ET476T
Electronic Circuit Design II
[Onsite]

Course Description:

This course continues the study of circuit design, and includes a laboratory that focuses on the circuit design aspects of the capstone project.

Prerequisite(s) and/or Corequisite(s):

Prerequisites: ET475T Electronic Circuit Design I; Corequisites: ET485T Capstone Project

Credit hours: 4

Contact hours: 60 (36 Theory Hours, 24 Lab Hours)

STUDENT SYLLABUS

Instructor: _____

Office hours: _____

Class hours: _____

Course Overview

This course continues the study of electronic circuit design with the focus on complicated circuits compared to the circuits studied earlier. The analysis of circuits covered in this course can involve multiple stages. The course will enable the students to apply mathematical and technical knowledge and skills to design and analyze electronic circuits that are commonly used in electronic systems.

The practice, lab, and homework exercises in the course give enough opportunity to the students to design circuits using pencil and paper methods, math tools, and then construct, test and analyze these circuits using computer software.

Major Instructional Areas

- Building blocks of analog integrated circuits
- Integrated circuit and op-amp architecture
- Linear applications of IC op-amp
- Filters
- Op-amp as comparator and its applications
- Wave shaping and wave generators
- Integrated circuit timer and its application
- Phase locked loop
- Data converters
- Voltage regulators

Course Objectives

Upon successful completion of this course, the student should be able to:

1. Calculate the differential voltage gain, input differential resistances, common-mode gain, and common mode resistance.
2. Explain the architecture of an Integrated circuit (IC) op-amp.
3. Discuss the design details of the A 741, effect of various non-ideal parameters on the performance of op-amp circuits.
4. Demonstrate the methods of measuring non-ideal parameters of an IC op-amp.
5. Discuss the linearity of ideal operational amplifier and to design instrumentation amplifiers.
6. Explain ideal op-amp as effect of finite gain bandwidth products and stability considerations.
7. Explain the classification, characteristics, and design of the different types of active as well passive filters.
8. Discuss the nonlinear applications of ideal operational amplifier.
9. Analyze an ideal op-amp as a comparator, and the use of comparator as limiter, Schmitt trigger and precision rectifier.
10. Explain waveform generators.
11. Design oscillators and multivibrators.
12. Analyze the block diagram of 555 timer and operation, applications of the 555 timer as Astable and Monostable multivibrators.
13. Identify Lead-Lag circuits and their use in Oscillators.

14. Discuss various types of Digital ICs in application.
15. Explain the basic principles of ADC and DAC.
16. Design the different types of data converter circuits.
17. Design series and shunt regulators, switching regulators.
18. Explain the need of switching regulators and current regulators.

Student Textbook

- *Electronic Design, 4th edition: Roden – Carpenter (Micro-Cap CD included)*
- *Electronic Design Lab Manual, Parts I and II.*

Course Outline

Unit	Topic	Chapters	Lab and Other Coverage
1	Building Blocks of Analog-Integrated Circuits	9.1 - 9.6	Lab, Homework Exercises
2	Practical Op-Amp configurations. Frequency response.	9.7 – 9.12 10.5.1 – 10.5.4	Lab, Homework Exercises
3	Active Filters	12.1 - 12.4	Lab, Homework Exercises
4	Active Filter Design	12.5 – 12.8	Lab, Homework Exercises
5	Rectifiers and Limiters	13.1 – 13.2	Lab, Homework Exercises
6	Comparators and Data Converters	13.3 – 13.5	Lab, Homework Exercises
7	Lead-Lag networks and Oscillators	11.8 – 11.11	Lab, Homework Exercises
8	Timing Circuits	14.4 – 14.5	Lab, Homework Exercises
9	Digital ICs	16.1 – 16.5	Lab, Homework Exercises
10	Voltage Regulators	8.5 – 8.6	Lab, Homework Exercises

11	Review, Final Lab Examination, and Final Design Evaluation		The final examination will be design-based evaluation and Capstone Project.

Evaluation Criteria and Grade Weights

- Homework 20%
- Circuit designs 20%
- Lab Exercises 30%
- Final Design Evaluation 30%

Final grades will be calculated from the percentages earned in class as follows:

A	90 - 100%	4.0
B+	85 - 89%	3.5
B	80 - 84%	3.0
C+	75 - 79%	2.5
C	70 - 74%	2.0
D+	65 - 69%	1.5
D	60 - 64%	1.0
F	<59%	0.0

