

ECE 302 Syllabus

Course:	ECE 302
Credit Hours:	4
Course Title:	Microelectronics
Course Description:	

Introduction to the physics of semiconductors, PN junctions, BJT and MOS field effect transistors: Physics of operation, IV characteristics, circuit models, SPICE analysis; simple diode circuits; Single Stage BJT amplifiers: Common Emitter, Common Collector and Common Base configurations. Single Stage MOSFET Amplifiers: Common Source, Common Drain and Common Gate configurations. Determination of amplifier operating points, calculation of small signal voltage gain, current gain, input resistance and output resistance. Examples of graphic frequency response of single stage amplifiers.

Prerequisite(s): ECE 211

Textbook(s) and/or other required material:

Microelectronic Circuit Design, Richard C. Jaeger, Travis N. Blalock, 3rd edition, 2008, McGraw Hill, ISBN: 978-0-07-319163-8

Course objectives. By the end of this course, the student should be able to (use demonstrative verbs):

1) Describe the essential characteristics of a semiconductor. 2) Explain the operation principles of pn-junctions, MOSFETs and BJTs. 3) Recognize I-V characteristics of pn-junctions, MOSFETs and BJTs. 4) Distinguish different kinds of digital inverters, their characteristics, operating points and voltage gains. 5) Apply small signal models for BJT s and MOSFET s. 6) Simulate using PSPICE characteristics of BJT s and MOSFET s. 7) Analyze simple circuits with BJT and MOSFET amplifiers.

Topics covered:

Course Overview (2) Basic Semiconductor Physics (4) PN-Junction Diodes (4) Metal Oxide Field Effect Transistors (6) Digital Circuits (4) Bipolar Junction Transistors (6) Single-Stage Transistor Amplifiers (2) Multistage Amplifiers (2) Frequency response and limitations (2)

Class/laboratory schedule (sessions per week and duration of each session):

Three 50-minutes lectures per week One 3-hour lab per week

Contribution of course to meeting the requirements of Criterion 5 - other:

None

Contribution of course to meeting the requirements of Criterion 5 - math and basic sciences:

1 hour

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Contribution of course to meeting the requirements of Criterion 5 - engineering topics:

3 hours

Contribution of course to meeting the requirements of Criterion 5 - general education:

Relationship of this course to program learning outcomes:

Learning Outcome	Level of Instruction	Related Course Content
Outcome A	Major	Students must apply basic circuit laws and I-V characteristics of diodes, BJTs and MOSFETs to analyze microelectronic circuits.
Outcome B	Major	Students follow experimental procedures to construct electronic circuits and make measurements. Students design single-stage transistor amplifiers, digital circuits.
Outcome C	N/A	
Outcome D	N/A	
Outcome E	Basic	Students must identify and solve various engineering problems related to specifications of solid state devices and their impact on circuit design.
Outcome F	N/A	
Outcome G	Basic	Students practice written communication skills by writing laboratory reports.
Outcome H	N/A	
Outcome I	N/A	
Outcome J	N/A	

Relationship of this course to program learning outcomes:

Learning Outcome	Level of Instruction	Related Course Content
Outcome K	Major	Students learn PSPICE circuit simulation package and use parametric analyzers, oscilloscopes, function generators etc, in the laboratory.

Person who last prepared this description and date of preparation:

- Ozturk, Hatice Orun (hoo) - Apr 15th, 2010 (09:25am)