ET475
Electronic Circuit Design I
[Onsite]

Course Description:

This course covers the analysis and design of electronic circuits, and includes a laboratory that utilizes computer-aided software tools for circuit design and simulation.

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

Prerequisite: ET446 Advanced Circuit Analysis II

Credit hours: 4

Contact hours: 50 (30 Theory Hours, 20 Lab Hours)

STUDENT SYLLABUS

Instructor : _____

Office hours: _____

Class hours: _____

Course Objectives

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

1. Calculate the gain and the input and output impedances for basic single-stage amplifier configurations using the small-signal models of Bipolar and Metal Oxide Semiconductor (MOSFET) transistors.

2. Evaluate physical frequencies using pole-zero analysis transfer functions.

3. Calculate multi-stage amplifier input – output parameters.

4. Produce manual estimates using the knowledge of high-frequency operation of linear Bipolar Junction.

5. Perform power calculations for amplifier circuits BJT and MOSFET.

6. Recognize ideal current sources and design a practical source given the current requirements.

7. Apply the concepts of temperature coefficients to a current source design.

8. Calculate Field Effect Transistor (FET) and BJT power dissipation under normal biasing conditions.

9. Predict a circuit waveform that is created by applying sinusoidal input signals.

10. Recognize and produce detailed performance characteristics of transistor Power Amplifiers.

11. Distinguish between BJT and FET advantages in design requirements.

12. Differentiate between frequency response curves of various transistor amplifier types.

13. Explain the concept and advantages of negative feedback in amplifiers.

14. Describe the operational amplifier (op-amp) as a multi-stage transistor amplifier circuit.

15. Implement the basic op-amp feedback Inverting and non-Inverting configurations.

16. Develop op-amp circuits with basic integration and differentiation operations.

17. Recognize the operation of digital logic basic circuits and their applications.
18. Design NAND, NOR, and XOR gates using CMOS technology.

Student Textbook and Materials

Text: *Electronic Design 4th edition by Roden and Carpenter*

[Micro-Cap CD included with the textbook]

Laboratory Manual parts I and II.

Course Outline

Unit	Topic (Lecture Period)	Chapters	Lab and Other Coverage
1	Transistor Amplifiers. Small and large signal models (BJT)	4.2 - 4.5 4.8 - 4.10	Select end of Ch. 4 exercises.

2	BJT amplifier analysis and design.	4.11 - 4.14 5.1 - 5.4	Select end of Ch. 4 and Ch. 5 exercises.
3	Multistage amplifier design. Current sources and mirrors.	5.7 - 5.11	Select end of Ch.5 exercises
4	Field Effect Transistors. MOSFETs and JFETs	6.1 - 6.7	Select end of Ch. 6 exercises
5	FET amplifier design	6.8 - 6.11	Select end of Ch. 6 exercises
6	Frequency response of transistor amplifiers	10.1 - 10.4	Select end of Ch.10 exercises
7	Power Amplifiers	8.1 - 8.4	Select end of Ch. 8 exercises
8	Operational Amplifiers. Op-Amp circuits	2.1 - 2.7	Select end of Ch. 2 exercises
9	Feedback and stability in transistor amplifiers. Final project assigned.	11.1 - 11.7	Select end of Ch. 11 exercises
10	Digital logic circuit design using transistors	15.1 - 15.11	Select end of Ch. 15 exercises
11	Review and Final Examination	The final examination will be based on the content covered in units 1- 10.	

Evaluation Criteria and Grade Weights

Quizzes		20%
Homework	20%	
Lab exercises	35%	
Final exam	25%	

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	<60%	0.0

