

**ITT Technical Institute**  
**ET215P**  
**Electronic Devices I**  
**Onsite Course**

**SYLLABUS**

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**Credit hours:** 4

**Contact/Instructional hours:** 66 (46 Theory Hours, 20 Lab Hours)

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

Prerequisite: ET145P AC Electronics

**Course Description:**

Students in this course study solid state devices, including diodes and transistors. Emphasis is placed on linear amplifiers and DC switching applications. Laboratory projects involve constructing, testing and troubleshooting circuits using solid state devices.



# STUDENT SYLLABUS: ELECTRONIC DEVICES I

Instructor: \_\_\_\_\_

Office hours: \_\_\_\_\_

Class hours: \_\_\_\_\_

## Major Instructional Areas

### Unit 1

#### Chapter 2, Sections 2.1-2.4

- The Atomic Structure of Semiconductors
- The PN Junction
- Biasing the Semiconductor Diode
- Diode Characteristics

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### Unit 2

#### Chapter 2, Sections 2.5-2.7

- Rectifiers
- Rectifier Filters and IC Regulators
- DC Power Supply
- Diode Limiting and Clamping Circuits

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### Unit 3

#### Chapter 2, Sections 2.8-2.10

- Special Purpose Diodes
- Diode Data Sheet
- Troubleshooting DC Power Supplies

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### Unit 4

#### Chapter 3, Sections 3.1-3.4

- Structure of Bipolar Junction Transistors
- BJT Bias Circuits
- Data Sheet Parameters and AC Considerations
- Common-Emitter Amplifiers

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### Unit 5

#### Chapter 3, Sections 3.5-3.6

- Common-Collector Amplifiers
- Common-Base Amplifiers

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|--------|---|---|
| nit 6  | <b>Chapter 3, Sections 3.7-3.9</b> <ul style="list-style-type: none"><li>• Bipolar Transistor as a Switch</li><li>• Transistor Packages and Terminal Identification</li><li>• Troubleshooting</li></ul> | U |
| nit 7  | <b>Chapter 4, Sections 4.1-4.3</b> <ul style="list-style-type: none"><li>• Structure of Field Effect Transistors</li><li>• JFET Characteristics</li><li>• JFET Biasing</li></ul>                        | U |
| nit 8  | <b>Chapter 4, Sections 4.4-4.5</b> <ul style="list-style-type: none"><li>• MOSFET Characteristics</li><li>• MOSFET Biasing</li></ul>  | U |
| nit 9  | <b>Chapter 4, Sections 4.6-4.7</b> <ul style="list-style-type: none"><li>• FET Linear Amplifiers</li><li>• MOSFET Switching Circuits</li></ul>  | U |
| nit 10 | <b>Chapter 5, Sections 5.1-5.3</b> <ul style="list-style-type: none"><li>• Capacitively Coupled Amplifiers</li><li>• RF Amplifiers</li><li>• Transformer-Coupled Amplifiers</li></ul>                   | U |

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## Course Objectives

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

1. Discuss the basic atomic structure of semiconductors and the characteristics of a pn junction.
2. Describe the basic diode characteristics and the operations of diodes.
3. Describe the basic construction and operation of bipolar junction transistors (BJTs) and identify various types of BJT transistor package configurations.
4. Determine the range of BJT transistor circuit V-I operating points for each BJT biasing circuit and explain how a transistor can be used as a switch.
5. Analyze the operations of common-emitter, common-collector, and common-base amplifiers.
6. Troubleshoot power supply failures and faults in transistor circuits using accepted techniques.
7. Describe the construction classifications and operations of field-effect transistors (FETs) and identify various types of FET transistor package configurations.
8. Determine the depletion mode V-I operating points for each junction field-effect transistor (JFET) biasing circuit.
9. Explain the construction, operation, and special handling requirement of metal-oxide semiconductor field-effect transistors (MOSFETs).
10. Determine MOSFET transistor circuit depletion and enhancement mode V-I operating points for each MOSFET biasing circuits.
11. Describe the operation of FET amplifiers and discuss switching applications of FETs.
12. Describe the operation of multistage, radio frequencies (RF), and power amplifiers.

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## 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.

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## 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.

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## Course Outline

| Unit | Topic (Lecture Period)  | Chapters  | Lab and Other Coverage                                      |
|------|---|---|---|
| 1    | The Atomic Structure of Semiconductors, The PN Junction, Biasing the Semiconductor Diode, Diode Characteristics | 2.1-2.4   | Lab #2  |
| 2    | Rectifiers, Rectifier Filters, IC Regulators, DC Power Supply, Diode Limiting and Clamping Circuits             | 2.5-2.7   | Labs #3, #4   |
| 3    | Special Purpose Diodes, the Diode Data Sheet, and Troubleshooting DC Power Supplies                             | 2.8-2.10  | Lab #5  |
| 4    | Structure of BJTs, BJT Bias Circuits, Data Sheet Parameters and AC Considerations, and CE Amplifiers            | 3.1-3.4   | Labs # 6,7,8  |
| 5    | CC and CB Amplifiers<br>UNIT EXAM   | 3.5-3.6   | Lab #9  |
| 6    | The Bipolar Transistor as a Switch, Transistor Packages and Terminal Identification, Troubleshooting            | 3.7-3.9   | Lab #10   |
| 7    | Structure of FETs, JFET Characteristics, JFET Biasing   | 4.1-4.3   | Lab #11   |
| 8    | MOSFET Characteristics and Biasing  | 4.4-4.5   | Labs #12, 13  |
| 9    | FET Linear Amplifiers, MOSFET Switching Circuits<br>UNIT EXAM   | 4.6,4.7   | Lab #14   |
| 10   | Capacitively Coupled Amplifiers, RF Amplifiers, and Transformer Coupled Amplifiers                              | 5.1-5.3   | Lab #15 and Final Lab Eval (may be finished in Week 11 lab) |
| 11   | Review and Final Exam   | The final exam will be based on the content covered in chapters 2.1-5.2 |   |

## Evaluation Criteria and Grade Weights

|   |              |             |
|---|--------------|-------------|
| ■ | Exercise     | 20%         |
| ■ | Lab          | 30%         |
| ■ | Exam         | 20%         |
| ■ | Final Exam   | 20%         |
| ■ | Lab Final    | 10%         |
| ■ | <b>Total</b> | <b>100%</b> |

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 |