

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**



**SAULT  
COLLEGE**

**COURSE OUTLINE**

**COURSE TITLE:** Electrical Fundamentals

**CODE NO. :** ELR 104

**SEMESTER:** Two

**PROGRAM:** Aviation Technology - Flight

**AUTHOR:** Bazlur Rasheed, Robin Braidon  
**PROFESSOR:** Bazlur Rasheed

**DATE:** Jan. 2015

**PREVIOUS OUTLINE DATED:** Jan. 2014

**APPROVED:**

Dec ' 16

*"Corey Meunier"*

**CHAIR**

**DATE**

**TOTAL CREDITS:** THREE

**PREREQUISITE(S):** None

**HOURS/WEEK:** THREE

**Copyright ©2017 The Sault College of Applied Arts & Technology**  
*Reproduction of this document by any means, in whole or in part, without prior written permission of Sault College of Applied Arts & Technology is prohibited.*  
*For additional information, please contact Corey Meunier, Chair,*  
*School of the Environment, Technology & Business*  
*(705) 759-2554, Ext. 2610*

**I. COURSE DESCRIPTION:**

An introductory course designed to give an overview of terms, devices, symbols and analysis techniques used in DC circuits, as they relate to the Aviation Industry. 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. The course will be directed towards Aircraft systems, and all course material will be related to aircraft components, including Aircraft Batteries, Motors, Generators, and Power distribution, with a focus on reading, and understanding Aircraft General Electrical Systems Schematics, as found in any Aircraft Manual.

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

**5. Practical knowledge of Aircraft Electrical Systems, and basic ability to read and understand schematic drawings.**

Potential Elements of the Performance:

- Aircraft starters, generators, and related control circuits.
- Power Distribution Systems
- Design and maintenance of aircraft electrical systems.

**III. TOPICS:**

1. Definition of voltage, current, resistance, sources, symbols
2. Ohm's Law
3. Series Circuits, Kirchhoff's Laws
4. Energy and Power, Efficiency
5. Parallel Circuits, Conductance
6. Series-Parallel Circuits
7. AC Fundamentals
8. RLC circuits, phasors and power factor correction
9. Magnetic materials and circuits, Right Hand Rule, Motor/Generator Action
10. Inductors, Series and Parallel, Mutual Inductance, energy storage, Transformer Introduction
11. Capacitors, Series and Parallel, energy stored
12. Inductor-Resistor Circuits, Time Constants, Instantaneous Values of Current and Voltage, Back emf
13. Capacitor-Resistor Circuits, Time Constants, Instantaneous Values of Current and Voltage, Back emf
14. Power Distribution Systems
15. Understanding Schematic Diagrams

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

- Aircraft Electricity and Electronics, Sixth Edition  
Thomas K. Eismin  
McGraw-Hill  
ISBN-10: 007179915X  
ISBN-13: 978-0071799157
- Internet Resources
- **Scientific Calculator**, similar to **Sharp EL-520W**

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

Final grade will be awarded based on the composite score of assignments, quizzes, and tests as follows:

Three Tests	75%
Quizzes	10%
Assignments	10%
Attendance	5%

(The percentages shown above may have to be adjusted to accurately evaluate student skills. Students will be notified of any changes made.)

The professor reserves the right to adjust the mark up or down 5% based on attendance, participation, leadership, creativity and whether there is an improving trend.

NOTES: If a student misses a test or surprise quiz without contacting the instructor prior to the test or quiz, a mark of zero will be granted without a re-write option.

A minimum of 80% attendance required in the lectures.

- Makeup Tests are at the discretion of the instructor and will be assigned a maximum grade of 50%.
- The professor reserves the right to adjust the number of tests, practical tests and quizzes based on unforeseen circumstances. The students will be given sufficient notice to any changes and the reasons thereof.
- A student who is absent for 3 or more times without any valid reason or effort to resolve the problem will result in action taken.

NOTE: If action is to be taken, it will range from marks being deducted to a maximum of removal from the course.

The following semester grades will be assigned to students:

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	90 – 100%	4.00
A	80 – 89%	3.00
B	70 - 79%	2.00
C	60 - 69%	1.00
D	50 – 59%	0.00
F (Fail)	49% and below	
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.

***It is the departmental policy that once the classroom door has been closed, the learning process has begun. Late arrivers will not be granted admission to the room.***

## VII. COURSE OUTLINE ADDENDUM:

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