Helen and John C. Hartmann Department of Electrical and Computer Engineering New Jersey Institute of Technology

ECE 368 Signal Transmission 3 credits 3contact hours (3;0;0)

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

Course Description:
This course is not for EE majors. Signal transmission both within and between digital systems.
Topics include the telegrapher's equations, wave propagation, lattice diagrams, transients in
digital systems, crosstalk, proper termination for high-speed logic, and the transmission
characteristics of various interconnecting geometries.
Prerequisite: ECE 232 and ECE 251
Corequisite: none

Computer Usage in course:
Multisim, Matlab

Specific Course Learning Outcomes (CLO): The student will be able to

1. understand transmission lines and when they are used as interconnects; understand and minimize
    propagation delay; provide examples;
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 ABET 1-7 Student Outcomes(SOs):
SO1. an ability to identify, formulate, and solve complex engineering problems by applying principles of
engineering, science, and mathematics.
        SO1.1. an ability to identify and formulate complex engineering problems by applying principles
        of engineering, science, and mathematics (CLOs 1-5).
        SO1.2. an ability to solve complex engineering problems by applying principles of engineering,
        science, and mathematics (CLOs 1-5).

SO5. an ability to function effectively on a team whose members together provide leadership, create a
collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
        SO5.1. an ability to function effectively on a team whose members together provide leadership,

create a collaborative and inclusive environment (CLO 3).
      SO5.2. an ability to establish goals, plan tasks, and meet objectives (CLO 3).

SO7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies. (CLOs 1-5).

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, Multisim demonstration	6-7
Nonlinear sources and terminations, Bergeron plots	8
Review and examination 2	9-10
Crosstalk on transmission lines	11-12
Interconnecting high speed ECL	12-13
Review	14

Grading policy: Homework, quizzes class, participation: 10%
                            Class Project   10%
Two examinations: 2x25%
Final examination: 30%
Homeworks and projects Multisim and Matlab based simulations of some transmission line problems
Updates and Assignments to be distributed via canvas or e-mail

Office: ECEC 311

Office hours:
         M   11:30 AM – 11:59 AM
         T   10:00 PM – 10:50 PM
         W   11:00 AM – 11:45 AM
         R   10:00 PM – 10:50 PM

Other times can be arranged through appointments; All appointments in the office should be preceded by an email at least 15 min before the appointment, and noting **the day and time** you want to meet. Any time, other than the office-hour times, will be conducted through Zoom with a day and time suitable for both parties. Times can be extended to beyond 10 PM on few days of the week, if need be.
Set up an appointment for any office hour (regular or extraordinary) meeting through email stating the suitable meeting day and time.
For extraordinary times, try to avoid Tuesdays to Fridays (you can use weekends if an emergency arises)

Honor Code:

*"Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: **http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf**.*

*Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. **Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.** If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu"*

Prepared by: M. Feknous