Importance of Sorting and Searching. Some well known sorting and searching algorithms.

Course 2: Wireless and Mobile Communication

(Offered during 3rd - 7th December, 2018)

Principal Coordinator - Academy	Support Coordinator - Academy	Participating Academies and Local Coordinator Details
Prof. Ratnajit Bhattacharjee @gmail.com Phone:3612582503(O) **IIT Guwahati**	*Dr. Bharat Gupta* bharat@nitp.ac.in **NIT Patna**	**IIT Guwahati -** *Dr. Kalpana Dhaka* and kalpana.dhaka@iitg.ac.in Phone: 36125 83456 (O) **Dr. Salil Kashyap** salilkashyap@iitg.ac.in Phone: 36125 83473 (O)
		NIT Patna - *Dr. Seemanti Saha* and seemanti@nitp.ac.in M: 94341 08693 *Dr. Bharat Gupta* bharat@nitp.ac.in M: 93314 06964
		NIT Warangal - *Dr. V. V. Mani* vvmani@nitw.ac.in M: 83329 69365
		MNIT Jaipur - *Dr. Satyasai J. Nanda* sjnanda.ece@mnit.ac.in M: 95496 54237
		IIT Roorkee - Dr. P.M. Pradhan eict@iitr.ac.in, pmpradhan.fec@iitr.ac.in M: +91-1332-286457

Module Details of Wireless and Mobile Communication

S.No.	Module Name	Topics
1	**Introduction & basics of Mobile radio propagation environment**	Evolution of mobile radio communication, Different generations of wireless communication and their specifications, Mobile radio propagation and wireless channel models-free space propagation, reflection, diffraction and scattering of radio signals, Doppler shift, Path loss and shadowing, Multipath propagation and impulse response model, Statistical fading models-Narrowband and wideband fading models, Different parameters of fading channels-rms delay spread and coherence bandwidth, Doppler spread and coherence time, Flat and frequency selective fading, Slow fading and fast fading, Level crossing rate (LCR) and Average fade duration (AFD), Link budget design. **Hands-on:** Path-loss and shadowing, Rayleigh and Rician fading, LCR and AFD
2.	**Cellular radio communication systems and Multiple access Techniques**	Cellular concept-Cellular system fundamental, frequency reuse, channel assignment, handoff, Interference and system capacity, Improving system capacity and cell coverage, Multiple access techniques-Frequency division multiple access (FDMA), Time division multiple access (TDMA), Code division multiple access (CDMA) and Space division multiple access (SDMA), Examples of practical cellular radio systems. **Hands-on:** Capacity of cellular systems with co-channel interference for varying cluster size.
3.	**Digital communication over fading channels, diversity equalization and channel coding**	Non-coherent and coherent reception; error probability of common modulation schemes for uncoded transmission, Receiver diversity-selection combining (SC), equal gain combining (EGC) and maximal ratio combining (MRC), Transmit diversity, Introduction to space-time codes, Linear and decision feedback equalizers, Linear block codes and convolution codes **Hands-on:** Error probability of common modulation schemes in Rayleigh fading, SC and MRC, Zero forcing (ZF) and Minimum mean square error (MMSE) equalizer.
4.	**Spread spectrum, Multi-carrier and MIMO wireless systems**	Spread spectrum-Spread Spectrum Principles, Direct Sequence Spread Spectrum (DSSS) system Model, Processing gain, Spreading codes, Multiple access interference, Power control, Synchronization, Rake receiver, Multi-carrier system-Data Transmission using Multiple Carriers, Orthogonal Frequency Division Multiplexing (OFDM), Matrix Representation of OFDM, Peak to Average Power Ratio, Frequency and Timing Offset, Multiple Input Multiple Output (MIMO) wireless systems-Narrowband MIMO Model, parallel decomposition of MIMO channel, MIMO Channel Capacity for various conditions, Diversity-Multiplexing Trade-offs **Hands-on:** Spread spectrum system, multiple access interference, OFDM systems-transmitter and receiver

Course 3: DSP and Sensors

(Offered during 10th - 14th December, 2018)

Principal Coordinator Academy	Support Coordinator Academy	Participating Academies and Local Coordinator Details
Prof. T. Kishore Kumar kishorefr@gmail.com M: 83329 69353 **NIT Warangal**	*Dr. C. Periasamy* cpsamy.ece@mnit.ac.in M: 95496 54235 **MNIT Jaipur**	**NIT Warangal -** *Prof. T. Kishore Kumar* kishorefr@gmail.com M: 83329 69353 **MNIT Jaipur -** *Prof. L. Bhargava* lavab@mnit.ac.in M: 95496 54231 **IIITDM Jabalpur -** *Dr. Varun Bajaj* varunb@iiitdmj.ac.in M: 76127 94470 **IIT Guwahati -** *Dr. Gaurav Trivedi* trivedi@iitg.ac.in Phone: 36125 82536 (O) **NIT Patna -** *Mr. Bikash Chandra Sahana* sahana@nitp.ac.in M: 94304 27925 and *Dr. Rajeev Arya* M: 97207 62699 rajeev.arya@nitp.ac.in

