

NEW YORK CITY COLLEGE OF TECHNOLOGY
The City University of New York

DEPARTMENT: Electrical and Telecommunications
Engineering Technology

**SUBJECT CODE
AND TITLE:** EET2120/ET342 Advanced Circuit Analysis

COURSE DESCRIPTION: Transient response of RL, RC, and RLC circuits utilizing both classical and Laplace transform techniques. Laboratory exercises and computer simulation software included.

PREREQUISITE: EET1222/ET242
COREQUISITE: MAT 1475/MA475

TEXTBOOK: Network Analysis with Applications
By Stanley, Publisher Prentice Hall 2003

**COURSE OBJECTIVES/
COURSE OUTCOMES:** Upon completion of this course the student will be able to:
1. Analyze and solve first order RL & RC circuits via classical differential equation methods. (ABET Criteria 2a, 2b, 2f, 2k).
2. Analyze and solve first order RL and RC using Laplace Transforms. (ABET Criteria 2a, 2b, 2f, 2k)
3. Analyze and solve second order RLC circuits using Laplace Transforms (ABET Criteria 2a, 2b, 2f, 2k).
4. Analyze and determine the stability of first order and second order systems. (ABET Criteria 2a, 2b, 2d, 2f, 2k)
5. Analyze and solve system responses using appropriate software.

TOPICS: Topics include dc, pulse, and ac analysis of first order and second order systems when solving the transient and steady state responses of a given network. Graphical plotting, analysis of findings, and stability criteria are discussed.

CLASS HOURS: 2

LAB HOURS: 2

CREDITS: 3

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October 2006

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ET2120/ET242
Experiments

Week

1-2	Review of Differential Calculus
3-4	Review of Integral Calculus
5-6	Transient Behavior of RC and RL Circuits
7	EWB simulation and graphy techniques of first order networks
8	Midterm
9-10	Steady State and Transient behavior of second outer networks
11-12	Computer simulation and graphy techniques of second order systems
12-14	Project
15	Final Examination

EVALUATION:

Exam #1	20%
Exam #2	20%
Lab Report	20%
Final Exam	40%

<u>Letter Grade</u>	<u>Numerical Grade Ranges</u>	<u>Quality</u>
A	93-100	4.0
A-	90-92.9	3.7
B+	87-89.9	3.3
B	83-86.9	3.0
B-	80.82.9	2.7
C+	77-79.9	2.3
C	70-76.9	2.0
D	60-69.9	1.0
F	59.9 and below	0.0

WEEK	TOPIC	READING ASSIGNMENTS	PROBLEMS
1	<u>Orientation</u>		
2	<u>Differentiation</u> of functions such as sine, cosine, algebraic and exponential; graphical significance.	Lab Manual pages 2-9 Chapter 3, pages 125-133	Lab Manual Problems 1-10 Chapter 3:1,2
3	<u>Integration</u> Cover only the functions sine, cosine, indefinite integration using the table in the manual and definite integration as area under a curve.	Lab Manual pages 13-22 Chapter 3: pages 133-138	Lab Manual Problems 1-8 Chapter 3: 3, 4
4	<u>DC (Average) Value and RMS</u> Find values for repetitive waveforms Discuss the CUE initiative at City Tech.	Chapter 10, Pages 523-530	Chapter 10: 1, 2, 3, 4
5	<u>Capacitive and Inductive Transients</u> Given simple functions of time as inputs, develop voltage and Current equations	Chapter 3, pages 137-154	Chapter 3: 5-20, 31-33
6-7	<u>Initial and Final Values</u> In RL, RC, and RLC Circuits with DC inputs DC source. Develop current and voltage equations	Chapter 4, pages 203-251	Chapter 4: 1-8 Chapter 4: 9-12, 13-16, 18
8	<u>Laplace Transforms</u> of functions such as sine, cosine, algebraic, exponential and operations	Chapter 5, pages 267-278	Chapter 5: 1-10
9	<u>Inverse Laplace Transformation</u> Functions with first and second order roots.	Chapter 5, pages 278-292	Chapter 5: 11-20, 21-23, 25, 29, 33
10	<u>Circuit Analysis</u> Using Laplace Transforms – as applied to RL, RC, RLC circuits with DC, AC, and exponential sources. Do experiment No. 6	Chapter 6, pages 299-312	Chapter 6: 1,3, 6-8, 11-13
11	<u>First Order Circuits – Using Laplace transforms</u> Develop voltage/ current equations for circuits with arbitrary source inputs. Have students brainstorm and critique selected responses from the CUE assignment.	Chapter 6, pages 313-319	Chapter 6: 17-22, 24
12	<u>Second Order circuits – Using Laplace Transforms</u> , develop voltage/current equations for circuits with DC and AC sources. Discuss damped responses.	Chapter 6, pages 320-331	Chapter 6: 25-30
13-14	<u>Transfer Functions</u> Discuss pole-zero analysis as applied to types of response and stability. Include system analysis using transfer functions	Chapter 7, pages 347-373	Chapter 7: 1-6, 8, 9, 13-15, 17, 19, 20, 23
15	<u>Review and Final Exam</u>		