

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



**SAULT
COLLEGE**

COURSE OUTLINE

COURSE TITLE: ELECTRONICS LEVEL I

CODE NO. : ELR621 **SEMESTER:** LEVEL ONE

PROGRAM: Construction & Maintenance Electrician – Basic Apprenticeship

AUTHOR: John Paloniemi

DATE: August 2011 **PREVIOUS OUTLINE DATED:** January 2011

APPROVED: *“Corey Meunier”*

CHAIR DATE

TOTAL CREDITS: FIVE

PREREQUISITE(S):

HOURS/WEEK: FOUR

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I. COURSE DESCRIPTION:

This is a course in electronics which includes topics such as series, parallel and combination DC circuits, diodes, LEDs, NPN and PNP bipolar transistors used as a switch, logic gates and flip flops.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

- Describe TTL and CMOS logic gate technology
- Describe the operation of basic logic gates including NOT, AND, OR, NAND and EXCLUSIVE OR gates
- Identify the schematic symbols both North American and European for basic logic gates.
- Demonstrate the use of basic logic gates to create digital logic.
- State the Boolean equations for simple logic gates.
- Design and test combination logic circuits using basic logic gates.
- State the truth table and demonstrate the use of an R, S and D type flip flop.
- Demonstrate the use of a logic probe to troubleshoot a digital system.
- Demonstrate the proper procedure for soldering and de-soldering.
- State the standard resistor colour code.
- Connect resistors in series, parallel and combination circuits, complete with voltmeter and ammeter connections.
- Describe the properties of N and P type semiconductor materials.
- Describe and demonstrate the operation of a bipolar diode.
- State current and voltage requirements for silicon diodes, germanium and light emitting diodes (LEDs).
- Demonstrate requirements for silicon diodes, germanium diodes and LEDs to be forward and reverse biased.
- Explain the important diode characteristics used when selecting replacement diodes
- Describe the operation and biasing requirements of NPN and PNP transistors
- Identify the schematic symbols for NPN and PNP bipolar transistors
- Describe and demonstrate how a transistor can be used as a switch
- Describe the operation of an opto-coupler
- State and demonstrate common applications for an opto-coupler

III. TOPICS:

1. SEMICONDUCTORS
2. POWER RATING
3. JUNCTION DIODES
4. LIGHT-EMITTING DIODES (LEDS)
5. THE TRANSISTOR
6. THE TRANSISTOR SWITCH
7. DIGITAL LOGIC
8. THE BOUNCELESS SWITCH

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

- **TEXT – Electronics For Electricians 5th Edition**
Author: Stephen L. Herman

V. EVALUATION PROCESS/GRADING SYSTEM:

The Final Grade will be a combination of theory and laboratory grades.

60% = Theory (Consisting of 3 equally weighted tests and several in-class quizzes or assignments (no makeup for missed in-class activities) and assigned homework.

40% = Lab Activities (Lab reports, attendance, on site evaluation practical lab exercises, active participation)

Both the THEORY and the LAB portions must have passing grades for a passing grade in the class to be issued!

See Special Notes Section for further details affecting final grade.

The following semester grades will be assigned to students:

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

Attendance:

Sault College is committed to student success. There is a direct correlation between academic performance and class attendance; therefore, for the benefit of all its constituents, all students are encouraged to attend all of their scheduled learning and evaluation sessions. This implies arriving on time and remaining for the duration of the scheduled session.

It is the departmental policy that once the classroom door has been closed, the learning process has begun. Late arrivers will not be granted admission to the room.

Other:

Attendance to scheduled lab activities is compulsory, unless permission has been granted by the instructor. Lab attendance and final grade are directly related. If a student arrives late for, or is not continuously present and actively participating at (scheduled breaks excepted), a scheduled lab class he/she will be considered absent for the entire class and will not be permitted to submit the associated lab report.

Theory Tests will not be returned!

Students will be given the opportunity to review / correct the test material.

Students must continuously wear all Sault College required personal protective equipment (PPE) during lab activities.

Failure to do this will result in expulsion from the lab activity and a grade of zero being assigned.

Students are expected to be wearing their required PPE prior to entering the lab.

The instructor will advise what specific PPE is required. If a student repeatedly neglects to wear PPE as required he/she will be considered to be in violation of the Sault College Academic Code of Conduct and may be sanctioned accordingly (see Student Code of Conduct & Appeal Guidelines).

For instance, first violation – verbal warning, second violation written warning, third violation suspension from lab activities.

Students must complete a lab safety orientation prior to participating in lab activities. Successful completion of this orientation will be demonstrated by the student completing a quiz with a minimum grade of 100%.

Cell Phone Use

Cell phones in the classroom are to be SHUT OFF during lectures and labs.

Ringling during class will result in a deduction of 5% from the final grade per event.

During Tests, Cell Phones are to be SHUT OFF and put away, and are not to be used as a calculator.

Should your phone ring during a test you will be asked to hand your test in and immediately leave the classroom.

A Grade of 0% will be issued for that test.

Students may not wear earphones of any kind (i.e. for play back of recorded music/voice) during lab activities or test sittings. This does not include hearing aids required for hearing impaired.

Any student who is absent for a test will be required to provide a Doctor's note immediately upon returning to the College. 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, excessive talking, inappropriate language, etc are not acceptable and will be dealt with on an individual basis.

Laboratory Reports shall be subject to the handout given at the start of the semester. 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 are included)

Completed Labs are to be delivered to the instructor in a clean neat folder and will include a computer generated cover label stating:

- Lab activity
- Due date
- Date activity was performed
- Your name
- Your partner's name

The content of the computer generated lab report will include:

- Cover page
- Equipment/parts list
- All Drawings/charts/diagrams are required to have Figure numbers which are referenced in the report.
- A summary of activities which were performed
- A conclusion (personal statement about what you learned from this activity)
- And, anything else that is appropriate for the activity.

VII. COURSE OUTLINE ADDENDUM:

The provisions contained in the addendum located on the portal form part of this course outline.