## SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

## SAULT STE. MARIE, ONTARIO


# COURSE OUTLINE

**COURSE TITLE:** ELECTRONIC FUNDAMENTALS

**CODE NO. :** ELN100 **SEMESTER:** 1

**PROGRAM:** ELECTRICAL/ELECTRONICS/INSTRUMENTATION TECHNICIAN/TECHNOLOGY

**AUTHOR:** BILL ARMSTRONG

**DATE:** August 99 **PREVIOUS OUTLINE DATED:** Sept. 98

**APPROVED:**

_____ _____

**DEAN** **DATE**

**TOTAL CREDITS:** 5

**PREREQUISITE(S):** N/A

**LENGTH OF COURSE:** 16 WEEKS **TOTAL CREDIT HOURS:** 85

**Course Name** **Course No.:**

**Electronic Fundamentals** **ELN-100**

## I. COURSE DESCRIPTION

This course introduces the student to electronic devices and circuit applications. Diodes, transistors and their applications will be studied in detail. Hands on skills will be developed in the practical component of this course,
which includes device testing, circuit assembly, analysis and troubleshooting.

## II. TOPICS TO BE COVERED:

1. Atomic theory and the pn junction

2. Diodes and their applications

3. Transistors and dc biasing circuits

4. Class A small signal amplifiers

## III. LEARNING OUTCOMES AND ELEMENTS OF PERFORMANCE:

### A. Learning Outcomes:

1. Understand atomic theory and the formation of a pn junction.

2. Understand the operation, dc biasing, testing and characteristics of rectifier and special purpose diodes.

3. Assemble, test and troubleshoot dc power supplies.

4. Understand the operation, dc biasing, testing and characteristics of bipolar junction transistors.(BJT)

5. Assemble, test and troubleshoot various configurations of class A amplifiers.

## B. Learning Outcomes with Elements of Performance:

**Upon successful completion of this course, the student will demonstrate the ability to:**

**1.** Understand atomic theory and the formation of a pn junction.

**Potential elements of the performance:**

***** Describe the makeup of the atom.
***** Explain how a pn junction is formed.

**2.** Understand diode principles.

**Potential elements of the performance:**

* Describe the construction of a diode.
* Define bias and explain the different methods of forward and reverse biasing a diode.
* Describe how to test a diode in and out of circuit with an analog or digital meter.
* Using a specification sheet, list the parameters and operating characteristics of diodes.
* Discuss the basic operating principles of rectifier diodes, zener diodes and light-emitting diodes.(LEDs)

**3.** Understand common diode applications.

**Potential elements of the performance:**

* Draw the block diagram of a dc power supply and describe the function of each circuit it contains.
* Describe the operation of the half-wave, full-wave and bridge rectifiers.
* Explain the effects that filtering has on the output of a rectifier.
* Describe different voltage and current regulators.
* Perform calculations to justify proper operation of the power supply.
* Assemble and test the power supply using proper test equipment.
* Troubleshoot the power supply if there is a problem and fix accordingly.

**Course Name:** **Course No.:**
**Electronic Fundamentals** **ELN 100**

**4.** Understand transistor principles.

**Potential elements of the performance:**

***** Describe the construction of a bipolar junction transistor (BJT) and the differences Between the npn and pnp transistors.
***** Describe the operation of a transistor in the active, cutoff and saturation regions and how to bias the transistor accordingly.
* Using a specification sheet, list the parameters and operating characteristics of transistors.
* Describe how to test transistors in and out of circuit with an analog or digital meter.

**5.** Understand transistor dc biasing circuits.

**Potential elements of the performance:**

***** State the purpose of dc biasing for transistor circuits.
* Plot the dc load line for an amplifier and explain what the Q point represents.
* Describe and analyse the operation of a base-bias circuit, and explain why this bias is used when you require the transistor to act as a switch.
* Describe and analyse the operation of an emitter-feedback bias circuit.
* Describe and analyse the operation of a voltage-divider biasing circuit.
* Perform dc calculations for biasing circuits.
* Assemble and test biasing circuits using proper test equipment.
* Troubleshoot biasing circuits if required.

**6.** Understand the operation of class A amplifiers and be able to assemble and test them.

**Potential elements of the performance:**

* List the fundamental ac properties of amplifiers.
* Draw and describe the general model of a voltage amplifier.
* Explain the effects of input and output impedance on voltage gain.
* Analyse amplifier efficiency.
* Derive the ac equivalent for a class A amplifier.
* Perform a complete dc and ac analysis of a voltage divider bias class A amplifier.
* Assemble and test a single stage amplifier for proper dc and ac voltages.
* Troubleshoot the amplifier if it is not working properly and fix it.

**Course Name:** **Course No.:**
**Electronic Fundamentals** **ELN 100**

## IV. REQUIRED STUDENT RESOURCES:

***** Text - Introductory Electronic Devices and Circuits - 4th Edition
Author - Robert T. Paynter

* Lab Manual to accompany text

* 1st Year Electronic Parts Package

## V. METHODS OF EVALUATION:

The following Grading System will be used:

A+ = 90% - 100
A = 80% - 89%
B = 70% - 79%
C = 60% - 69%
R = 59% or below (Repeat Course)
X = Temporary Grade as per College Policy

The final grade will be derived as follows: Theory - Tests ( 3 or 4 ) and Quizzes = 60%
Lab - Practical tests and reports = 30%
Attendance and work ethics **= 10%**
TOTAL =100%

## VI. SPECIAL NOTES:

1. The Instructor reserves the right to modify the course as is deemed necessary to meet the needs of the students.

2. Students with special needs (Physical Limitations, Visual/Hearing Impairments etc. ) are encouraged to discuss confidentially, required accommodations with the instructor and/or contact the Special Needs Office, Room E1204, Extension 493, 717 or 491.

3. Attendance to lab activities is compulsory, unless discussed with the instructor in advance of the absence. Your attendance and final grade are directly related.

## VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in this course, should consult with the Professor