



**ELECTRICAL
ENGINEERING**

Analog Circuits and Systems through SPICE Simulation

Type of Course	: New
Course Snapshot	: Core / UG/PG : B.E/B.Tech,M.E/M.Tech,M.S
Pre-requisites	: Basic Understanding of Analog Electronic Circuits, MOSFET device operation, digital logic circuits
Course Duration	: 30 hours / 12 weeks
Industry support	: SCL Chandigarh, SAC Ahmedabad (ISRO) Maxlinear

COURSE OUTLINE:

This course is supposed to provide a comprehensive design example, utilizing (and building upon) the basic concepts covered in a UG Analog Circuits course. All the essential circuit fundamentals, like-DC biasing, small signal analysis, signal-swing, linearity, noise, frequency-response, single-stage, multi-stage and differential amplifier topologies, feedback topologies, stability and oscillation, operational-amplifier circuits (transistor level), will be applied to a practical design example.

INSTRUCTOR:

Prof. Mrigank Sharad
Department of Electrical and Electronics
IIT Kharagpur



ABOUT INSTRUCTOR:

Prof. Mrigank Sharad received BTech and MTech degrees in Electronics from IIT Kharagpur in 2010 and PhD degree from Purdue University, USA in 2014. He received highest honors for his academic performance and projects at IIT, including institute level Gold Medal. Mrigank's research interest lie in the domain of application specific mixed signal design and associated data processing.

COURSE PLAN:

- Week 1 : System Description, and Block and Circuit Level Specifications, GUI based SPICE simulation for basic Single stage amplifiers
- Week 2 : Differential amplifier (fully differential and current mirror load); 2-stage OPAMP (with single ended and fully differential outputs).
- Week 3 : Feedback Amplifiers Circuits using OPAMP, Stability and compensation, Stability of common-mode feedback
- Week 4 : Design of common-mode feedback for fully differential OPAMP
- Week 5 : Noise analysis for frontend amplifier.
- Week 6 : Transistor level design for frontend amplifier and VGA
- Week 7 : Design of Gm-C filters
- Week 8 : Single Slope ADC specifications and building blocks
- Week 9 : Comparator design considerations
- Week 10 : Design and description of digital control
- Week 11 : Transistor level implementation of Digital building blocks
- Week 12 : Dynamic offset cancellation using servo loop