CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

ETE 310

COURSE OUTLINE

Course Information		**ABET Unit Classification** (4 Quarter Units)	
Department:	Engineering Technology	Math:	
Course Number:	ETE 310/310L	Basic Science:	
Course Title:	Applied Network Analysis	Engineering Topics:	4
Revision Date:	3/18/05	*Contains significant design content:*	Yes
Revised by:	Massoud Moussavi	Other:	
Compliant:	Catalog 2004/05	Curriculum Designation:	Required

I. Catalog Description

The analysis of electric in frequency and time domains employing Laplace transform method, including first and second order passive and active circuits. The circuit responses to a various signals, stability analysis of closed loop systems, Computer methods utilized. 3 lectures/problem-solving and 1 three-hour laboratory Prerequisites: ETE 210 and co-requisite MAT 132.

II. Prerequisites and Co-requisites

ETE 210/210L and MAT 132; Students are expected to have a good theoretical, analytical, and practical knowledge of first and second order passive networks including loop-equation, Thevenin, Norton, superposition, and Bode plot concepts and forms.

III. Textbook and/or other Required Material

William D. Stanley, Network Analysis with Applications, 4th Edition, Prentice Hall Pub. Co.
ISBN: 0-13-060246-9

IV. Course Objectives

Upon successful completion of this course, each student should be able to:

1. Understanding of Laplace Transform and Inverse Laplace Transform.
2. Understanding of behaviors of analog signals and their form in frequency domain.
3. Explain the differences of network analysis in time and frequency domain.
4. Analysis of first order passive and active networks in frequency domain.
5. Analysis of second order passive and active networks in frequency domain.
6. Understanding of transfer function, forced and natural responses, poles and zeros, and stability analysis of networks.
7. Understanding of frequency response and Bode plot.

V. Expanded Course Description

A. Expanded Description of the Course

1. Laplace Transform

Study of Laplace transforms and inverse Laplace transform function and its properties, analog networks in frequency domain using Laplace transform and T flip-flops, and study of their timing diagram. Synchronous and asynchronous sequential networks (2 weeks)

2. **Analog signals in frequency domain**
   Study of analog signals and their properties in frequency domain (1 week)

3. **First order network in frequency domain**
   Study of the first order passive and active network in frequency domain using Laplace transform, step, ramp, and sinusoidal responses in frequency and time domain using inverse Laplace transform. (2 weeks)

4. **Second order network in frequency domain**
   Study of the second order passive and active network in frequency domain using Laplace transform, step, ramp, and sinusoidal responses in frequency and time domain using inverse Laplace transform.(2 weeks)

5. **Transfer function and its properties**
   Characteristics and properties of transfer function, natural and forced responses, poles and zeros in s-plane, and stability analysis of analog networks in frequency domain. (2 weeks)

6. **Frequency response and Bode plot**
   Study of frequency response and Bode plot in frequency domain. (1 week)

B. Typical Laboratory Experiments

Lab 1. Build, analyze, test, and simulation of a first order passive RC network in frequency and time domains.

Lab 2. Build, analyze, test, and simulation of a first order passive RL network in frequency and time domains.

. Lab 3. Build, analyze, test, and simulation of a first order active low-pass filter in frequency and time domains.

Lab 4. Build, analyze, test, and simulation of a first order active high-pass filter I frequency and time domains.

Lab 5. Build, analyze, test, and simulation of a second order passive network in frequency and time domains.

Lab 6. Build, analyze, test, and simulation of a second order active network in frequency and time domains.

Lab project I. Build, analyze, and test an open loop network and simulate it using MATLAB.

Lab project II. Build, analyze, and test a closed loop network and simulate it using MATLAB.

VI. Class/Laboratory Schedule

Lecture: Two 75 minute sessions per week.
Lab: One 3 hour session per week.

VII. Contribution of Course to Professional Component

Lecture: Students learn about analyze of passive and active networks in frequency domain using Laplace transform and conversion to time domain using inverse Laplace transform.

Lab: Students learn how to build, simulate, test, and troubleshoot the variety of passive and active networks and compare the laboratory and experimental results. sequential logic networks in both hardware and software laboratories. They also learn how to write a technical report based on collected data. A wide range of measurement techniques is used in lab exercises including B2Spice, PSPICE, and MATLAB software tools.

VIII. Evaluation of Students

The instructor evaluates outcomes using the following methods: homework assignment submittals, midterm and final exams, one-on-one discussions during office hours, laboratory experiments, and laboratory reports.

The student grades are typically based on the following factors: quizzes, homework, midterm exam and final Exam.

IX. Relationship of Course Objectives to Program Outcomes

	Program Outcomes										
Crse Obj	***(a)*** **Use of modern tools of discipl**	***(b)*** **Use of math, science, Engg & Tech**	***(c)*** **Do experi-ments**	***(d)*** **Dsn of sys & components**	***(e)*** **Work on teams**	***(f)*** **Do Tech probs**	***(g)*** **Eff Com**	***(h)*** **Life-long learn**	***(i)*** **Prof, ethics, social resps**	***(j)*** **Prof, soc, globl, diversity**	***(k)*** **Qual, Cont impr, timeliness**
1		X			X	X					X
2		X	X		X	X					X
3	X	X	X	X	X	X					X
4	X	X	X	X	X	X					X
5	X	X	X	X	X	X					X
6	X	X	X	X	X	X					X