

# ESE 314 Electronic Laboratory B

Fall 2011

## 2010-2011 Catalog Description:

Laboratory course on design and operation of basic building blocks in electronics. The course is coordinated with, and illustrates and expands upon, concepts presented in ESE 372. Emphasis is given to design solutions more relevant to integrated rather than to discrete element electronics. Field effect transistors are given special attention due to their importance in contemporary analog and digital IC. Frequency responses of the basic amplifiers and active filters are analyzed. Internal structure and fundamental performance limitations of digital inverter and other gates are studied.

**Course Designation:** Required

**Text Books:** A.S. Sedra, K.C. Smith, "Microelectronic circuits",  
6<sup>th</sup> edition, Oxford, ISBN 978-0-19-532303-0

**Prerequisites:** ESE 211, ESE 372

**Corequisites:** none

**Coordinator:** Leon Shterengas

**Goals:** To understand operation of standard building blocks of modern analog and digital circuits.

## Course Learning Outcomes:

Ability to design and characterize: differential and single stage amplifiers, active RC and switched capacitor filters, and digital gates. Ability to optimize design for improved bandwidth and reduced power dissipation.

## Topics Covered:

FET operation and parameters.

MOSFET bias and current mirrors.

Common source amplifier. Active load.

Frequency response of common source amplifier.

Frequency response of common gate and common drain amplifiers.

MOSFET differential stage.

Active RC filters.

Switched capacitor network.

CMOS inverter.

CMOS NAND gate. Power dissipation in digital gates.

Propagation delay in digital gates.

MOSFET versus BJT. BiCMOS.

**Class/laboratory schedule:** Lecture: 80min/1 day per week  
Lab: 3 hr/1 day per week

## Grading:

Lab reports	40%
Midterm	20%
Final	20%
Quizzes	15%
Portfolio	5%