

# SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



Sault College

## COURSE OUTLINE

Course Title : **Electrical Fundamentals**

Course No.: **ELR 1040**

Program: **Aviation ( Flight )**

Semester: **Four**

Author(s): **Alan Gooderham**

Date: August 2002

Previous

Outline Dated: August 2001

Approved:

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Dean

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Date

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*For additional information, please contact Rick Wing, Dean, School of Trades & Technology, (705) 759-2554, Ext. 642.*

**Course Name: Electrical Fundamentals**

**Course No.: ELR1040**

**TOTAL CREDITS: 3**

**PREREQUISITES: None**

**COURSE LENGTH: 15 weeks**

**TOTAL CREDIT HOURS: 45 hrs.**

## **I. COURSE DESCRIPTION**

An introductory course designed to give an overview of terms, devices, symbols and analysis techniques used in DC circuits. Topics include series, parallel and series-parallel DC circuit analysis. Other topics include an introduction to magnetism and magnetic devices, inductors and capacitors and their principle operation in DC circuits. An introduction to AC circuits, phasor diagrams and RLC circuit analysis basics completes the course.

## **II. TOPICS TO BE COVERED:**

1. Definition of voltage, current, resistance, sources, symbols
2. Ohm's Law
3. Series Circuits, Kirchhoff's Laws, Real vs. Ideal Circuits
4. Energy and Power, Efficiency
5. Parallel Circuits, Conductance
6. Series-Parallel Circuits
7. Circuit Theorems, Thevenin's, Max Power Transfer, Superposition
8. Magnetics, materials and circuits, Right Hand Rule, Motor/Generator Action
9. Inductors, Series and Parallel, Mutual Inductance, energy storage, Transformer Introduction
10. Capacitors, Series and Parallel, energy stored

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11. Inductor-Resistor Circuits, Time Constants, Instantaneous Values of Current and Voltage, Back emf
12. Capacitor-Resistor Circuits, Time Constants, Instantaneous Values of Current and Voltage, Back emf
13. AC fundamentals
14. RLC circuits, phasors and power factor correction

### **III. LEARNING OUTCOMES AND ELEMENTS OF PERFORMANCE:**

#### **A. Learning Outcomes:**

Upon successful completion of this course the student will be able to:

1. Analyse fundamental DC Circuits
2. Use a number of Theorems to analyse complex DC Circuits
3. Describe basic parts and operation of transformers and DC machines
4. Analyse RL and RC , DC circuits
5. Analyse RLC , AC circuits using phasors

#### **B. Learning Outcomes with Elements of Performance:**

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

1. Analyse Series, Parallel and Series-Parallel DC circuits containing voltage and current sources and resistors, to determine individual voltage, current and power values.

#### **Potential elements of the performance:**

- Complete mathematical questions from text and assignments
  - Choice and use of network Theorems to aid in analysis
  - Completion of test
2. Analyse magnetic properties of circuits and devices
    - Determine the direction of magnetic flux present as a result of DC current flow in a conductor

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- Determine the direction of magnetic flux present as a result of DC current flow in a coil
  - Determine the direction of rotation of a simple dc motor
  - Determine the direction of current flow in a simple dc generator
  - Completion of dc machine diagrams showing flux fields, main fields and rotation
  - Complete test questions
3. Analyse a DC circuit containing inductors or capacitors and resistors, to determine charge and discharge characteristic values

**Potential elements of the performance:**

- Completion of RL and RC circuit questions regarding time constants
  - Completion of RL and RC circuit questions requiring the solution of the time for threshold voltage or current achievement
  - Completion of test
4. Analyse an AC circuit containing inductors and capacitors, to determine total impedance, current, phase angles and power factor

**Potential elements of the performance:**

- Completion of AC sinewave characteristics questions
- Completion of impedance calculations in AC circuits
- Current and voltage phase angle calculations
- Power factor correction questions in parallel AC circuits

**IV. REQUIRED STUDENT RESOURCES:**

- Electric Circuits Fundamentals, 5th ed. , by Floyd

**V. METHODS OF EVALUATION:**

The following Grading System will be used:

A+ = 90% - 100%

A = 80% - 89%

B = 70% - 79%

C = 60% - 69%

R = less than 60% (Repeat Course)

X = Temporary Grade as per College Policy

**Three Tests @ 33.33 % each, for : TOTAL 100%**

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**Surprise Quiz's may be given for a maximum of 5% of the final grade and are attributed toward the next test percentage value.**

#### **VI. SPECIAL NOTES:**

1. The Instructor reserves the right to modify the course as is deemed necessary to meet the needs of the students.
2. Students with special needs (Physical Limitations, Visual/Hearing Impairments etc. ) are encouraged to discuss confidentially, required accommodations with the instructor and/or contact the Special Needs Office, Room E1204, Extension 493, 717 or 491.
3. If a student misses a test or surprise quiz ( maximum 5% of final grade ) without contacting the instructor, the Dean's office or the switchboard prior to the test or quiz, a mark of zero will be granted without a re-write option. No re-writes will be granted for students completing a test.

#### **VII. PRIOR LEARNING ASSESSMENT:**

Students who wish to apply for advanced credit in this course, should consult with the Professor.