Module details of DSP and Sensors

S.No.	Module Name	Topics
1.	**Introduction**	Review of Signals and Systems, Z-Transform and properties, Discrete Fourier representation of periodic sequences (DTFT), Properties, Frequency response. Discrete Fourier Transform: The DFT & its properties; Inverse DFT, Linear filtering methods based on DFT, Efficient computation of DFT algorithms - Radix 2 (DIT & DIF), Radix 4, Split radix algorithms. Linear filtering approach to computation of DFT, Quantization effects in the computation of DFT - Direct & FFT method.
2.	**Filter Design and Realization**	Digital Filters: Linear phase FIR filter, Design of FIR filter - Windowing, Frequency sampling, Design of IIR filters from Analog filters - Impulse invariance, Bilinear transformation, Matched z-transform. Digital Filter Structures: FIR filters - Direct form, Cascade form, Frequency sampling, Lattice; IIR filter - Direct form I, Direct form II, cascade form, parallel form Lattice & Lattice loader, Quantization of coefficients in FIR filters, Round off effects in digital filters.
3.	**Advanced DSP**	Multirate DSP: Decimation by a factor D, Interpolation by a factor I, Sampling rate conversion by a rational factor I/D Adaptive Signal Processing and Applications
4.	**Introduction and Measurement of Physical Parameters - I**	Introduction to Sensors, Basic Requirements, Classification, static and dynamic characteristics and Loading effects. Various Displacement, Proximity, Force and Pressure sensors
5.	**Measurement of Physical Parameters - II**	Various Velocity, Flow, Level, Temperature, Motion and Light sensors.

Course 4: AI and Machine Learning

**(Offered during 17th - 21st December, 2018)**

| Principal Coordinator - Academy	Support Coordinator - Academy	Participating Academies and Local Coordinator Details
Sanjeev Manhas samanfec@iitr.ac.in M: 70786 27392 **IIT Roorkee**	*Dr. Atul Gupta* atul@iiitdmj.ac.in M: 94251 52499 Phone: 0761-2794223 **IIITDM Jabalpur**	**IIT Roorkee -** *Dr. Bala Subramanian* eict@iitr.ac.in balarfma@iitr.ac.in Phone: 01332-286457 **IIITDM Jabalpur -** *Dr. Atul Gupta* atul@iiitdmj.ac.in M: 94251 52499 Phone: 0761-2794223 **IIT Guwahati -** *Dr. Prithwijit Guha* pguha@iitg.ac.in Phone: +91-361-258-3452 (O) **NIT Patna -** *Dr. J. P Singh* M: 85211 59014 jps@nitp.ac.in and *Dr. Akshay Deepak* M: 62010 80411 akshayd@nitp.ac.in

Module details of AI and Machine Learning

S.No.	Module Name	Topics
1.	**AI Fundamentals**	Fundamental Concepts of AI: Agents, environments, general model; Problem Solving techniques.
2.	**Search Techniques**	Uninformed search, heuristic search, adversarial search and game trees; Solution of constraint satisfaction problems using Search.
3.	**Knowledge Representation**	Propositional and predicate calculus, semantics for predicate calculus, inference rules.
4.	**Machine Learning Structures**	Supervised and unsupervised learning. Artificial Neural Network (Multi-Layer Perception), Radial Basis Function, Functional Link ANN, Self-Organizing Map, Clustering Adaptive FIR and IIR structures.
5.	**Machine Learning Algorithms**	Least Mean Square algorithm, Back Propagation,Genetic algorithm, Differential Evolution, Particle Swarm Optimization and Other Nature Inspired Optimization.

