

**Electronics II
(02 SE048)**

August-December 2003
9-11 hrs Mondays and Wednesdays
Classroom C210

Instructor Information

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General Description

This course will enable students to analyze and design two of the most fundamental analog electronic systems: amplifiers and oscillators. The students will also gain a solid foundation for the analysis of integrated circuits. The use of simulation software and practical implementations in the laboratory will be emphasized through out the course.

Prerequisites

Electronics I (02 SE047)

Objectives

By the end of the course the student will be able to:

- A. Design differential and multistage amplifiers at mid frequencies, implemented with bipolar transistors as well as with field effect transistors (SYNTHESIS)
- B. Explain the origin of the non-ideal effects in operational amplifiers (COMPREHENSION)
- C. Apply the time constant method to analyze the frequency response of single and multistage amplifiers (APPLICATION)
- D. Identify the effects of feedback on the amplifier's behavior (COMPREHENSION)
- E. Efficiently analyze feedback amplifiers (ANALYSIS)
- F. Analyze the stability of amplifiers and apply basic frequency compensation techniques (ANALYSIS)
- G. Identify the fundamental principles for circuit oscillation (COMPREHENSION)

- H. Design sinusoidal oscillators at low and mid frequencies (SYNTHESIS)
- I. Analyze power amplifiers and output stages typically used in integrated circuits (ANALYSIS)
- J. Verify the behavior of amplifiers and oscillators using simulation software (APPLICATION)
- K. Use measurement instruments to characterize simple electronic systems (APPLICATION)
- L. Implement in the lab simple electronic systems previously analyzed, and contrast measurements with theoretical predictions (ANALYSIS)

General Contents

Differential and multistage amplifiers
 Frequency response
 Feedback and stability
 Oscillators and signal generators
 Output stages and power amplifiers

Relationship between Contents and Objectives

	1	2	3	4	5
A	✓				
B	✓				
C		✓			
D			✓		
E			✓		
F			✓		
G				✓	
H				✓	
I					✓
J	✓	✓	✓	✓	
K	✓			✓	
L	✓			✓	

Course Skeleton

For the proposed course skeleton it is assumed: a group of 15 to 35 students; 2 sessions per week, 2 hours long each, during 16 weeks; laboratory available 8 hours a day, from Monday to Friday; simulation software available at ITESO and/or at home (WinSpice, Electronic Workbench, OrCad – Cadence –, or any other similar circuit simulator).

It is also expected that the student will be able to dedicate an average of 10 hours of work per week to this course, including attending classes.

Week	Activity	Week	Activity
1	Pretest	9	
2		10	
3		11	Lab Report 3, Exam 3
4		12	
5	Lab Report 1, Exam 1	13	
6		14	Lab Report 4, Exam 4
7		15	
8	Lab Report 2, Exam 2	16	Exam 5

Assessment

The overall grade in this course will be built from the following elements:

5 Exams	50%
4 Lab reports	30%
Participation	20%
Final exam	10% (optional)

To pass this course, the student must have an average in the 5 exams of at least 6/10.

Each exam and lab report focuses on one of the 5 general contents units. These contents are naturally cascaded, so that the knowledge and skills developed in a given unit are needed in the next units.

The exams will be applied during class, and will have a duration of 1 hour and 50 minutes each. Each exam consists of three sections: selected response assessment (multiple choice, true/false, etc.), brief analysis problems, and a more complex analysis problem or a design problem.

The lab reports might consist of simulations in the computer, implementations in the laboratory, or a combination of both. Lab projects and reports can be realized individually or in teams of 2-3 students.

Missed exams and lab reports deadlines can not be made up.

Assignments in the form of solved problems will be suggested for the student to test their comprehension of concepts and their ability to analyze and design common electronic circuits. These assignments will not be graded. It is strongly suggested to the students to solve these problems, since they are fundamental in the learning process.

