**ELEN 3120: Electromagnetic Fields 2**

**Class Schedule:** 3 Credit course, meeting the equivalent of 3-50 minute class periods per week.

**Course Coordinator:** James Richie

**Course Materials:**

**Required:** M. N. O. Sadiku, Elements of Electromagnetics, 6th Edition, New York, NY: Oxford Univeristy Press, 2015.

**Course Description:**

Development and use of wave equations as derived from Maxwell’s equations to explain the propagation of electromagnetic waves. Includes treatment of physical optics, antennas, waveguides, and transmission lines.

**Prerequisites:** ELEN 3110

**Selected Elective** in the Electromagnetic Fields and Communication area.

**Contribution to Professional Component:** Engineering Science 80%

Engineering Design 20%

**Course Goals:**

To enable students to understand the behavior of waves and time varying fields and to acquire the tools of analysis and design of transmission lines, plane waves, waveguides, and antennas.

**Course Objectives:**

*By the end of this course, you should....*

1. Be able to solve transmission line problems using mathematics and the Smith chart.
2. Be able to use reflection diagrams to compute DC source transients on transmission lines.
3. Be able to perform impedance matching using a variety of methods.
4. Be able to use reflection/transmission coefficients and Snell’s laws to compute the fields in a plane wave reflection scenario.
5. Understand the TE and TM modal behavior of rectangular waveguides, the Brillouin diagram, and cavity resonator modes.
6. Be able to compute the engineering parameters for rectangular waveguides.
7. Recognize the similarities between the reflection of waveguide modes, plane waves, and transmission line waves.
8. Be able to compute the electric field using the far field approximation for a simple system of currents.

**Contribution to Program Objectives:** partial fulfillment of Criterion 3 objectives A, C, E,

G, K

**Course Topics: In the text**

Transmission Lines Chapter 11

Plane Waves Chapter 10

Waveguides and Cavity Resonators Chapter 12

Antennas Chapter 13