Department of Electrical and Computer Engineering

New Jersey Institute of Technology

ECE 368 Signal Transmission **(2 credits, 2contact hours, required course)**

Instructor: Edip Niver; email: niver@njit.edu; Tel.: 973-596-3542

Text books   S. Rosenstark,"Transmission lines in Computer Engineering," McGraw Hill, 1994
SBN 0-07-053953-7 (main text)
A.F. Peterson and G.D. Durgin, Transient signals on Transmission lines, Morgan
& Claypool, 2009 ISSN 1932-1252

Course Description:
To introduce computer engineering students to fundamental principles of transmission lines in time domain with applications to digital systems, interconnects between line drivers and line receivers and crosstalk in coupled lines. Topics include the telegrapher's equations, wave propagation, lattice diagrams, transients in digital systems, crosstalk, proper termination for high speed logic.
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Prerequisite: CoE students - ECE 232 and ECE 251 **Corequisite**: none

Specific course learning outcomes (CLO): The student will be able to

1. understand transmission lines and when they are used as interconnects they intoduce propagation delay;
2. understand and utilize the basic solutions of transmission lines to transient phenomena in a resistive and reactive loads based on lattice diagrams;
3. utilize graphical solutions due to non-linear source and load terminations of transmission lines;
4. utilize solutions to include crosstalk for multiple coupled transmission lines;
5. utilize solutions to high speed ECL logic and other logic families in the presence of transmission lines.

Relevant student outcomes (ABET criterion 3):

(a) an ability to apply knowledge of mathematics, science, and engineering (CLO 1, 2, 3)
(b) an ability to design and conduct experiments, as well as to analyze and interpret data (CLO 1, 2, 3)
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability (CLO 3, 4)
(f) an understanding of professional and ethical responsibility (CLO 3, 4)
 (i) a recognition of the need for, and an ability to engage in life-long learning (CLO 3, 4)
(j) a knowledge of contemporary issues (CO 4)
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (CLO 3, 4).

Computer assisted design and course specific software:
PSpice, APPCAD

This course outline serves to provide a big picture of the course. Instructional materials such as textbooks, individual topics, and grading policy are subject to revision and changes by individual instructors.

Tentative Course Schedule	Weeks
Transmission Line Fundamentals	1
Reflections on Transmission Lines	2-3
Review and examination 1	4
Review of Laplace Transform	5
Transients on Transmission Lines, PSPICE demonstration	6-7
Nonlinear sources and terminations, Bergeron plots	8
Review and examination 2	9-10
Crosstalk on transmission lines	11
Interconnecting high speed ECL	12
Review and examination 3	13-14

Grading policy: Homework, quizzes class, participation: 5%
                                Three examinations: 20%, 20%, 20%
                                Final examination: 35%

Homeworks and projects
PSpice - based simulations of various transmission line problems

Updates and Assignments to be distributed via e-mail

Office hours, recitations and group studies: By appointment

Honor Code: The NJIT Honor Code will be upheld; any violations will be brought to the immediate attention of the Dean of Students.

Office: MIC Bldg., Room 406

Prepared by: E. Niver

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