



## COURSE OUTLINE: ELR109 - AC CIR ANAL & MACH

Prepared: A. Gooderham

Approved: Corey Meunier, Chair, Technology and Skilled Trades

|  |   |
|--|---|
| <b>Course Code: Title</b>  | ELR109: AC CIRCUIT ANALYSIS & MACHINES  |
| <b>Program Number: Name</b>  | 4026: ELECTRICAL TN-PROC<br>4029: ELECTRICAL TY-PROCES<br>4127: ELECTRICAL TN-TRADES  |
| <b>Department:</b>   | ELECT./INSTRUMENTATION PS   |
| <b>Semesters/Terms:</b>  | 19W   |
| <b>Course Description:</b>   | This course is an analytical study of series, parallel and series-parallel A.C. impedance networks, network theorems and polyphase circuits. Concurrently an introduction to A.C. and D.C. motors and generators together with their control methods is studied using complex math.   |
| <b>Total Credits:</b>  | 5   |
| <b>Hours/Week:</b>   | 5   |
| <b>Total Hours:</b>  | 75  |
| <b>Prerequisites:</b>  | ELR100  |
| <b>Corequisites:</b>   | There are no co-requisites for this course.   |
| <b>This course is a pre-requisite for:</b>   | ELN213, ELN229, ELR215, ELR232, ELR251, ELR309  |
| <b>Vocational Learning Outcomes (VLO's) addressed in this course:</b><br><br>Please refer to program web page for a complete listing of program outcomes where applicable. | <b>4026 - ELECTRICAL TN-PROC</b><br>VLO 1 Interpret and produce electrical and electronics drawings including other related documents and graphics.<br>VLO 2 Analyze and solve routine technical problems related to electrical systems by applying mathematics and science principles.<br>VLO 6 Verify acceptable functionality and apply troubleshooting techniques for electrical and electronic circuits, components, equipment, and systems under the supervision of a qualified person.<br>VLO 8 Use computer skills and tools to solve routine electrical related problems.<br>VLO 13 Perform tasks in accordance with relevant legislation, policies, procedures, standards, regulations, and ethical principles.<br>VLO 16 Select electrical equipment, systems and components to fulfill the requirements and specifications under the supervision of a qualified person.<br><br><b>4029 - ELECTRICAL TY-PROCES</b><br>VLO 1 Analyze, interpret, and produce electrical and electronics drawings, technical reports including other related documents and graphics.<br>VLO 2 Analyze and solve complex technical problems related to electrical systems by applying mathematics and science principles.<br>VLO 6 Design, assemble, analyze, and troubleshoot electrical and electronic circuits, components, equipment and systems under the supervision of a qualified person. |



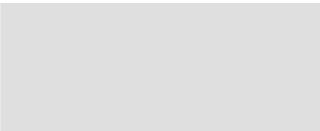
SAULT COLLEGE | 443 NORTHERN AVENUE | SAULT STE. MARIE, ON P6B 4J3, CANADA | 705-759-2554

