

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



COURSE OUTLINE

COURSE TITLE: Electric & Electronic Controls

CODE NO. : ELR111 **SEMESTER:** 2

PROGRAM: Mechanical Technician and Techniques

AUTHOR: Stefan Tanninen

DATE: January 2013 **PREVIOUS OUTLINE DATED:** January 2012

APPROVED: *"Corey Meunier"*

CHAIR **DATE**

TOTAL CREDITS: 1

PREREQUISITE(S): None

HOURS/WEEK: 1

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I. COURSE DESCRIPTION:

This course introduces the student to the fundamentals of electricity. Safety issues, provincial and national codes relating to electrical installations, and characteristics of electric circuits are also introduced.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. *List and describe the purpose of various codes associated with electrical installations.*

Potential Elements of the Performance:

- Describe the purpose and scope of the Canadian Electrical Code (CSA Standard C22.1).
- Describe the purpose and scope of the Ontario Electrical Safety Code and how it is related to the Canadian Electrical Code.

2. *Describe the purpose and function of electrical components as they relate to safety.*

Potential Elements of the Performance:

- Describe the purpose and function of fuses.
- Describe the purpose and function of circuit breakers.
- Describe the purpose, function and limitations of isolating switches.
- Describe the purpose and function of lock-outs.
- Describe the purpose and function of shut-off procedures.

3. *Describe atomic theory and electricity.*

Potential Elements of the Performance:

- List and describe the components of an atom.
- Define molecule, element and compound.
- Describe static charges and electromotive force.
- List sources of electromotive force.
- Describe the characteristics of conductors, insulators and semiconductors.
- Define voltage, current and resistance.
- Describe alternating current (ac) and direct current (dc) listing sources and applications of each.
- Describe the characteristics of a simple electric circuit.
- State and perform calculations using Ohm's Law.

4. *Analyze simple series and parallel circuits with a direct current supply.*

Potential Elements of the Performance:

- Describe characteristics and applications of series circuits.
- Use Ohm's Law to solve for current, voltages and resistances in series circuits.
- Describe characteristics and applications of parallel circuits.
- Use Ohm's Law to solve for voltage, currents and resistances in parallel circuits.
- Describe applications of series-parallel circuits.

5. *Identify, select and use electrical test instruments safely.*

Potential Elements of the Performance:

- Describe how voltage is measured in an electric circuit and how the type (ac or dc) and magnitude of the voltage affects the type of meter used, how the meter is used and how the meter is set up.
- Describe how current is measured in an electric circuit and how the type (ac or dc) and magnitude of the current affects the type of meter used, how the meter is used and how the meter is set up.
- Describe how resistance of components and circuits is measured.
- Describe how insulation of electrical components and circuits is tested and how the test equipment can differ from a standard ohm-meter.
- Describe the consequences of incorrectly connecting or applying various electrical test instruments.

6. *Describe the principles of grounding as it pertains to safety.*

Potential Elements of the Performance:

- Describe how electrical systems are grounded.
- Define bonding.
- Describe how grounding and bonding are related and how they differ.
- Describe how grounding and bonding assist the operation of protective devices such as fuses and circuit breakers.
- Describe how grounding and bonding reduce the risk and severity of electric shock.

III. TOPICS:

1. Electrical Safety Codes.
2. Fuses, circuit breakers and isolating switches.
3. Atomic theory and electricity.
4. Series and parallel circuits.
5. Electrical test instruments.
6. Grounding of electrical systems.

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

The instructor will provide hand-outs and students are expected to take notes during lectures..

V. EVALUATION PROCESS/GRADING SYSTEM:

2 or 3 tests: 100%

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%	
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.