

ITT Technical Institute
ET245
Electronic Devices II
Onsite Course

SYLLABUS

Credit hours: 4

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

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

Prerequisite: ET215 Electronic Devices I

Course Description:

Students study integrated circuits such as those used in communications and control systems. The circuits include, but are not limited to, amplifiers, timing circuits, summation amplifiers, active filters and oscillators. Laboratory projects include constructing, testing and troubleshooting circuits containing operational amplifiers.

STUDENT SYLLABUS: ELECTRONIC DEVICES II

Instructor: _____

Office hours: _____

Class hours: _____

Major Instructional Areas

Unit 1

Chapter 5: Sections 5.4-5.8

- Direct-coupled Amps
- Class A Power Amps
- Class B Power Amps
- Class C and Class D Power Amps
- IC Power Amps

Unit 2

Chapter 6: Sections 6.1-6.3

- Introduction to Op-Amps
- Differential Amps
- Op Amp Data Sheet parameters

Unit 3

Chapter 6: Sections 6.4-6.5

- Negative Feedback
- Op-Amp Configurations with Negative Feedback

Unit 4

Chapter 6: Sections 6.6-6.7

- Op-Amp Impedances
- Troubleshooting

Unit 5

Chapter 7: Sections 7.1-7.3

- Basic Concepts
- Op Amp Open-Loop Response,
- Op Amp Closed-Loop Response

Unit 6

Chapter 8: Sections 8.1-8.3

- Comparators
- Summing Amplifier

- Integrators and Differentiators

Unit 7

Chapter 9: Sections 9.1-9.3

- Basic Filter Responses
- Filter Response Characteristics
- Active Low-Pass Filters

Unit 8

Chapter 9: Sections 9.4-9.6

- Active High-Pass Filters
- Active Band-Pass Filters
- Active Band-Stop Filters

Unit 9

Chapter 10: Sections 10.1, 10.5, 10.6, 10.7

- The Oscillator
- Relaxation Oscillator Principles
- 555 Timer as an Oscillator
- 555 Timer as a One-Shot

Unit 10

Chapter 11: Sections 11.1-11.4

- Voltage Regulation
- Basic Series Regulators
- Basic Shunt Regulators
- Integrated Circuit Voltage Regulators

Unit 11

Review and Final Examination

- Review Session
- Final Examination

Course Objectives

1. Explain the concept of an integrated circuit.
2. Explain the advantages of an integrated circuit when compared to a discrete circuit.
3. Explain how to identify integrated circuit packages and interpret their data sheets.
4. List the functions and configurations of operational amplifiers to include amplifiers, comparators, integrators, differentiators, filters, oscillators, and special-purpose amplifiers.
5. List the functions and configurations of timers.
6. List the functions of voltage regulators.
7. Explain the concept of negative and positive feedback.
8. Build applications using 741 op-amps, 555 timers, and voltage regulators.
9. Calculate the theoretical values of 741 op-amps, 555 timers, and voltage regulators.
10. Measure the values of 741 op-amps, 555 timers, and voltage regulators using both simulations and actual lab equipment.
11. Troubleshoot 741 op-amps, 555 timers, and voltage regulators to identify the failed component.

Teaching Strategies

Curriculum is designed to promote a variety of teaching strategies that support the outcomes described in the course objectives and that foster higher cognitive skills. Delivery makes use of various media and delivery tools in the classrooms.

Student Textbook and Materials

Floyd, T. L., & Buchla, D. M. (2013). *Analog fundamentals: A systems approach (1st ed.)*. Upper Saddle River, NJ: Prentice Hall

Floyd, T. L., & Buchla, D. M. (2013). *Lab manual for analog fundamentals: A systems approach (1st ed.)*. Upper Saddle River, NJ: Pearson Custom Publishing.

Course Outline

Unit	Topic (Lecture Period)	Chapters	Lab and Other Coverage
1	Direct coupled Amps, Class A Power Amps, Class B Power Amps, Class C Power Amps, Class D Power Amps, and IC Power Amps	Chapter 5: Sections 5.4-5.8	Labs #16 and #17
2	Introduction to OpAmps, Differential Amps, Op-Amp Data Sheet parameters	Chapter 6: Sections 6.1-6.3	Lab #18
3	Negative Feedback, Op Amp Configurations with Negative Feedback,	Chapter 6: Sections 6.4 and 6.5	Lab #19
4	Op-mp Impedances and Noise, Troubleshooting	Chapter 6: Sections 6.6 and 6.7	Lab #20
5	Basic Concepts, Op-Amp Open-Loop Response, Op-Amp Closed-Loop Response UNIT EXAM	Chapter 7: Sections 7.1-7.3	Lab #21
6	Comparators, Summing Amplifiers, Integrators and Differentiators	Chapter 8: Sections 8.1-8.3	Lab #22
7	Basic Filter Response, Filter Response Characteristics Active Low-Pass Filter	Chapter 9: Sections 9.1-9.3	Lab #25
8	Active High-Pass, Active Band-Pass, Active Band-Stop	Chapter 9: Sections 9.4-9.6	Lab #26
9	The Oscillator, 555 Timer as an Oscillator, 555 Timer as a One-Shot UNIT EXAM	Chapter 10: Sections 10.1, 10.5, and 10.6	Lab #29

Unit	Topic (Lecture Period)	Chapters	Lab and Other Coverage
10	Voltage Regulation, Basic Series Regulators, Basic Shunt Regulators, Integrated Circuit Voltage Regulators	Chapter 11: Sections 11.1, 11.2, 11.3, and 11.5	Labs #30 and #31
11	Review and Final Examination	The final examination will be based on the content covered in the chapter references listed above.	

Evaluation Criteria and Grade Weights

Exercise	20%
Lab	30%
Exam	20%
Final Exam	20%
Lab Final	10%
Total	100%

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