|   |  |
|---|--|
|   | <p>VLO 8 Use computer skills and tools to solve a range of electrical related problems.</p> <p>VLO 13 Perform and monitor tasks in accordance with relevant legislation, policies, procedures, standards, regulations, and ethical principles.</p> <p>VLO 16 Select and recommend electrical equipment, systems and components to fulfill the requirements and specifications under the supervision of a qualified person.</p> <p><b>4127 - ELECTRICAL TN-TRADES</b></p> <p>VLO 1 Interpret and produce electrical and electronic drawings including other related documents and graphics.</p> <p>VLO 2 Analyze and solve routine technical problems related to electrical systems by applying mathematics and science principles.</p> <p>VLO 6 Verify acceptable functionality and apply troubleshooting techniques for electrical and electronic circuits, components, equipment, and systems under the supervision of a qualified person.</p> <p>VLO 8 Use computer skills and tools to solve routine electrical related problems.</p> <p>VLO 13 Perform tasks in accordance with relevant legislation, policies, procedures, standards, regulations, and ethical principles.</p> <p>VLO 16 Select electrical equipment, systems and components to fulfill the requirements and specifications under the supervision of a qualified person.</p> |
| <b>Essential Employability Skills (EES) addressed in this course:</b> | <p>EES 1 Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.</p> <p>EES 2 Respond to written, spoken, or visual messages in a manner that ensures effective communication.</p> <p>EES 3 Execute mathematical operations accurately.</p> <p>EES 4 Apply a systematic approach to solve problems.</p> <p>EES 5 Use a variety of thinking skills to anticipate and solve problems.</p> <p>EES 6 Locate, select, organize, and document information using appropriate technology and information systems.</p> <p>EES 7 Analyze, evaluate, and apply relevant information from a variety of sources.</p> <p>EES 8 Show respect for the diverse opinions, values, belief systems, and contributions of others.</p> <p>EES 9 Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals.</p> <p>EES 11 Take responsibility for ones own actions, decisions, and consequences.</p>  |
| <b>Course Evaluation:</b>   | Passing Grade: 50%, D  |
| <b>Other Course Evaluation &amp; Assessment Requirements:</b>         | <p>If a student misses a test or surprise quiz (maximum 5% of final grade) without contacting the instructor, the Deans office or the switchboard prior to the test or quiz, a mark of zero will be granted without a re-write option.</p> <p>Surprise Quizzes may be given for a maximum of 5% of the final grade and are attributed toward the next test percentage value.</p> <p>No rewrites are given for any test attempted.</p> <p>Grade</p>   |



|  |  |   |                         |
|--|--|---|-------------------------|
|  | Definition Grade Point Equivalent<br>A+ 90 - 100% 4.00<br>A 80 - 89%<br>B 70 - 79% 3.00<br>C 60 - 69% 2.00<br>D 50 - 59% 1.00<br>F (Fail)49% and below 0.00<br><br>CR (Credit) Credit for diploma requirements has been awarded.<br>S Satisfactory achievement in field /clinical placement or non-graded subject area.<br>U Unsatisfactory achievement in field/clinical placement or non-graded subject area.<br>X A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.<br>NR Grade not reported to Registrar's office.<br>W Student has withdrawn from the course without academic penalty. |   |                         |
| Books and Required Resources:            | Fundamentals of Electric Circuits by Bell<br>Publisher: Oxford Edition: 7<br>ISBN: 978-0-19-542524-6   |   |                         |
| Course Outcomes and Learning Objectives: | Course Outcome 1   | Learning Objectives for Course Outcome 1  |                         |
|  | 1. Analyze a DC circuit containing capacitors and resistors, to determine charge and discharge characteristics   | 1.1 Completion of RC cct questions regarding time constants<br>1.2 Completion of RC cct questions requiring the solution of the time for threshold voltage or current level achievement<br>1.3 Completion of test   |                         |
|  | Course Outcome 2   | Learning Objectives for Course Outcome 2  |                         |
|  | 2. Determine the impedance and operation of single-phase AC circuits using phasors and complex math.   | 2.1 Completion of complex math questions including the j operator<br>2.2 Completion of basic trigonometry questions<br>2.3 Completion of polar and rectangular conversions<br>2.4 Analysis of single-phase circuit operation using complex math, to find impedance(s), voltage and current values<br>2.5 Completion of test   |                         |
|  | Course Outcome 3   | Learning Objectives for Course Outcome 3  |                         |
|  | 3. Analyze a three-phase cct with respect to type (Delta or Wye) and solve for both line and phase voltages and currents.  | 3.1 Completion of three-phase cct questions regarding line and phase values<br>3.2 Completion of three-phase cct questions having combinations of delta and wye generators and impedance loads<br>3.3 Completion of three-phase transformer connections and values<br>3.4 Analysis of ideal vs real transformer model calculations, including no-load vs full-load phasor diagrams using R, L and C loads<br>3.5 Investigate the characteristics of 3-phase synchronous AC generators<br>3.6 Completion of test |                         |
| Evaluation Process and Grading System:   | Evaluation Type  | Evaluation Weight   | Course Outcome Assessed |
|  | Review Assignment  | 1%  |                         |

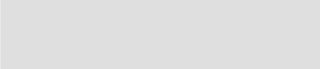




|        |     |  |
|--------|-----|--|
| Test 1 | 33% |  |
| Test 2 | 33% |  |
| Test 3 | 33% |  |

**Date:**

August 22, 2018



Please refer to the course outline addendum on the Learning Management System for further information.

