

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**



**SAULT  
COLLEGE**

**COURSE OUTLINE**

**COURSE TITLE:** ELECTRONICS LEVEL II

**CODE NO. :** ELR721                      **SEMESTER:** Intermediate Level

**PROGRAM:** Construction and Maintenance Electrician – Intermediate Apprenticeship

**AUTHOR:** Sean Hager

**DATE:** October 2014              **PREVIOUS OUTLINE DATED:** October 2013

**APPROVED:**                      *“Corey Meunier”*

	<b>CHAIR</b>	<b>DATE</b>
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**TOTAL CREDITS:** 3

**PREREQUISITE(S):** NONE

**HOURS/WEEK:** 3

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**For additional information, please contact Corey Meunier, Chair  
Technology & Skilled Trades  
(705) 759-2554, Ext. 2610**

**I. COURSE DESCRIPTION:**

A course in the applications of diodes in rectifier circuits and power supplies. Other topics include Zener diodes, Field Effect Transistors, op-amps and thyristors including the SCR, DIAC and TRIAC

**II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:**

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

1. Use the oscilloscope to test circuits.
2. Explain the importance of isolation as applied to test equipment.
3. Describe and demonstrate full-wave rectification.
4. Connect capacitors and inductors to filter a power supply output.
5. Explain and demonstrate the use of a Zener diode as a regulator.
6. Describe and demonstrate the operation of a SCR.
7. Describe and demonstrate the operation of a DIAC.
8. Describe and demonstrate the operation of TRIAC.
9. Describe and demonstrate how a DIAC and RC network can be used to phase shift a TRIAC
10. Describe the operation and applications of a Pulse Transformer and the theory of pulse triggering thyristors
11. Explain the operation of a Field Effect Transistor (FET)
12. Explain the operation of an Operational Amplifier (Op. Amp)
13. Calculate the expected gain of an inverting and non-inverting Op-Amp circuits
14. Demonstrate the operation of an Op-Amp used as a comparator
15. Demonstrate the operation of an Op-Amp used as an amplifier.

**III. TOPICS:**

1. The Oscilloscope
2. Single-Phase Rectifiers
3. Filters
4. Zener Diodes
5. Thyristors
6. Phase Shifting SCRs and TRIACs
7. Pulse Triggering Thyristors
8. Field Effect Transistors
9. The Operational Amplifier (Op-Amp)

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

- TEXT – Electronics For Electricians 6<sup>th</sup> Edition  
Author: Stephen L. Herman
- Proper P.P.E. (Personal Protective Equipment)
- Hand tools – Needle nose pliers, side cutters

## V. EVALUATION PROCESS/GRADING SYSTEM:

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

**50%** = Theory (Tests and Quizzes)

**50%** = Lab Activities (Lab reports, attendance, on site evaluation practical lab exercises, active participation)

There will likely be 2-3 tests during the intake and dates will be identified in class.

The professor reserves the right to adjust the number of tests as warranted. Any modifications will be discussed in class.

Attendance is mandatory and quizzes will only be marked when completed in class.

Tests will not be returned but will be available for review.

**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:

<b>Grade</b>	<b><u>Definition</u></b>	<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.**

If a student misses a test he/she must have a valid reason (i.e. medical or family emergency – documentation may be required). In addition, the instructor must be notified prior to the test sitting. If this procedure is not followed the student will receive a mark of zero on the test with no make-up option.

If a student misses class time due to sickness, family emergency or other reason beyond his/her control the student must at his/her first opportunity meet with the course faculty to discuss if the missed time has placed the student at an increased risk of failing. The student must follow up the meeting by emailing the faculty with a summary of the meeting's discussions. Documentation validating the missed time may be required.

Any material covered during any absence legitimate or not is the responsibility of the student.

There are no make-up tests, assignments or extra work allowed for any reason.

Any material covered during any absence legitimate or not is the responsibility of the student.

**Electronic Devices in the Classroom:**

Students who wish to use electronic devices in the classroom will seek permission of the faculty member before proceeding to record instruction. With the exception of issues related to accommodations of disability, the decision to approve or refuse the request is the responsibility of the faculty member. Recorded classroom instruction will be used only for personal use and will not be used for any other purpose. Recorded classroom instruction will be destroyed at the end of the course. To ensure this, the student is required to return all copies of recorded material to the faculty member by the last day of class in the semester. Where the use of an electronic device has been approved, the student agrees that materials recorded are for his/her use only, are not for distribution, and are the sole property of the College.

**Cell Phone Use**

**Cell phones in the classroom are to be put on Silent or Vibrate 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 that 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 partners name

The content of the computer generated lab report will include:

- Cover page
- Usable Table of Contents
- 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.

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%.**

**VII. COURSE OUTLINE ADDENDUM:**

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