The quality of the participation of the students during the lectures will be graded. This participation will be evaluated based on student's attitude and performance during class: punctuality, willingness to ask relevant questions, respect to others, attention during class, ability to answer questions, ability to solve problems during the problem solving sessions, ability to solve assignments, etc.

An optional final exam can be taken to earn extra credit. This is applied at the end of the course, and evaluates all the five contents units. It has a duration of 2 hours.

Teaching Methods

This course will use a variety of teaching methods including: lecturing, problem solving sessions, self-conducted laboratory work, computer simulations, lab report writings, assignments, and readings.

A pre-test will be applied in the first day of class with the objective of assessing the background knowledge and skills relevant to the course. The results of this evaluation will be used by the instructor to suggest some remedial readings and exercises to individual students, as well as to redesign, if necessary, the approach to the course contents and objectives. This pretest will not be considered for grading.

Important information related to the course will be posted in the instructor's web site through out the semester. Open and frequent communication with the instructor is encouraged. Collaboration between the students for the realization of the lab projects and assignments is encouraged.

Out of class student's work is fundamental in the learning process. It is extremely important to read the corresponding materials before each lecture, either in the textbook or in the course handouts (lecture presentations, available in the website indicated below). It is also very important to solve the suggested assignments, either alone or collaborating with other classmates.

The students will be asked to solve a problem in most lectures. These problems are intended to re-inforce the learning process as well as to evaluate students' participation. The students should bring a calculator to each class.

The course will be conducted mainly in Spanish, but some of the lectures and discussions might be held in English. Most of the written material for the course will be available in English. The lab reports can be submitted in either English or Spanish.

Textbook

Microelectronic Circuits

Fourth Edition

Adel S. Sedra, University of Toronto, and Kenneth C. Smith, Hong Kong University of Science and Technology and University of Toronto

Oxford University Press

ISBN: 0195116631

References and Other Resources

Lectures, excercises and labs for the course available in the web site:

<http://iteso.mx/~erayas>

Analog Electronics Area at ITESO

<http://www.desi.iteso.mx/analog/>

Electronic Devices and Circuit Theory, Seventh Edition

Boylestad, Robert L. and Nashelsky, Louis

Prentice Hall

Microelectronic Circuit Design
Jaeger, Richard C.
McGraw-Hill

Análisis y Diseño de Circuitos Electrónicos, Tomos I y II
Neamen, Donald A.
México, 1a. edición 1999
McGraw-Hill Interamericana

Electronics, 2nd edition
Allan R. Hambley, Michigan Technological University
Prentice Hall

Sedra/Smith web site
<http://www.oup-usa.org/sc/0195116631/sedrasmith.org>

WinSpice circuit simulator
<http://www.winspice.com/>

Cadence (Pspice Orcad), Spice simulator
<http://www.cadencepcb.com/products/pspice/>

Multisim circuit simulator from Electronics Workbench
<http://www.electronicworkbench.com>

MicroCap (Spectrum Software), Spice simulator
<http://www.spectrum-soft.com/index.shtm>

TopSpice (Penzar Development), Spice simulator
<http://www.penzar.com/>

T-Spice (Tanner Research Inc.)
<http://www.tanner.com/EDA/>

ICAP/4 (Intusoft), Spice simulator
<http://www.intusoft.com/>

Microelectronics Laboratory Using Electronics Workbench (EWB)
IEEE Self-Study Course
Muhammad Rashid, University of West Florida
2000, ISBN 0-7803-4804-4
IEEE Online Catalog: customer-service@ieee.org



On line internet seminars on electronics

<http://www.netseminar.com/>

<http://www.techonline.com/>

Notes on reading and self-study

http://iteso.mx/~gabi/tl/mat/algunas_estrategias_que_facilitan_la_compension_de_la_lectura.htm

Learning English at ITESO

Centro de Lenguas, Office N-15

cenlenguas@iteso.mx

NOTA: En caso de alguna dificultad o confusión respecto de este programa de estudios (por estar en idioma inglés), favor de consultar directamente con el profesor.