

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**



Sault College

**COURSE OUTLINE**

**COURSE TITLE:** ELECTRONIC FUNDAMENTALS  
**CODE NO. :** ELN100 **SEMESTER:** 1  
**PROGRAM:** ELECTRICAL/ELECTRONIC/INSTRUMENTATION  
TECHNICIAN/TECHNOLOGY  
**AUTHOR:** BILL ARMSTRONG  
**DATE:** AUG. 2000 **PREVIOUS OUTLINE DATED:** AUG. 1999  
**APPROVED:**

	_____ DEAN	_____ DATE
<b>TOTAL CREDITS:</b>	5	
<b>PREREQUISITE(S):</b>	N/A	
<b>HOURS/WEEK:</b>	5	

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*For additional information, please contact Kitty DeRosario, Dean*  
*School of Technology, Engineering & Technical Trades*  
*(705) 759-2554, Ext.642*

## **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. 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.

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 analyze 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 analyze the operation of an emitter-feedback bias circuit.
- \* Describe and analyze 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.
- \* Analyze 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.

**III. 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

**IV. REQUIRED RESOURCES/TEXTS/MATERIALS:**

\* Text - Introductory Electronic Devices and Circuits - 5th Edition  
Author - Robert T. Paynter

\* Lab Manual to accompany text

\* 1st Year Electronic Parts Package

**V. EVALUATION PROCESS/GRADING SYSTEM:**

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%
<b>TOTAL</b>		<b>=100%</b>

The following semester grades will be assigned to students in postsecondary courses:

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	90 - 100%	4.00
A	80 - 89%	3.75
B	70 - 79%	3.00
C	60 - 69%	2.00
R (Repeat)	59% or below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field placement or non-graded subject areas.	
U	Unsatisfactory achievement in field placement or non-graded subject areas.	
X	A temporary grade. This is used in limited situations with extenuating circumstances giving a student additional time to complete the requirements for a course (see <i>Policies &amp; Procedures Manual – Deferred Grades and Make-up</i> ).	
NR	Grade not reported to Registrar's office. This is used to facilitate transcript preparation when, for extenuating circumstances, it has not been possible for the faculty member to report grades.	

**VI. SPECIAL NOTES:**Special Needs:

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your instructor and/or the Special Needs office. Visit Room E1204 or call Extension 493, 717, or 491 so that support services can be arranged for you.

Retention of course outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Plagiarism:

Students should refer to the definition of “academic dishonesty” in *Student Rights and Responsibilities*. Students who engage in “academic dishonesty” will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Course outline amendments:

The Professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

**VII. PRIOR LEARNING ASSESSMENT:**

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

**VIII. DIRECT CREDIT TRANSFERS:**

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.