

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



Sault College

COURSE OUTLINE

COURSE TITLE: AC Circuits and Machines
CODE NO. : ELR 109 **SEMESTER:** 2
PROGRAM: Electrical / Power Generation / Instrumentation Technician
AUTHOR: A. Gooderham
DATE: Jan 2009 **PREVIOUS OUTLINE DATED:** Jan 2008
APPROVED:

“Corey Meunier”	<hr style="width: 100px; margin: 0 auto;"/>
CHAIR	DATE

TOTAL CREDITS: 4
PREREQUISITE(S): ELR100 Electrical Fundamentals DC
HOURS/WEEK: 5

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For additional information, please contact Corey Meunier, Chair
School of Technology & Skilled Trades
(705) 759-2554, Ext. 2610

I. COURSE DESCRIPTION:

An analytical study of series and parallel, and series-parallel AC circuits, impedance networks, network theorems and poly-phase circuits. Fundamentals of DC circuit analysis in RC circuits is followed by AC analysis techniques in RL, RC and RLC circuits. An overview of the basic construction and operation of DC and AC machines and transformers completes the course content.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. Analyse a DC circuit containing capacitors and resistors, to determine charge and discharge characteristics

Potential Elements of the Performance:

- Completion of RC cct questions regarding time constants
- Completion of RC cct questions requiring the solution of the time for threshold voltage or current level achievement
- Completion of test

2. Determine the impedance and operation of single-phase AC circuits using phasors and complex math.

Potential Elements of the Performance:

- Completion of complex math questions including the j operator
- Completion of basic trigonometry questions
- Completion of polar and rectangular conversions
- Analysis of single-phase circuit operation using complex math, to find impedance(s), voltage and current values
- Complete formal test

3. Analyse a three-phase cct with respect to type (Delta or Wye) and solve for both line and phase voltages and currents.

Potential Elements of the Performance:

- Completion of three-phase cct questions regarding line and phase values
- Completion of three-phase cct questions having combinations of delta and wye generators and impedance loads
- Completion of three-phase transformer connections and values
- Completion of test

4. Analyse AC motor and generator characteristics, parts and power factor correction.

Potential Elements of the Performance:

- Completion of AC machine diagrams identifying parts of the machine
- Description of AC machine operation and characteristics
- Completion of power factor correction calculations and relationships
- Completion of test

III. TOPICS:

1. Capacitance
2. RC, DC Circuits
3. AC fundamentals (review)
4. Phasors & Complex Numbers
5. RL , RC & RLC AC Circuits, Resonance & Filters
6. Series-Parallel AC Circuits
7. Power in AC Circuits
8. AC Networks
9. Three-Phase AC Systems
10. Transformers
11. AC Motor/Generators
12. Three-Phase AC Motors (if time permits)

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Principles of Electric Circuits , 8th Ed. , by Floyd

V. EVALUATION PROCESS/GRADING SYSTEM:

**Three Tests @ 33 % each + Review Assignment @ 1%
= 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.

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:

Disability Services:

If you are a student with a disability (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Disability Services office. Visit Room E1101 or call Extension 2703 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.

Communication:

The College considers **WebCT/LMS** as the primary channel of communication for each course. Regularly checking this software platform is critical as it will keep you directly connected with faculty and current course information. Success in this course may be directly related to your willingness to take advantage of the **Learning Management System** communication tool.

Plagiarism:

Students should refer to the definition of “academic dishonesty” in *Student Code of Conduct*. 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 advance credit transfer (advanced standing) should obtain an Application for Advance Credit from the program coordinator (or the course coordinator regarding a general education transfer request) or academic assistant. Students will be required to provide an unofficial transcript and course outline related to the course in question.

Credit for prior learning will also be given upon successful completion of a challenge exam or portfolio.