



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

Prepared: A. Gooderham, J. Paloniemi, J. Oja

Approved: Corey Meunier, Dean, Technology, Trades, and Apprenticeship

<b>Course Code: Title</b>	ELR109: AC CIRCUIT ANALYSIS & MACHINES
<b>Program Number: Name</b>	4026: ELECTRICAL TN-PROC 4029: ELECTRICAL TY-PROCES 4127: ELECTRICAL TN-TRADES
<b>Department:</b>	ELECT./INSTRUMENTATION PS
<b>Academic Year:</b>	2024-2025
<b>Course Description:</b>	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.
<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>	<p><b>4026 - ELECTRICAL TN-PROC</b></p> <p>VLO 1 Interpret and produce electrical and electronics 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> <p><b>4029 - ELECTRICAL TY-PROCES</b></p> <p>VLO 1 Analyze, interpret, and produce electrical and electronics drawings, technical reports including other related documents and graphics.</p> <p>VLO 2 Analyze and solve complex technical problems related to electrical systems by applying mathematics and science principles.</p>



- VLO 6 Design, assemble, analyze, and troubleshoot electrical and electronic circuits, components, equipment and systems under the supervision of a qualified person.
- VLO 8 Use computer skills and tools to solve a range of electrical related problems.
- VLO 13 Perform and monitor tasks in accordance with relevant legislation, policies, procedures, standards, regulations, and ethical principles.
- VLO 16 Select and recommend electrical equipment, systems and components to fulfill the requirements and specifications under the supervision of a qualified person.

#### **4127 - ELECTRICAL TN-TRADES**

- VLO 1 Interpret and produce electrical and electronic drawings including other related documents and graphics.
- VLO 2 Analyze and solve routine technical problems related to electrical systems by applying mathematics and science principles.
- 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.
- VLO 8 Use computer skills and tools to solve routine electrical related problems.
- VLO 13 Perform tasks in accordance with relevant legislation, policies, procedures, standards, regulations, and ethical principles.
- 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.
- EES 2 Respond to written, spoken, or visual messages in a manner that ensures effective communication.
- EES 3 Execute mathematical operations accurately.
- EES 4 Apply a systematic approach to solve problems.
- EES 5 Use a variety of thinking skills to anticipate and solve problems.
- EES 6 Locate, select, organize, and document information using appropriate technology and information systems.
- EES 7 Analyze, evaluate, and apply relevant information from a variety of sources.
- EES 8 Show respect for the diverse opinions, values, belief systems, and contributions of others.
- EES 9 Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals.
- EES 11 Take responsibility for ones own actions, decisions, and consequences.

#### **Course Evaluation:**

Passing Grade: 50%, D

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



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
1. Analyze a DC circuit containing capacitors and resistors, to determine charge and discharge characteristics	1.1 Calculate time constants for RC circuits 1.2 Calculate time/voltage relationships in RC circuits 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 2.2 Perform basic trigonometry calculations 2.3 Perform conversions between polar and rectangular forms 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 3.2 Calculate circuit values for three-phase circuits involving combinations of delta and wye sources and loads 3.3 Draw three-phase transformer connections and calculate



values

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

**Evaluation Process and Grading System:**

<b>Evaluation Type</b>	<b>Evaluation Weight</b>
Assignments and Quizzes	25%
Tests (3 evenly weighted)	75%

**Date:**

January 8, 2025

**Addendum:**

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

