SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

Sault College

COURSE OUTLINE

COURSE TITLE: INSTALLATION METHODS, LEVEL II

CODE NO. : ELR 724 **SEMESTER:** TWO

PROGRAM: CONSTRUCTION & MAINTENANCE ELECTRICIAN APPRENTICESHIP

AUTHOR:

DATE: 12/2004 **PREVIOUS OUTLINE DATED:** N/A

APPROVED:

_____ _____

DEAN **DATE**

TOTAL CREDITS: 3

PREREQUISITE(S): NONE

HOURS/WEEK: 3

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For additional information, please contact Colin Kirkwood, Dean, School of Technology, Skilled Trades and Natural Resources, (705) 759-2554, Ext. 688

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 be 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 Motors
3. RLC Circuits

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Ontario Electrical safety Code, 23rd Edition/2002
ISBN # 1-55324-570-9

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 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 to 100%
Practical Tests: 0 to 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:

Special Needs:
If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your instructor and/or the Special Needs office. Visit Room E1204 or call Extension 493 so that support services can be arranged for you.

Retention of course outlines:
It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Plagiarism:
Students should refer to the definition of “academic dishonesty” in *Student Rights and Responsibilities*. Students who engage in “academic dishonesty” will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Course outline amendments:
The Professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

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

Students will not be permitted in the lab without safety glasses and hand tools. This is a hands on course and students must be prepared to safely and actively participate.

VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

VIII. DIRECT CREDIT TRANSFERS:

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.

IX LAB REQUIREMENTS:

1. All lab reports are to be computer generated. Hand written reports will not be accepted. Circuit diagrams may be neatly hand drawn.
2. All lab reports are to include a title page with the following information:

- Lab title and number
- Due date
- Date submitted
- Course number
- Names of group members
- Instructor's name

3. Lab reports are to include all procedures and observations listed in the order they were performed/taken and numbered to match the lab handout.
4. One lab report submission per group. Maximum 2 members per group.
5. Lab reports submitted with grammatical and/or spelling errors will receive a grade of 0. Word processors have spell check, it is expected students will use it.
6. Lab reports are due at the beginning of class 1 week after the scheduled period in which it was done. Late submissions will receive a grade of 0.
7. Students are not permitted to work on live equipment outside of regular class time. If a student misses all or part of a lab class he/she will not be permitted to submit the corresponding lab report.
8. Students must supply their own hand tools and safety glasses. Students will not be permitted in the lab without safety glasses and must wear the safety glasses whenever working on or around live equipment. Students must never work alone in the lab. Unsafe work habits will not be tolerated.