

ENPH 314 Signals and Systems

Department: Mathematics, Physics and Engineering

Credit Hours: 3

Current Catalog Description:

Lumped linear passive and active circuit analysis by Laplace transformation methods; transient and steady-state response; two-port networks theory; Fourier series; Fourier transform; elementary feedback.

Course Schedule:

3 lecture hr/ wk, 0 lab hr/week

Coordinator:

Dr. Denise Martinez

Prerequisites by Topic:

Math 306 – Differential Equations (corequisite)

Enph 225 – Electrical Circuit Theory

Program Outcome and Course Learning Goals Map:

The Program Outcomes for Engineering Physics are:

- A. an ability to apply knowledge of math, engineering & science
- B. an ability to design and conduct experiments, as well as to analyze and interpret data
- C. an ability to design system, component or process to meet needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- D. an ability to function on multi-disciplinary teams
- E. an ability to identify, formulate, and solve engineering problems
- F. an understanding of professional and ethical responsibility
- G. an ability to communicate effectively
- H. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- I. a recognition of need for, and ability to engage in life-long learning
- J. a knowledge of contemporary issues
- K. an ability to use techniques, skills, and modern engineering tools necessary for engineering practice.
- L. a depth and breadth of knowledge in engineering and physics necessary to work in a multidisciplinary environment

Course Learning Goals:

Upon completion of this course with a C or better, the students will:

1. Be able to determine system properties of linearity, causality, and time invariance,
2. Model mechanical and electrical systems as input/output differential equations and as transfer functions.
3. Use Laplace techniques to solve differential equations.
4. Be able to calculate the convolution of two continuous or discrete signals,
5. Know and be able to apply sifting property, final value theorem and initial value theorem,
6. Determine the stability of a given system,
7. Determine the impulse, step, ramp, and sinusoidal response of a system.
8. Understand and determine overdamped, underdamped and critically damped,
9. Sketch magnitude and phase Bode plots for a given system.
10. Analyze, design and implement high-, low-, and bandpass filters.
11. Be able to use MATLAB in the above designs and analyses.

Topics Covered:

Topic	Course Goal	Program Outcomes	# Lec/Lab (approx.)
Basic system properties	1	a	3
Matlab	11	a,b,c,e,k	4
Model linear i/o systems using differential eqns.	2	a,e	1
Model linear i/o systems using difference eqns.	2	a,e	1
Discrete Time Convolution	4	a,e,k	2
Continuous Time Convolution	4	a,e,k	2
Continuous Time LaPlace Transforms and Properties	3,5	a,e	2
Inverse LT and I/O DEs	3,5	a,e	2
Transfer Function Representation	2,6,7	a,e,k	2
Stability, Routh-Hurwitz	6	a,b,c,e,k	2
Overdamped, Underdamped, Critically damped systems	7,8	a,b,e,k	1
Frequency Response	7,8,9	a,b,c,e,k	2
Filters	9,10	a,b,c,e,k	4
Projects	all	a-e,g,k	0
Exams	all	a-e,k	2

Academic Honesty:

Cheating, plagiarism (submitting another person's materials or ideas as one's own), or doing work for another person who will receive academic credit are all-impermissible. This includes the use of unauthorized books, notebooks, or other sources in order to secure or give help during an examination, the unauthorized copying of examinations, assignments, reports, or term papers, or the presentation of unacknowledged material as if it were the student's own work. Disciplinary action may be taken beyond the academic discipline administered by the faculty member who teaches the course in which the cheating took place.

Students with Disabilities Policy:

It is the policy of Tarleton State University to comply with the Americans with Disabilities Act (ADA) and other federal, state, and local laws relative to the provision of disability services. Students with disabilities attending Tarleton State University may contact the Office of Disability Services at (254) 968-9478 to request appropriate accommodation. Furthermore, formal accommodation requests cannot be made until the student has been officially admitted to Tarleton State University.

Contribution of Course to Meeting the Professional Requirement:

Engineering Topics: 100%

Status of Continuous Improvement Review of this Course:

Prepared by: Denise Martinez

Date: August 23, 2004

Reviewed by: Denise Martinez (ENPH 4434 Coordinator)

Date: October 31, 2004

Review Notes:

05/05/05 – based on feedback from students taking the FE, some Fourier would be good. – dmm