

## Spring 2018, ESE 311: Analog Integrated Circuits

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Office Hours: Tues, Thurs, 3-5 PM, 247 Light Eng.

**Prerequisites:** ESE 372, Electronics

**Description:** Engineering design concepts applied to electronic circuits; basic network concepts, computational analysis and design technique; models of electronic devices; biasing and compensation methods; operational amplifiers designed by conventional and computer-aided techniques.

**Lectures:** 128 Chemistry, Mon, Wed, 2:30-3:50 PM

**Textbook (required):** B. Razavi, Fundamentals of Microelectronics, 2<sup>nd</sup> ed., 2013, Wiley& Sons, ISBN-13: 978-1118520970, ISBN-10: 1118520971

**Additional reading (recommended):** B. Razavi, Design of Analog CMOS Integrated Circuits, 2<sup>nd</sup> ed., 2016, McGraw Hill, ISBN-13: 978-0072524932, ISBN-10: 0072524936

**Grading:** 11 homeworks (11 pts), 5 simulation assignments (5 pts), project (15 pts), 2 quizzes (4 pts), test 1 (10 pts), test 2 (20 pts), final exam (30 pts), portfolio (5 pts)

### Topical outline:

1. **MOSFET and BJT parameters:** fabrication technology of integrated circuits, - 10%
2. **Single-ended amplifiers:** biasing, active load, frequency response, Miller's theorem, cascode amplifier - 20%
2. **Differential amplifiers:** differential pairs with active load, differential gain, common-mode gain, common-mode rejection ratio, non-ideal characteristics, frequency response - 30%
3. **Negative feedback:** four basic feedback topologies, loop gain, stability and pole location, frequency compensation - 20%
4. **Operational Amplifiers:** OpAmp architectures, two-stage and folded cascode amplifiers, DC and small signal parameters, frequency response, slew rate - 20%

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