# COURSE OUTLINE: ELR109 - AC CIR ANAL & MACH

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Approved: Corey Meunier, Chair, Technology and Skilled Trades

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| **Course Code: Title** | ELR109: AC CIRCUIT ANALYSIS & MACHINES |
| **Program Number: Name** | 4026: ELECTRICAL TN-PROC<br>4029: ELECTRICAL TY-PROCES<br>4127: ELECTRICAL TN-TRADES |
| **Department:** | ELECT./INSTRUMENTATION PS |
| **Semesters/Terms:** | 22W |
| **Course Description:** | The student will apply network theorems to the analysis of series, parallel and series-parallel A.C. impedance networks and polyphase circuits. The student will apply concepts of complex math in analyzing A.C. and D.C. motors and generators, together with their control methods. |
| **Total Credits:** | 5 |
| **Hours/Week:** | 5 |
| **Total Hours:** | 75 |
| **Prerequisites:** | ELR100 |
| **Corequisites:** | There are no co-requisites for this course. |
| **This course is a pre-requisite for:** | ELN213, ELN229, ELR215, ELR232, ELR251, ELR309 |
| **Vocational Learning Outcomes (VLO's) addressed in this course:**<br><br>**Please refer to program web page for a complete listing of program outcomes where applicable.** | **4026 - ELECTRICAL TN-PROC**<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>**4029 - ELECTRICAL TY-PROCES**<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. |

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2021-2022 academic year.

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| | VLO 6 Design, assemble, analyze, and troubleshoot 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 a range of electrical related problems.<br>VLO 13 Perform and monitor tasks in accordance with relevant legislation, policies, procedures, standards, regulations, and ethical principles.<br>VLO 16 Select and recommend electrical equipment, systems and components to fulfill the requirements and specifications under the supervision of a qualified person.<br><br>**4127 - ELECTRICAL TN-TRADES**<br>VLO 1 Interpret and produce electrical and electronic 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. |
| **Essential Employability Skills (EES) addressed in this course:** | 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.<br>EES 2 Respond to written, spoken, or visual messages in a manner that ensures effective communication.<br>EES 3 Execute mathematical operations accurately.<br>EES 4 Apply a systematic approach to solve problems.<br>EES 5 Use a variety of thinking skills to anticipate and solve problems.<br>EES 6 Locate, select, organize, and document information using appropriate technology and information systems.<br>EES 7 Analyze, evaluate, and apply relevant information from a variety of sources.<br>EES 8 Show respect for the diverse opinions, values, belief systems, and contributions of others.<br>EES 9 Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals.<br>EES 11 Take responsibility for ones own actions, decisions, and consequences. |
| **Course Evaluation:** | Passing Grade: 50%, D<br><br>A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation. |
| **Other Course Evaluation & Assessment Requirements:** | If a student misses a test or quiz, a mark of zero will be assigned with no re-write option. A test may be rescheduled in the event of a legitimate medical reason (doctor`s note required) or family emergency, if the student contacts the instructor, the Dean`s office, or the switchboard |

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prior to the test or quiz.

The student must achieve a passing grade (40/80) on the Tests portion of the final mark to pass the course.

Surprise Quizzes may be given for a maximum of 5% of the final grade.

Rewrites will not be allowed for any test attempted.

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.

**Books and Required Resources:**

Fundamentals of Electric Circuits by Bell
Publisher: Oxford Edition: 7
ISBN: 978-0-19-542524-6

**Course Outcomes and Learning Objectives:**

| **Course Outcome 1** | **Learning Objectives for Course Outcome 1** |
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| 1. Analyze a DC circuit containing capacitors and resistors, to determine charge and discharge characteristics | 1.1 Calculate time constants for RC circuits<br>1.2 Calculate time/voltage relationships in RC circuits<br>1.3 Calculate require component values to achieve desired time/voltage characteristics |
| **Course Outcome 2** | **Learning Objectives for Course Outcome 2** |
| 2. Explain operation, and calculate voltage, current and impedance for single-phase AC circuits using phasors and complex math. | 2.1 Perform calculations involving the j operator<br>2.2 Perform basic trigonometry calculations<br>2.3 Perform conversions between polar and rectangular forms<br>2.4 Analyze single-phase circuits using complex math to find impedance(s), voltage and current values |
| **Course Outcome 3** | **Learning Objectives for Course Outcome 3** |
| 3. Analyze three-phase circuits of both Delta and Wye configurations, and solve for line and phase voltages and currents. | 3.1 Perform calculations of line and phase values for three-phase circuits<br>3.2 Calculate circuit values for three-phase circuits involving combinations of delta and wye sources and loads<br>3.3 Draw three-phase transformer connections and calculate |

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| | values<br>3.4 Analyze ideal and real transformer models, including no-load and full-load phasor diagrams using R, L and C loads<br>3.5 Describe the characteristics of 3-phase synchronous AC generators |

**Evaluation Process and Grading System:**

| Evaluation Type | Evaluation Weight |
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| Assignments and Quizzes | 19% |
| Review Assignment | 1% |
| Tests (3 evenly weighted) | 80% |

**Date:** July 30, 2021

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