IIT Roorkee
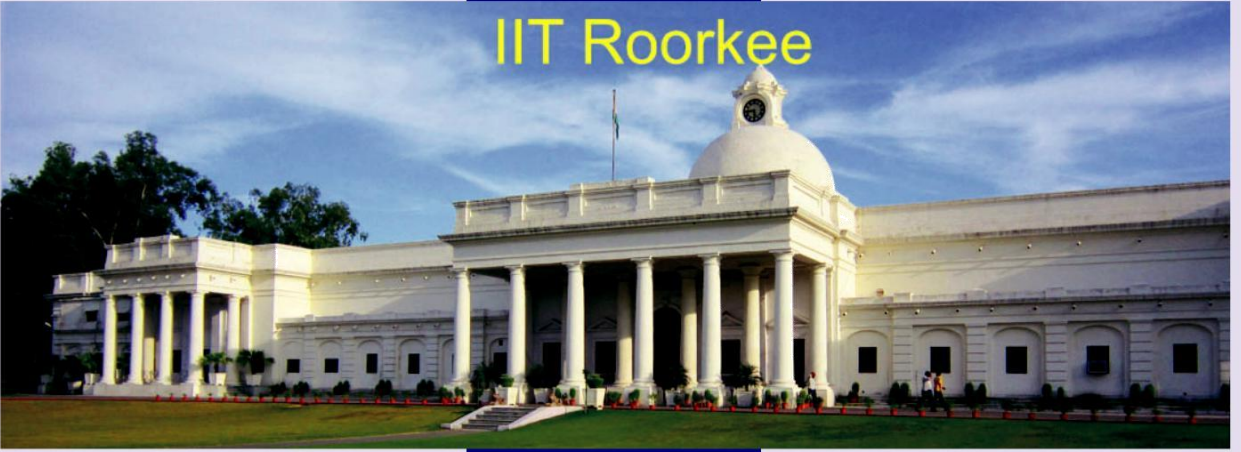
IIT Guwahati
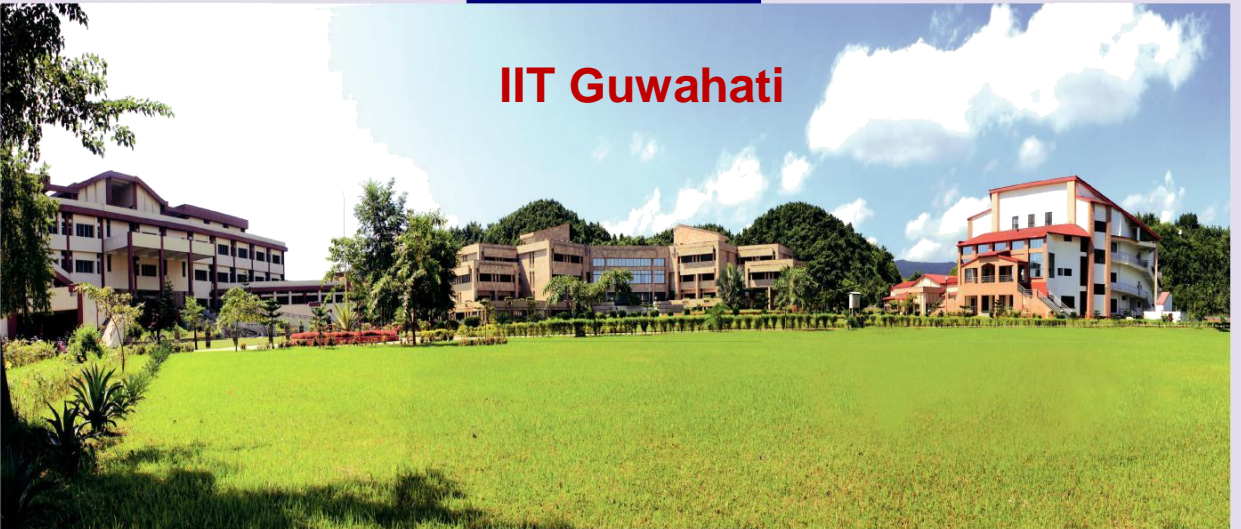
NIT WARANGAL

MNIT Jaipur

NIT Patna

PDPM IIITDM Jabalpur

IIT Kanpur

Contact us

Academy Name	States/UTs to Which Catering	Chair/Chief Coordinator	Contact Details
Electronics & ICT Academy at NIT Warangal	Telangana, Andhra Pradesh, Karnataka, Puducherry, Andaman and Nicobar Islands, Goa	*Prof. D.V.L.N. Somayajulu*	Email: eict.nitw@gmail.com M: 09121016547 Website: http://nitw.ac.in/eict/
Electronics & ICT Academy at IIT Guwahati	Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Sikkim	*Prof. Ratnajit Bhattacharjee*	Email:ratnajit@iitg.ernet.in M: 09954498116 Website: https://www.iitg.ernet.in/eictacad/
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Electronics & ICT Academy at IIT Roorkee	Jammu and Kashmir, Himachal Pradesh, Uttarakhand	*Dr. Sanjeev Manhas*	Email: samanfec@iitr.ac.in Contact No.: 01332-286457 Website: http://eict.iitr.ac.in/
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