SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE:	INSTALLATION METHODS – LEVEL II		
CODE NO. :	ELR724	**SEMESTER:**	Intermediate Level
PROGRAM:	Construction & Maintenance Electrician – Intermediate Apprenticeship		
AUTHOR:	Juhani (John) Paloniemi		
DATE:	April 2017	**PREVIOUS OUTLINE DATED:**	October 2016
APPROVED:	*"Corey Meunier"* **CHAIR**		April 2017 **DATE**
TOTAL CREDITS:	THREE		
PREREQUISITE(S):			
HOURS/WEEK:	THREE		

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

I. COURSE DESCRIPTION:

This lab-based course runs concurrently with and supports theory covered in Electrical Theory, Level II. Students will connect and test direct current (DC) motors and generators, single phase and three phase squirrel cage induction motors and associated control circuitry. Alternating current RLC circuits will also be tested in the lab.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. Connect and test various DC machine configurations.

Potential Elements of the Performance

- Identify the mechanical parts, windings and wiring connections of DC machines.
- Draw schematics and demonstrate wiring, starting, and control methods of series, shunt and compound DC motors.
- Demonstrate methods for forward-reverse control of DC motors.
- Explain and demonstrate reduced voltage starting techniques for DC motors.
- Demonstrate dynamic braking to illustrate principles of Counter Electromotive Force
- Use voltmeters and ammeters to determine torque and load characteristics of DC machines.

2. Connect and test single phase and three phase squirrel cage induction motors.

Potential Elements of the Performance:

- Identify the mechanical parts, windings, and wiring connections for single- and three-phase squirrel cage induction motors (SCIM).
- Draw schematics and demonstrate manual and magnetic across-the-line starting techniques for single- and three-phase squirrel cage induction motors.
- Draw schematics and demonstrate methods of jogging and plugging control of three-phase squirrel cage induction motors.
- Demonstrate methods for forward and reverse control of single- and three-phase squirrel cage induction motors using push buttons, selector switches, limit switches, pilot lamps, and related devices.

- Draw schematic circuit diagrams and demonstrate the control of a Single Phase Capacitor Start Dual Voltage Motor with a reversing drum switch and manual starter.
- Draw schematic circuit diagrams and demonstrate push-button control of a Single Phase Capacitor Start Dual Voltage Motor with a reversing magnetic starter.
- Connect, test, and describe the characteristics of RCL circuits.
- State the procedures for installing and aligning belt driven motors.

3. Use test equipment to analyze alternating current RLC circuits.

Potential Elements of the Performance:

- Connect RLC circuits and measure current and voltages using multimeters and oscilloscopes.
- Perform calculations to confirm lab measurements.

III. TOPICS:

1. Direct Current Machines
2. Single Phase and Three Phase Squirrel Cage Induction Motor
3. Motor Control
4. RLC Circuits

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Canadian Electrical Code, Part 1 2009 (it is recommended the students purchase the Ontario Electrical Safety Code 2009 since it contains the Canadian Electrical Code as well as supplements relevant to working in Ontario).

REFERENCES:

Industrial Motor Control (Lab Manual) by Herman
ISBN 0-8273-8642-7

Industrial Motor Control (Text) by Herman & Alerich
ISBN 0-8273-8640-0

Electric Motor Control by Herman & Alerich
ISBN 0-7668-6164-3

Safety glasses, rubber insulating gloves with leather protectors and hand tools are required.

V. EVALUATION PROCESS/GRADING SYSTEM:

Course grade will be based primarily on lab reports. Students must attend and actively participate in their scheduled lab classes in order to submit associated reports. Late arrival or leaving early without the instructor's permission will be considered as missing the class. Students must bring hand tools and safety glasses to all classes.

Lab Reports:	**80%**
Tests (1 or 2 practical or theory tests, time permitting)	**20%**

See Special Notes.

The following semester grades will be assigned to students:

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:

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.

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

If a student misses a test/lab 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 or lab sitting. If this procedure is not followed the student will receive a mark of zero on the test/lab with no make-up option. Students may not submit lab reports for labs in which they were not in continuous attendance. Lab reports not submitted by the assigned deadline will receive a grade of 0.

Other:

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

VII. COURSE OUTLINE ADDENDUM:

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