



ANALOG IC DESIGN

PROF. S. ANIRUDDHAN

Department of Electrical Engineering
IIT Madras

PROF. NAGENDRA KRISHNAPURA

Department of Electrical Engineering
IIT Madras

PRE-REQUISITES : UG course (or equivalent) on: Basic Electrical Circuits, Signals and Systems, Analog Circuits

INTENDED AUDIENCE : B.E/B.Tech,M.E/M.Tech,M.S,PhD engineering subject

COURSE OUTLINE :

This course will introduce advanced concepts in analog circuit design specifically relevant to CMOS IC design. It will cover circuit noise and mismatch, their analysis, and their impact on CMOS opamp design. As prerequisites, the student is expected to have undergone a course on (a) basic circuit theory and analysis (b) signals and systems and (c) MOS analog circuits. At the end of this course, the student should be able to design and analyze several types of CMOS opamps at the transistor level.

ABOUT INSTRUCTOR :

Prof. S.Aniruddhan is an assistant professor in the Integrated Circuits and Systems group of the department of Electrical Engineering at Indian Institute of Technology Madras. He works broadly in the area of Analog IC design, with specific focus on RFIC design. He obtained a B. Tech. degree in Electrical Engineering from IIT Madras in 2000, and a Ph.D. degree from the University of Washington, Seattle in 2006. Between 2006 and 2011, he worked in the RF-Analog group at Qualcomm Inc., San Diego, designing integrated circuits for Cellular RF applications.

Prof. Nagendra Krishnapura is an associate professor in the VLSI group of the department of Electrical Engineering of the Indian Institute of Technology, Madras. He works in the area of analog and mixed-signal integrated circuits and signal processing.

He graduated with a Ph.D. from Columbia University, New York in Oct. 2000. He obtained his B. Tech. degree in Electronics and Communications Engineering from the Indian Institute of Technology, Madras, in 1996. Between 2000 and 2005, he worked as a senior design engineer at Celight, Inc. and Multilink(later Vitesse Semiconductor) where he designed integrated circuits for high speed communications. From 2003 to 2005, he was an Adjunct Assistant Professor and taught courses on Analog Circuit Design at Columbia University.

COURSE PLAN :

Week 1 : Negative Feedback control

Week 2 : Negative feedback with ideal delays

Week 3 : Nyquist criterion, Gain and phase margin

Week 4 : Single and two-stage opamps at block level

Week 5 : Three-stage and feedforward compensated opamps

Week 6 : Opamp datasheet, CMOS process

Week 7 : MOS transistor basics

Week 8 : Noise in circuits

Week 9 : Basic amplifier stages

Week 10 : Single-stage opamp

Week 11 : Cascode opamp

Week 12 : Two-stage opamp