## SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

## SAULT STE. MARIE, ONTARIO


Sault College

# COURSE OUTLINE

**COURSE TITLE:** ELECTRICAL THEORY 2

**CODE NO. :** ELR720 **SEMESTER:**

**PROGRAM:** CONSTRUCTION AND MAINTENANCE ELECTRICIAN

**AUTHOR:** DOUGLAS FAGGETTER

**DATE:** OCT 2005 **PREVIOUS OUTLINE DATED:**

**APPROVED:**

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**DEAN** **DATE**

**TOTAL CREDITS:**

**PREREQUISITE(S):**

**HOURS/WEEK:** 6

**I. COURSE DESCRIPTION:**

A course covering the topics of magnetism, DC machines and AC circuit theory

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

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

1. Describe magnetic flux and flux density

2. Solve problems associated with magnetic energy, including magnetic potential difference, flux density, reluctance, permeance, and permeability

3. List and explain the factors that affect the magnitude and direction of induced EMF in single conductors and in coils

4. Describe factors which affect inductance and perform related calculations

5. State Fleming's hand rules

6. State and apply Lenz's law

7. Describe the creation and effects of eddy currents

8. Describe the construction, operation and characteristics of Permanent Magnet, separately excited, shunt , series and compound (cumulative and differential) DC motors and generators

9. Draw connection diagrams for all types of DC motors and generators

10. Describe a sine wave, calculate RMS average, maximum and instantaneous values

11. Explain and calculate frequency, electrical and mechanical degrees

12. Interpret and calculate phasors, vectors, and vector diagrams

13. Describe the effects of alternating voltage and current in a resistive device

14. Describe inductance, self inductance and characteristics of a coil connected to a DC source

15. Describe the characteristics of a coil connected to an AC source

16. Calculate inductive reactance, voltage, current and power of an inductive circuit

17. Describe capacitance and the characteristics of a capacitor connected to a DC source

18. Describe the characteristics of a capacitor connected to an AC source

19. Calculate the capacitive reactance, voltage, current, power and phase relationships of a capacitive circuit

20. Calculate the values for RL/RC/RLC series circuits

21. Describe and calculate resonant circuits

22. Describe and calculate resonant circuits and phase relations

23. Explain and calculate RL/RC parallel circuits

24. Label, describe and calculate values for RLC parallel circuits

25. Describe the method for testing RLC parallel circuits

26. Explain and calculate RLC parallel circuits

27. Explain and calculate the efficiency of AC loads as related to power factor correction

28. Explain the effects of power factor correction

29. Calculate power factor correction for single-phase loads

30. Describe the principles of operation of various types of single phase transformers

31. Determine and perform calculations involving turns/voltage/current ratios for single phase transformers

## III. TOPICS:

1. Magnetism
2. Magnetic Induction
3. Basic Trigonometry and Vectors
4. Alternating Current (AC)
5. Inductance in AC circuits
6. Resistive-Inductive Series Circuits
7. Resistive-Inductive Parallel Circuits
8. Capacitor
9. Capacitor in AC Circuits
10. Resistive-Capacitive Series Circuits
11. Resistive-Capacitive Parallel Circuits
12. Resistive-Inductive-Capacitive Series Circuits
13. Resistive-Inductive-Capacitive Parallel Circuits
14. Single Phase Transformers
15. DC Generators
16. DC Motors

## IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

**Delmar's Standard Textbook of Electricity**
**By Stephen L. Herman**

## V. EVALUATION PROCESS/GRADING SYSTEM:

Theory 100%

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 professor and/or the Special Needs office. Visit Room E1101 or call Extension 703 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.

<*include any other special notes appropriate to your course*>

## 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.