

EE2001 Introduction to Circuits and Electronics

Updated: Feb. 2 2013

This course outline is to serve as a reference for instructors and students. It gives a general overview of course content and ABET Outcomes. Please consult the semester specific syllabus produced by the course instructor for more detailed information.

Course Prerequisites, Basic Content, and Outcomes

Catalog Description: (3.0 cr; Prereq-&PHYS 1302, &(MATH 2243 or MATH 2373 or MATH 2573); fall, spring, summer, every year)

Physical principles underlying circuit element models. Kirchhoff's laws. Independent/dependent sources. Opamps. Linearity in circuits. Diodes and rectification. FET characteristics, biasing, small signal models, and simple amplifiers. Transients in first- and second-order circuits. CMOS-based logic gates. Circuit simulators.

Contact Hours: 3 hours of lecture and 1 hour of discussion per week.

Text:

Microelectric Circuits with CD Sixth Edition, Sedra, Oxford.

Electric Circuits with access code and P-spice Manual 9th Edition, Nillson, Prentice Hall.

Prerequisites by Topic: Differential equations and electricity and magnetism.

Course Outcomes:

- 1) An understanding of nodal and mesh analysis of simple resistive circuits.
- 2) An understanding of first- and second-order transients in RL, RC, and RLC circuits.
- 3) An understanding of the fundamentals of biasing diodes, BJT's, and FET's.
- 4) An understanding of the fundamentals of the small-signal models of diodes, BJT's and FET's.
- 5) An understanding of the fundamentals of analysis and design of circuits utilizing op-amps.

Relationship to Student Outcomes:

In accordance with ABET accreditation criteria, all engineering programs must demonstrate that their students achieve certain outcomes. This list of outcomes may be found on the ABET.org website. Of the outcomes listed in the ABET criteria (enumerated as (a) through (k)), this course teaches skills which help the student achieve the following outcomes:

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (e) an ability to identify, formulate, and solve engineering problems
- (i) a recognition of the need for, and an ability to engage in life-long learning
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Course Outline

<u>Week</u>	<u>Lecture Topics</u>
1	Basix circuit concepts
2	Basic circuit concepts / Circuit theorems
3	Circuit theorems
4	Circuit theorems / Diodes
5	Diodes and rectification
6	MOSFET characteristics, load lines, and biasing
7	MOSFET characteristics, load lines, and biasing / MOSFET single transistor amplifiers
8	MOSFET single transistor amplifiers / Op Amps
9	Op Amps
10	RC, RL, and RLC transients
11	RC, RL, and RLC transients
12	RC, RL, and RLC transients / Digital Logic Inverter electrical specifications
13	CMOS Inverter
14	CMOS Logic Gates / Review

Departmental and University Policies

Student Academic Integrity and Scholastic Dishonesty: Academic integrity is essential to a positive teaching and learning environment. All students enrolled in University courses are expected to complete coursework responsibilities with fairness and honesty. Failure to do so by seeking unfair advantage over others or misrepresenting someone else's work as your own, can result in disciplinary action. The University Student Conduct Code defines scholastic dishonesty as follows:

Scholastic Dishonesty: Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering forging , or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis.

Within this course, a student responsible for scholastic dishonesty can be assigned a penalty up to and including an "F" or "N" for the course. If you have any questions regarding the expectations for a specific assignment or exam, ask.

Incompletes: A grade of I for Incomplete is given at the discretion of the course instructor when, due to extraordinary circumstances, the student who has successfully completed a substantial portion of the course's work with a passing grade was prevented from completing the work of the course on time. Students must fill out an Incomplete Grade Agreement form found in Keller 3-166. The maximum time to remove and replace an incomplete grade is one year.

Makeup Work for Legitimate Absences: Consult university policy here:
<http://policy.umn.edu/Policies/Education/Education/MAKEUPWORK.html>

Personal Electronic Devices: Consult university policy here:
<http://policy.umn.edu/Policies/Education/Education/CLASSROOMPED.html>

Mental Health: As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. University of Minnesota services are available to assist you with addressing these and other concerns you may be experiencing. You can learn more about the broad range of confidential mental health services available on campus via the Student Mental Health Website at <http://www.mentalhealth.umn.edu>