

# **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