COURSE OUTLINE: ELR309 - NUMERIC & NETWK ANAL

Prepared: Juhani Paloniemi
Approved: David Orazietti, Dean, Environment, Technology, and Business

Course Code: Title	ELR309: NUMERICAL AND NETWORK ANALYSIS
Program Number: Name	4029: ELECTRICAL TY-PROCES
Department:	ELECT./INSTRUMENTATION PS
Semesters/Terms:	21W
Course Description:	An in-depth study of A.C. and D.C. circuits using network theorems, differential equations and Laplace transforms.
Total Credits:	7
Hours/Week:	5
Total Hours:	75
Prerequisites:	ELR109, MTH577
Corequisites:	There are no co-requisites for this course.
Vocational Learning Outcomes (VLO's) addressed in this course: **Please refer to program web page for a complete listing of program outcomes where applicable.**	**4029 - ELECTRICAL TY-PROCES** VLO 2 Analyze and solve complex technical problems related to electrical systems by applying mathematics and science principles.
Essential Employability Skills (EES) addressed in this course:	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.
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:	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.

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 2020-2021 academic year.

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W Student has withdrawn from the course without academic penalty.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:

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: September 2, 2020

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

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