1. ECE 342: Electromagnetic Fields & Devices

2. 3 credits: 2-75 minute lecture sessions/week

3. Mario Marconi; Branislav Notaros

4. Electromagnetics. Branislav M. Notaros. 2011.

5. Course Information
    a. Basic concepts of time varying electromagnetic fields and transmission lines
    b. Prerequisites: ECE 341 with a C or higher
    c. Required: Electrical Engineering; Lasers & Optical Engineering

6. Goals for the Course
    a. Course Learning Outcomes
        i. Solve for a planar transmission line
        ii. Understand lumped vs. distributed element concept, transmission line matching, and concepts of transmission line
        iii. Model the frequency response of transmission lines, use Smith Chart to solve transmission line circuits, match stubs and quarter-wave transformers, and model the behavior of a lossy transmission line
        iv. Express a wave propagating in a medium in an arbitrary direction and understand wave propagation in dielectric slab waveguides
        v. Utilize Fresnet Equations, and understand the concept of dispersions and group velocity
    b. Student Outcomes
        1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
        4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
        5. 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
        6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
        7. An ability acquire and apply new knowledge as needed, using appropriate learning strategies

7. Topics Covered
    Propagation of uniform plane
    Electromagnetic waves in free space and in various media
    Wave refection, transmission and refraction
    Skin effect
    Transmission-line theory using frequency- and time-domain analysis
    Analysis of waveguides and electromagnetic resonators

Fundamentals of radiation, antenna, and wireless communication systems