

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**



Sault College

**COURSE OUTLINE**

**COURSE TITLE:** Electrical Fundamentals

**CODE NO. :** ELR 104

**SEMESTER:** 2

**PROGRAM:** Aviation Flight

**AUTHOR:** A. Gooderham

**DATE:** Jan 2005

**PREVIOUS OUTLINE DATED:** Jan  
2004

**APPROVED:**

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**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 & Natural Resources  
(705) 759-2554, Ext.688*

- 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. LEARNING OUTCOMES AND ELEMENTS OF THE 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  
Potential Elements of the Performance:
  - Determine the direction of magnetic flux present as a result of DC current flow in a conductor
  - 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

**III. TOPICS:**

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
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

**IV. REQUIRED RESOURCES/TEXTS/MATERIALS:**

**Electronics, A Complete Course, 2nd ed. , by Cook**

**V. EVALUATION PROCESS/GRADING SYSTEM:**

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

**NOTES:** 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.

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

**No rewrites are given for any test attempted.**

The following semester grades will be assigned to students in all credit courses.			
	<b>Grade</b>	<b>Definition</b>	<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:

### 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, 717, or 491 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.

**VII. PRIOR LEARNING ASSESSMENT:**

Students who wish to apply for advanced credit in the course should consult the professor.

**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.