EE 444

1. **Course Number & Name:** EE 444, Introduction to RF Communications

2. **Course Credit and Contact Hours:** 3 Units, 3 hours

3. **Course Coordinator:** Dr. Mohamed Salem


5. **Supplemental Materials:** None

6. **Specific Course Information:**
   a. **Description:** Principles of transmission line theory, scattering matrix methods, impedance matching, waveguides, microstrip, coplanar lines, couplers, detectors, antennas, RF filters, RF amplifiers, passive RF/microwave devices (mixers, diplexers, etc.), RF/microwave communications link design, system noise and distortion, common wireless protocols.
   
   b. **Prerequisites:** (EE 442 and EE 442L with a C or better) or EE 430 with a C or better, or consent of instructor
   
   c. **Co-Requisite:** None
   
   d. **Status:** ☐ Required for EE program, ☑ Elective, ☐ Selected Elective

7. **Specific Goals for the Course:**
   a. **Specific outcomes of instruction:** Upon successful completion of this course the students will be able to:
      
      i. Calculate the voltage, current and impedance on a transmission line as a function of distance.
      
      ii. Properly terminate a transmission line.
      
      iii. Calculate the characteristics of a transmission line between a source and a load.
      
      iv. Calculate linear models of RF and microwave circuits.
      
      v. Use CAD software to design and simulate a matching network.

   b. **This course supports the following ABET Student Outcomes:**
      
      i. *SO-1:* an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
8. Brief List of Topics to be Covered:

a. Definitions and units

b. Transmission-line theory (lumped-element model, lossless transmission-line, wave equations, characteristics impedance, termination of a transmission-line, reflection coefficient, average power, return loss, voltage standing wave ratio (VSWR), generator and load mismatch)

c. Microwave network analysis theory and measurements (Smith chart, linear parameters, vector network analysis, non-linear scattering parameters, lossy transmission-lines, generator and load mismatch)