EEE3303 - Electronics I

Three Credits, Two hours, Engineering Topic.

Instructor: Dr. Nonnarit O-Larnnithipong

Textbook: Microelectronic Circuits by M. Rashid, Cengage, 3rd Edition ISBN-10: 0495667722, ISBN-13: 978-0495667728

Specific Course Information:

This is an introductory course dealing with basic electronic devices such as diodes, Bipolar Junction Transistors, Field Effect Transistors, Operational amplifiers, and their circuit application. The objective of this course is to provide electrical and computer engineering undergraduates with sufficient fundamental and theoretical knowledge to pursue advanced courses in analog and digital electronics and integrated circuits.

Specific Goals for the Course

a. Specific outcomes of instruction

Upon successful completion of this course, the student will:

1.Solve problems involving the concept of the ideal Op-Amp and Analyze circuits containing ideal Op-Amps

2.Solve problems involving the effect of finite open-loop gain on circuit performance

3.Solve problems involving the concept of the ideal diode and the terminal characteristics of junction diodes.

4.Analyze and synthesize piece-wise linear circuits consisting of resistors, independent current and voltage sources, and ideal diodes

5.Perform the analysis of diode circuits. Derive and understand the small-signal diode model and its application

6.Apply the operation in the reverse breakdown region and Zener diodes

7.Analyze and design rectifiers, peak detectors, etc.

8.Discuss the structure and physical operation of the enhancement type MOSFET

9.Analyze MOSFET circuits at DC. Bias the MOSFET for discrete-circuit and IC design

10.Derive and understand the small-signal model and its parameters

11.Solve problem based on the operation of the BJT

12.Sketch the pertinent voltage-current characteristics of the BJT

13.Perform the dc analysis of transistors circuits

14.Derive and understand the hybrid-model and its parameters

15.Bias the BJT for discrete-circuit and IC design

16.Be able to apply probability and statistics knowledge to solve electrical engineering problems.

b. Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

In this course the student will have to show

(a) an ability to apply knowledge of mathematics, science, and engineering (X)

(b) an ability to design and conduct experiments (simulations), as well as to analyze, interpret data (N/A)

(c) an ability to design a system, component, or process to meet desired needs (X)
(d) an ability to function in multi-disciplinary teams (N/A)
(e) an ability to identify, formulate, and solve engineering problems (homework) (X)
(f) an understanding of professional and ethical responsibility (N/A)
(g) an ability to communicate effectively (through project reports) (N/A)
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context (N/A)
(i) a recognition of the need, and an ability to engage in life-long learning (N/A)
(j) a knowledge of contemporary issues (N/A)
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (X)
(l) a knowledge of probability and statistics (N/A)

Brief list of the topics to be covered

1.Introduction to Electronics and Design.
2.Introduction to Operational Amplifiers and Applications
3.Semiconductors and pn Junction Characteristics
4.Semiconductor Diodes and Rectifiers
5.Bipolar Junction Transistors and Amplifiers
6.Metal Oxide Semiconductor Field-Effect Transistors
7.Bipolar Versus MOS Transistors and Amplifiers
8.Frequency Response of BJT And MOSFET Amplifiers.
9.Feedback Amplifiers.
10.Power Amplifiers

GRADING:

Course Requirements	Weight
Assignments	40%
Quizzes	15%
Midterm Exam	20%
Final Exam	15%
Overall Grade	100%

Conversion of Numerical Grade to Letter Grad

95<=A<=100	83<=B<84	65<=C<69
90<=A-<94	75<=B-<79	60<=D<64
85<=B+<89	70<=C+<74	F: Below 60