

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**



**SAULT  
COLLEGE**

**COURSE OUTLINE**

**COURSE TITLE:** ELECTRICAL THEORY I

**CODE NO. :** ELR620 **SEMESTER:** BASIC LEVEL

**PROGRAM:** CONSTRUCTION AND MAINTENANCE ELECTRICIAN APPRENTICESHIP (6520)

**AUTHOR:** Al Gooderham

**DATE:** January 2016 **PREVIOUS OUTLINE DATED:** August 2015

**APPROVED:** *"Corey Meunier"*

**CHAIR** **DATE**

**TOTAL CREDITS:** EIGHT

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

**HOURS/WEEK:** SIX

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

**I. COURSE DESCRIPTION:**

This is an electrical theory course in DC electric circuits. Atomic theory will be introduced along with voltage, current, resistance, power and energy in electric circuits. Ohm's Law and Kirchoff's Laws will be studied as they relate to series, parallel and combination circuits. Wire sizing, resistivity and magnetism will also be introduced.

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

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

1. Demonstrate an understanding of atomic theory.
2. Describe the requirements for a simple electric circuit.
3. Define voltage, current and resistance.
4. Define work, power and energy.
5. Convert between mechanical and electrical units of work, power and energy.
6. Calculate energy in kilo-watt hours.
7. Describe the effects of current on the human body.
8. Apply Ohm's Law to analyze series DC circuits.
9. Apply Kirchoff's Law to analyze series DC circuits.
10. Apply Ohm's Law to analyze parallel DC circuits.
11. Apply Kirchoff's Law to analyze parallel DC circuits.
12. Apply Ohm's Law to analyze combination DC circuits.
13. Apply Kirchoff's Law to analyze combination DC circuits.
14. Analyze and calculate voltage, current and power in 2-wire and 3-wire distribution systems for balanced, unbalanced and faulted.
15. Define and calculate efficiency of electrical distribution systems.
16. Perform calculations relating to wire measurements, AWG, SI units, resistivity, line loss, and temperature coefficients.
17. Name and explain the principles of operation of common sources of EMF.
18. Describe the characteristics of primary and secondary cells.
19. State the Fundamental Law of Magnetism.
20. Define permanent and temporary magnets.
21. Describe magnetic lines of force and list their characteristics.
22. Describe the relationship between magnetism and induced EMF.

**III. TOPICS:**

1. ATOMIC STRUCTURE
2. ELECTRICAL QUANTITIES AND OHM'S LAW
3. STATIC ELECTRICITY
4. RESISTORS
5. SERIES CIRCUITS
6. PARALLEL CIRCUITS
7. COMBINATION CIRCUITS
8. USING WIRE TABLES AND DETERMINING CONDUCTOR SIZES
9. CONDUCTION IN LIQUIDS AND GASES
10. BATTERIES AND OTHER SOURCES OF ELECTRICITY
11. MAGNETISM
12. MAGNETIC INDUCTION

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

**Delmar's Standard Textbook of Electricity (Current edition),  
Stephen L. Herman**

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

The grading weight for the course is:

***Theory tests and quizzes: 80%.***

***Homework assignments: 20%.***

The following semester grades will be assigned to students:

<b>Grade</b>	<b><u>Definition</u></b>	<b><i>Grade Point Equivalent</i></b>
A+	90 – 100%	
A	80 – 89%	4.00
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:

### 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.***

## VII. COURSE OUTLINE ADDENDUM:

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

## Class/Lab Conduct:

Attendance to scheduled lab activities is compulsory, unless permission has been granted by the instructor. Lab attendance and final grades are directly related. **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 PPE prior to entering the lab. The instructor will advise what specific PPE is required (safety glasses will definitely be required).** Unsafe conduct in the lab will not be tolerated.

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.

Use of cell phones/PDAs for any form of communication (voice text/internet) during class is strictly prohibited. Cell phones/PDAs must be silenced during regular class and lab times and must be turned off and kept out of sight during test sittings. If a student's phone is used during a test sitting, the instructor will immediately collect the test, and a grade of 0 will be assigned.

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.

Students are expected to maintain an active Sault College email account. They are required to check this email account daily. The instructor may announce details of lab and test requirements and scheduling through the Sault College email system (as well as sharing other important information).

Any requests to deviate from the aforementioned course outline requirements must be made to the instructor in writing or via Sault College email. If permission is granted it must also be granted in writing or via Sault College email. Verbal requests/permissions are not acceptable. It is the student's responsibility to maintain a copy of all such requests and associated permissions.