Introduction to Radio Frequency and Optical Engineering

ECE 3010

Credit Hours:
3.00

Course Levels:
Undergraduate (1000-5000 level)

Course Components:
Lecture

Course Description:
Waves and pulses on transmission lines; charges, fields, and potentials; inductance and capacitance; Faraday?s law; Maxwell?s Equations; plane wave propagation, polarization, reflection, and transmission.

Prerequisites and Co-requisites:
Prereq: 2020, 2021, 2100, 2100.02, 2100.06, or 2105; and Physics 1251 or 1261, or both 1240 and 1241; and Math 2415 or 2174; and enrollment in ECE or EngPhysics major; or prereq or concur: 2010 or 2061, and permission of department.

Course Goals / Objectives:
- Become familiar with the theory and application of waves and pulses on transmission lines
- Learn basic transmission line impedance matching concepts
- Become familiar with the concepts of capacitance and inductance from a physical standpoint
- Become familiar with the basic laws of time varying electromagnetic fields
- Become familiar with the concepts of wave propagation, polarization, attenuation, reflection, and transmission
Course Topics:
- Waves on transmission lines, including reflection and impedance on terminated transmission lines
- Impedance matching on transmission lines and use of Smith chart
- Pulses and transients on transmission lines
- Review of vector calculus using the theory of static fields as example
- Physical viewpoint on capacitance, resistance, Ohm's law, and inductance
- Faraday's law and applications
- Maxwell's equations, the wave equation and plane wave solutions
- Plane wave propagation, polarization, attenuation, reflection, and transmission

Designation:
Required
Elective