

# ELEG 309 SPRING 2018 COURSE SYLLABUS

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<b>Instructor</b>	Richard Martin, Ph.D. ( <a href="mailto:rdmartin@udel.edu">rdmartin@udel.edu</a> ) Office Evans 216; Office hours: MTWR 9:30 – 10:30 or by appointment
<b>Teaching Assistants</b>	Dun Mao– <a href="mailto:dmao@udel.edu">dmao@udel.edu</a> Office 243 DuPont Hall, Office hours TBD Jielin Li – <a href="mailto:lijielin@udel.edu">lijielin@udel.edu</a> Office 211 Evans Hall, Office hours TBD
<b>Graders</b>	Thomas Kananen– <a href="mailto:tkananen@udel.edu">tkananen@udel.edu</a> Kyle McParland – <a href="mailto:kylemcp@udel.edu">kylemcp@udel.edu</a>

Class schedule TR 11:00 - 12:15 PM in Kirkbride Hall room 204

Course Material Web site <https://www.canvas.udel.edu>

Piazza class discussion site <https://piazza.com/udel/spring2018/eleg309/home>

I believe class participation is important and I will keep attendance records which will contribute to your course grade. This course will be recorded using UD Capture with LiveMark so you can review the lecture or catch a missed lecture.

The link for this course is: <https://udcapture.udel.edu/2018s/eleg309-010/>

## Purpose

The class covers introductory topics in analog electronics. Together with ELEG312, it constitutes the foundation for integrated analog circuit analysis and synthesis. The main goal is to present the students to the fundamental semiconductor components (diodes and transistors), appropriate modeling and analysis techniques as well as basic analog circuit configurations and applications. At the end of the class, the student will be able to model, analyze and to a certain level synthesize circuits containing a few transistors.

## General contents

The course covers basic operational amplifier circuits as well as diodes, metal oxide semiconductor field effect transistors (MOSFETs), bipolar junction transistors (BJTs), and simple single transistor amplifiers.

## Prerequisites

Basic algebra and calculus; ELEG205: circuit analysis techniques (KVL and KCL, superposition, circuit transformation, Thévenin and Norton equivalents).

## Class requirements

Three exams during the semester, numerous (~16) homework assignments, 6 mandatory (1 optional) labs with reports, and a final exam. The exams are individual and closed book. I will provide an equation sheet for the exams if needed and NO additional material is allowed during the exams except for calculators. Any requests for “make up” tests will be subjected to university policy.

Lab experiments *must* be performed in groups of two to four people with a single submission per group electronically through Canvas. Homework is collected in class and due at the beginning of class on the submission date. Homework that is not submitted on time will not be accepted, and will be assigned a grade of zero.

**Important note: Any evidence of copied lab reports, homework or dishonesty during tests and quizzes will result in an academic dishonesty report in your record and the corresponding academic penalty. NO EXCEPTIONS.**

The overall course grade is derived as follows:

3 Exams	40%
Final Exam	15%
Homework/participation	20%
Labs	25%

The course grading scale is as follows:

92 – 100% = A, 90 – 91.99% = A-, 88 – 89.99% = B+, 82 – 87.99% = B, 80 – 81.99% = B-, 78 – 79.99% = C+, 72 – 77.99% = C, 70 – 71.99% = C-, 68 – 69.99% = D+, 62 – 67.99% = D, 60 – 61.99% = D-, 0 – 59.99% = F

Required Textbook: Sedra, A., Smith, K. "Microelectronic Circuits", Oxford University Press, 7<sup>th</sup> edition.

## CLASS TOPICS

### ELEG 309 PART I:

#### DEVICES AND BASIC CIRCUITS

Chapter 1. Signals and Amplifiers

Chapter 2. Operational Amplifiers

Chapter 3. Semiconductors

Chapter 4. Diodes

Chapter 5. MOS Field-Effect Transistors (MOSFETs)

Chapter 6. Bipolar Junction Transistors (BJTs)

Chapter 7. Transistor Amplifiers

### ELEG 312 PART II:

#### INTEGRATED-CIRCUIT AMPLIFIERS

Chapter 8. Building Blocks of Integrated-Circuit Amplifiers

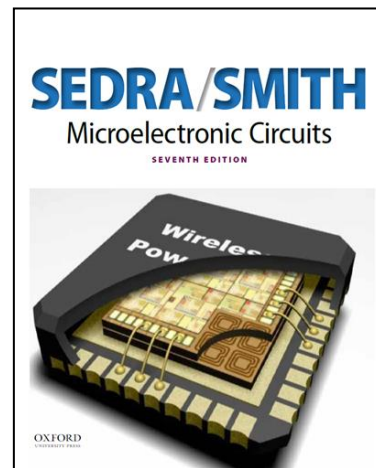
Chapter 9. Differential and Multistage Amplifiers

Chapter 10. Frequency Response

Chapter 11. Feedback

Chapter 12. Output Stages and Power Amplifiers

Chapter 13. Operational Amplifier Circuits



## LAB SCHEDULE

Week	Dates	Laboratory	Due
1, 2	Feb 6 - 20	1 – Signals and Single Time Constant (STC) Circuits: SPICE and Experimental Validation	11:55 PM Feb 20
3	Feb 20 – 27	2 – Operational Amplifier Circuits	11:55 PM Feb 27
4,5	Feb 27 – Mar 13	3 – Diodes and an Infrared Optical Link	11:55 PM Mar 13
6,7	Mar 13 – Apr 3	4 – Linear and Switching Power Supplies	11:55 PM Apr 3
8,9	Apr 3 – 17	5 – MOSFETs, Voltage Transfer Curves, and a Common Source Amplifier	11:55 PM Apr 17
10,11	Apr 17 – May 1	6 – Bipolar Junction Transistors (BJTs) and Common Emitter and Common Collector Amplifiers	11:55 PM May 1
12	May 1 – 8	7 – Simple BJT Op Amp [Optional]	11:55 PM May 8

## TENTATIVE EXAM SCHEDULE

1. SIGNALS AND AMPLIFIERS
  2. OPERATIONAL AMPLIFIERS .....EXAM #1 (2/27)
  3. SEMICONDUCTORS
  4. DIODES..... EXAM #2 (3/22)
  5. MOS FIELD-EFFECT TRANSISTORS (MOSFETs)
  6. BIPOLAR JUNCTION TRANSISTORS (BJTs) ..... EXAM #3 (4/24)
  7. TRANSISTOR AMPLIFIERS.....
- COMPREHENSIVE FINAL EXAM