Analog VLSI Circuits

Credits: 2:1

Session: August 2022

Instructor: Arup Polley

Course syllabus & required number of lectures:

1. Introduction (1)
2. MOS device review (2)
3. MOS small signal model – Long channel (2)
4. Circuit building blocks – switch, MOS diode & current sink/source (2)
5. MOS amplifiers (3)
6. Current mirror revisit (1)
7. MOS short channel effects (2)
8. Differential amplifiers (3)
9. Frequency response (3)
   ---------- Mid Term
10. Noise (2)
11. Feedback (2)
12. Stability and Frequency compensation (2)
13. Two-stage op-amp (2)
14. Bandgap reference (1)
15. Advanced topics - TBD (4)

Lab syllabus:

1. Introduction to EDA tools
2. Analysis methods: DC analysis, Transient analysis, Frequency analysis, Noise analysis, Stability analysis
3. Designs: Current mirror, 2-stage operational amplifier, bandgap reference
4. Layout: Current mirror

Software:

Cadence – Virtuoso (using remote login with assistance from TAs)

Assignments: 8 assignments (4 theory + 4 lab)

References:

1. Design of analog CMOS integrated circuits – Razavi [Intuitive, practical, excellent introductory book]
2. Analysis and design of analog integrated circuits – Grey, Hurst, Lewis and Meyer [BJT, rigorous analysis]
3. CMOS analog circuit design – Allen and Holdberg [Advanced treatment, great reference]

Grading policy:

Assignments – 50%
Mid-term – 15%
End-term – 35%

Academic policies:

1. For theory assignments, you can discuss, but please do it on your own.
2. For lab assignments, we will form groups of two.
3. No credit for attendance in the class.

Modified

Date: 4/8/2022