



## COURSE OUTLINE: ELR309 - NUMERIC & NETWK ANAL

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Approved: Corey Meunier, Chair, Technology and Skilled Trades

<b>Course Code: Title</b>	ELR309: NUMERICAL AND NETWORK ANALYSIS
<b>Program Number: Name</b>	4029: ELECTRICAL TY-PROCES
<b>Department:</b>	ELECT./INSTRUMENTATION PS
<b>Semesters/Terms:</b>	20W
<b>Course Description:</b>	An in-depth study of A.C. and D.C. circuits using network theorems, differential equations and Laplace transforms.
<b>Total Credits:</b>	7
<b>Hours/Week:</b>	5
<b>Total Hours:</b>	75
<b>Prerequisites:</b>	ELR109, MTH577
<b>Corequisites:</b>	There are no co-requisites for this course.
<b>Vocational Learning Outcomes (VLO's) addressed in this course:</b>  Please refer to program web page for a complete listing of program outcomes where applicable.	<b>4029 - ELECTRICAL TY-PROCES</b>  VLO 2     Analyze and solve complex technical problems related to electrical systems by applying mathematics and science principles.
<b>Essential Employability Skills (EES) addressed in this course:</b>	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.
<b>Course Evaluation:</b>	Passing Grade: 50%, D
<b>Other Course Evaluation &amp; Assessment Requirements:</b>	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 W Student has withdrawn from the course without academic penalty.



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**Books and Required Resources:**

Network Analysis for ELR309 by Doug Faggetter  
Publisher: AK Graphics - Sault College

**Course Outcomes and Learning Objectives:**

Course Outcome 1	Learning Objectives for Course Outcome 1
1. Analyze a resistive circuit using Nodal analysis and Mesh analysis.	1.1 Using a matrix solution of the network equations, determine the voltages and currents in the elements of a resistive circuit.
Course Outcome 2	Learning Objectives for Course Outcome 2
2. Analyze First-Order circuits using differential equations.	2.1 Construct and solve a differential equation for a network with resistors and capacitors. 2.2 Construct and solve a differential equation for a network with resistors and inductors.
Course Outcome 3	Learning Objectives for Course Outcome 3
3. Analyze Second-Order circuits using differential equations.	Construct and solve a differential equation for a Second-Order circuit with resistors, inductors and capacitors. 3.1 Apply the appropriate analysis techniques to Second-Order circuits with excitation by: 1. initial conditions, 2. a source, and 3. initial conditions and a source. 3.2 Find complementary, particular and complete solutions. 3.3 Utilize the appropriate solution forms for the under-damped case, critically-damped case and over-damped case. 3.4 Correlate the regions of a root-locus diagram to degree of damping, and the values of R, for a series circuit and a parallel circuit.
Course Outcome 4	Learning Objectives for Course Outcome 4
4. Analyze First-Order and Second-Order circuits using Laplace transforms.	4.1 Define the Laplace transform. 4.2 Derive, from first principles, the Laplace transforms of basic time-based functions. 4.3 Apply Laplace transforms to a circuit's differential equation. 4.4 Solve for the desired variable in the Laplace domain. 4.5 Re-transform solutions from the Laplace domain into the time domain. 4.6 Analyze a circuit using the network transformation technique when appropriate.

**Evaluation Process and Grading System:**

Evaluation Type	Evaluation Weight
Tests (4 evenly weighted)	100%

**Date:**

August 29, 2019

**Addendum:**

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

