EE 430

1. **Course Number & Name:** EE 430, Electromagnetic Theory and Applications

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

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

4. **Textbook:** Fawwaz T. Ulaby and Umberto Ravaioli, *Fundamentals of Applied Electromagnetics*, 7th Edition, Pearson, 2015. ISBN 978-0-13-335681-6.

5. **Supplemental Materials:** None

6. **Specific Course Information:**

   a. **Description:** Electrostatics, magnetostatics, electric currents, electromagnetic induction, electric and magnetic fields in matter, Maxwell's equations, retarded potentials radiation reaction, light emission, simple scattering and antenna theory, properties of waveguides, relativistic formulation of electrodynamics, Fourier decomposition of fields.

   b. **Prerequisites:** EE 330, MATH 241 and MATH 261

   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.   Understand principles of waves and phasors.

      ii. Model transmission lines as two-port networks.

      iii. Apply relevant electrostatics and magnetostatic equations with appropriate boundary conditions.

      iv. Understand how electromagnetic fields are derived from scalar and vector potentials.

      v.   Understand concepts of losses and polarization in relation to plane-wave propagation.

      vi. Calculate the reflected and transmitted waves at a planar interface

      vii. Understand the principles of electromagnetic radiation

    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. Waves and phasors

    b. Transmission lines

    c. Vector analysis

    d. Electrostatics

    e. Magnetostatics

    f. Time-varying fields

    g. Maxwell's equations

    h. Plane-wave propagation

    i. Wave reflection and transmission

    j. Electromagnetic field in materials

    k. Radiation and antennas