



# Electronics & ICT Academy IIT Guwahati, Assam



An Initiative of Department of Electronics & Information  
Technology (DeitY),  
Ministry of Communications and IT,  
Government of India

## A Faculty Development Programme on

## Fundamentals of Analog Integrated Circuit Design



Organized in association with **Gauhati University & support from Entuple Technologies Pvt Ltd.**

Applications are invited from Faculty Members/ Research Scholars/PG & UG Students/Lab Technicians/Project Staffs from Universities/Colleges/Schools & Industry Personnel working in the concerned discipline can attend the Faculty Development Programme on

### “Fundamentals of Analog Integrated Circuit Design”

Course Date: 23-31 January 2017

Last Date of Registration: 20.01.2017

(Online Registration Link will be open from 01.01.2017)

Venue: Gauhati University, Assam

### Supported by

Department of Electronics and Information  
Technology (DeitY)  
Ministry of Communications and  
Information Technology,  
Government of India



सत्यमेव जयते

## Objective of the Course

Course Objective is to provide basic knowledge in Designing Analog IC using Cadence Tool . The programme will focus on practical aspects and include examples which are relevant to the current industry requirements.

## Course Programme

Faculty Development Programme is split into two parts:

- Lectures.
- Labs/Hands-on sessions daily
- Tools: Cadence Design Tool.

**Certificate with grades will be given by E&ICT Academy, IIT Guwahati to the participants.**

## Who Can Attend

Programme is open to Faculty Members, Research Scholars, PG & UG Students, Lab Technicians and Project Staffs from Universities , Colleges & Schools. Industry Personnel working in the concerned/allied discipline may also apply.

## How to Apply

**Online** – The participants may log on to the E&ICT Academy, IIT Guwahati website: <http://eictacad@iitg.ernet.in> and fill up the application form.

**Through Email** – Scanned copy of the filled in application form duly endorsed by the, forwarding authority is to be mailed at E&ICT Academy’s email id ([eictacad@gmail.com](mailto:eictacad@gmail.com), [eictacad@iitg.ernet.in](mailto:eictacad@iitg.ernet.in)). Application format given in this brochure may also be downloaded from the website.

**Contact Hours for the Course  
80 Hrs (Theory, Hands-on & Tutorial)**

## Registration Form

Name of the Applicant (first, last):

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.....

Gender: .....

Designation: .....

Highest Qualification: .....

Name and Address of the Organization/Institute:

.....

City/town:.....

Email:.....

Phone Number:.....

Mobile Number:.....

Do you need accommodation?

(Yes/No):.....

Transaction ID (Applicable for Online

Transaction):.....

Signature of the Applicant:.....

Signature and Seal of the Forwarding Authority

Name .....

Designation .....

*Note: The Faculty/Staff are requested to submit the NOC from respective department before attending the session.*

## Registration Fee

**Registration Fee (Including Course Material, Snacks and Lunch )**

**Rs. 2,500/-** for Faculty, Lab Technicians and Project Staff  
**Rs. 5,000/-** for Industry Personnel, Research Scholars and Students.

**Mode of Payment: Online Only (RTGS/NEFT)**

### For Online Transfer

**Bank Name: State Bank of India**

**Account Name: IIT Guwahati R&D E&ICT Academy**

**Account No.: 36071160089**

**IFSC Code: SBIN0014262**

**Bank Name: State Bank of India**

**Bank Address: IIT Guwahati, GHY- 39.**

## Course Outcome

The participants are expected to understand:

- Characterize the PDK for device analog model parameters.
- Synthesize basic and OP-AMP amplifier circuit topologies.
- Analyze the Performance Specification Requirements and identify the suitable circuit topologies.
- Carry out the Design for DC and AC Performance for the various basic CMOS Amplifier circuits .
- Develop programmed spread sheets for amplifier design automation.
- Design and characterize a seven – pack CMOS Compensated OPAMP at the schematic design entry level.
- Derive Layout Constraints for the Physical Design of the OPAMP and carry out DRC and LVS clean Physical Design.
- Carry out the Physical verification and Parasitic Extraction.
- Back Annotate and carry out Post Layout Simulation/ Characterization

## Assignments and Project

The course will include:

- Cadence Virtuoso Schematic Editor .
- ADE (Analog Design Environment).
- SPECTRE for Analog Simulation .
- Virtuoso Layout Editor .
- Assure for Physical Verification.

## Preferred Pre- Requisites for the Course

- Required coding skills for Lab.
- Knowledge of Basic Electronics is a plus. DC and AC circuits helpful to this programme.
- Basics Analog Electronics.

## Hands-on Session

The Hands- on session will include the following:

- PDK Device Characterization for Analog Model Parameters .
- Simulation of a CS Amplifier for Large /small Signal DC performance.
- Design Bias Ckt for the CS Amplifier.
- Design and characterization of CMOS Current Mirror.
- DC Performance of the basic CMOS Diff Amplifier.
- Determining gm, g0, gm/g0, cgg, cdd, ft as a function of Vgs.
- Design and characterization of CS amplifier for small signal DC and AC performance.
- Design and characterization of differential pair for small signal DC and AC performance.
- Schematic Design of CMOS OP-AMP for a given specifications and characterization.
- Layout Design of a CMOS current mirror
- Layout Design of a balanced differential pair.
- Layout Design of 7 pack OpAmp.

## About E&ICT Academy

Electronics and ICT Academy is an initiative of Department of Electronics & Information Technology (DeitY) Ministry of Communications and IT, Govt. of India for Faculty/ Research Scholar Development Programme.

Academy has planned short term training programmes on fundamental and advanced topics in IT, Electronics & Communication, Product Design, Manufacturing with hands on training and project work using latest software tools and systems.

In addition, the Academy will conduct specialized/customized training programmes and research promotion workshops for corporate sector & educational institutions.

**For details of the programme and course contents etc., please log on to Electronics and ICT Academy website:**  
<http://eict.iitg.ernet.in/>

## Course Coordinators from Academy

- **Prof. Ratnajit Bhattacharjee**  
*Principal Investigator*  
*E&ICT Academy, IIT Guwahati*
- **Prof. Rohit Sinha**  
*Co-Principal Investigator*  
*E&ICT Academy, IIT Guwahati*
- **Dr. Gaurav Trivedi**  
*Co-Principal Investigator*  
*E&ICT Academy, IIT Guwahati*

## Expert from Industry

- **Mr Venugopal D Kulkarni**  
Analog Mixed Signal Design Consultant,  
Entuple Technologies Pvt Ltd, Bangalore
- **Mr Varun Bhadana**  
Entuple Technologies Pvt Ltd, Bangalore

## Contact Details

**For more details or any queries please contact**  
**Course Coordinator: Feroza Haque,**  
**IIT Guwahati**  
**Email: [eictacad@iitg.ernet.in](mailto:eictacad@iitg.ernet.in),**  
**[eictacad@gmail.com](mailto:eictacad@gmail.com)**  
**Phone No: +91-3612586442**

## How To Reach Gauhati University

Gauhati University is located at Gopinath Bardoloi Nagar, Jalukbari, Guwahati, along NH 37 between the airport and the city centre (10 km in either direction). Frequent local buses ply on NH 37, reaching Pan Bazar, Paltan Bazaar, Chandmari, ISBT (Inter State Bus Terminal) and the Lokpriya Gopinath Bardoloi International Airport. Autorickshaws to or from the airport or city centre to Gauhati university are available for hire.