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 Modified by: Ed Sowka		
DATE:	August 2006	**PREVIOUS OUTLINE DATED:**	August 2005
APPROVED:			

_____ _____

DEAN **DATE**

TOTAL CREDITS:	5
PREREQUISITE(S):	N/A
HOURS/WEEK:	5

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:

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.
- State the relationship between the number of valence electrons and the elements conductivity.
- Contrast between trivalent and pentavalent elements
- List the similarities and differences between n-type and p-type semiconductors.
- Explain how a pn junction is formed.
- Define bias and describe the different methods of forward and reverse biasing a pn junction.

2. Understand diode principles.

Potential elements of the performance:

- Describe the construction of a diode.
- Identify the terminals of a diode and be able to draw and analyze the schematic diagram of a simple diode circuit.
- 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 different 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 power supplies using proper test equipment.
- Troubleshoot various power supplies in a safe and proper manner.

4. Understand transistor principles.

Potential elements of the performance:

- Describe the construction of a bipolar junction transistor (BJT) and the difference 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.
- Describe the transistor as a current-controlled device and state the relationship among the three terminal currents.
- Define beta and use it in transistor current calculations.
- Using a specification sheet, list the parameters and operating characteristics of different 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 in a safe and proper manner.

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 – 6th or 7th Edition Author - Robert T. Paynter

- 1st Year Electronic Parts Package

- Digital Multimeter

V. EVALUATION PROCESS/GRADING SYSTEM:

The final grade will be derived as follows:

- Theory - Tests (3 or 4) and Quizzes = 50%
- Lab - Practical tests and reports = 40%
- Attendance and work ethics = 10%
- TOTAL =100%

- **See Special Notes Section VI for further details affecting final grade.**

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

Grade	Definition	Grade Point Equivalent
Grade	**Definition**	*Grade Point Equivalent*
A+	90 – 100%	4.00
A	80 – 89%	
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 – 59%	1.00
F (Fail)	49% and below	0.00

CR (Credit)	Credit for diploma requirements has been awarded.
S	Satisfactory achievement in field /clinical placement or non-graded subject area.
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.
NR	Grade not reported to Registrar's office.
W	Student has withdrawn from the course without academic penalty.

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 E1101 or call Extension 2703 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.

- Attendance to lab activities is compulsory, unless discussed with the instructor in advance of the absence and the absence is for a medical or family emergency. A ***deduction of 2% per Lab missed***, will be imposed on the final lab mark.
- Your attendance to all classes, and your final grade are directly related. A ***deduction of 1% per theory hour missed***, will be imposed.
- Any student that is absent for a test, will be required to provide a doctors' note immediately upon returning. Failing to do so will result in a grade of 0% being assigned to the missed test.
- Tests, quizzes and other activities, will not be scheduled on an individual basis, unless it is for a medical or family emergency.
- Disruptions to theory classes, such as lateness, are not acceptable and will be dealt with on an individual basis.

Laboratory Reports shall be subject to the handout and or criteria given at the start of the semester by the instructor.
All Lab Reports are due at the start of the following weeks Lab Class unless otherwise stipulated by the instructor. A ***penalty of 10% per day*** will be assessed for late submissions (Weekends included).

All Lab Reports must be submitted in a Duo-Tang cover unless otherwise noted.

All other required submissions will be assessed a late penalty of ***5% per day*** (Weekends included).

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.