ANALOG ELECTRONIC CIRCUIT

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PRE-REQUISITES : Should know basic circuit analysis

INTENDED AUDIENCE : Any Interested Learners

INDUSTRIES SUPPORT: Texas Instruments, Cypress Semiconductors, Sandisk Technology, Western Digital, STMicroelectronics, Qualcomm, Freescale Semiconductors, Cadence, Synopsys

COURSE OUTLINE :
This is a basic analog electronics course. The most important objective for electronic circuits is to build an amplifier. This course will develop the principles behind the design of an amplifier. You should be able to design an operational-amplifier independently well before the end of the course. The course will use MOS devices exclusively. Other analog circuit building blocks such as voltage regulators and power amplifiers will also be discussed

ABOUT INSTRUCTOR :
Prof. Shouri Chatterjee received the B.Tech. degree in Electrical Engineering from the Indian Institute of Technology, Madras, in 2000, and the M.S. and Ph.D. degrees in Electrical Engineering from Columbia University, New York, in 2002 and 2005, respectively. From 2005 to 2006, he was a design engineer in the wireless division at Silicon Laboratories Inc., Somerset, NJ. Since November 2006 he has been with the faculty of the department of Electrical Engineering of the Indian Institute of Technology, Delhi, India. Currently he is the NXP/Philips chair professor at IIT Delhi.

COURSE PLAN :

Week 1**:** Non-linear circuit analysis, diodes, load line concepts, introduction to the MOSFET

Week 2: DC operating point, biasing the MOSFET, small signal model of the MOSFET, small signal analysis

Week 3: Thevenin and Norton models, common source, common gate, common drain Circuits

Week 4: Source degenerated common source amplifier, cascode and cascaded circuits

Week 5: Current sources and current mirrors, biasing with current sources, constant gm circuits

Week 6: Differential amplifiers, common mode and differential mode gains, CMRR, structure of complete amplifier

Week 7: Folded cascode differential amplifier, self-biased active-load differential Amplifier

Week 8: Feedback: examples of feedback amplifiers, current and voltage sensing, current and voltage feedback; op-amps and op-amp circuits

Week 9: High frequency model of the MOSFET, revision of common-gate, common- source, common-drain circuits; poles and zeros in the transfer function

Week 10: Poles and zeros of cascode amplifier, Miller theorem, phase margin, unity gain bandwidth, compensation of the cascaded amplifier

Week 11: Voltage regulators, LDOs, stability of regulators, power supply rejection,bandwidth

Week 12: Power amplifiers, audio power amplifier, class-A/class-AB/class-B/class-C; push-pull class-AB power amplifier