

## EEL 4478 Electromagnetic Compatibility

**Credits:** 3

**Text book, title, author, and year:** Introduction to Electromagnetic Compatibility (Second Edition), 2006, by Clayton Paul

**Supplemental materials:** Notes

### Specific course information

- a. **Course descriptions:** Introduction to electromagnetic compatibility (EMC), intersystem and intra-system interferences and their characteristics, coupling by conduction and radiation, shielding, and interference reduction techniques.
- b. **Prerequisites:** EEL 3470-Electromagnetic Fields and Waves; EEE 4361-Electronics 2
- c. **Required, elective, or selected elective:** Elective

### Specific goals for the course

#### Specific outcomes of instruction:

The students will learn several basic mechanisms of electromagnetic interference generated either by man-made or natural type, in the frequency range from low megahertz to about 10 gigahertz. The students will be able to calculate the emissions based on the antenna characteristics and system gain. The student will be able to understand several simple EMI mitigating techniques.

The students will utilize the information received from the class to team-design/fabricate a PCB for minimum EMI emissions, to perform an EMI measurement, and to compare the results against FCC requirements. The student will be a better circuit designer for high-speed electronics devices to reduce EMI emissions.

The student will be able to effectively communicate in writing answers to qualitative questions on tests.

### Brief list of topics to be covered

Introduction to EMC and the sources  
Common FCC and EU standards relating to EMI  
Spectra of Digital Waveform, LISN  
Transmission line characteristics, mismatch, signal integrity  
Non-ideal behavior of R, L and C, ferrite, common-mode chokes  
Introduction to Dipole, Loop, Biconical, and Log periodic Antennas  
Common mode noise and radiated emissions  
Grounding concepts  
Printed circuit board design to reduce EMI  
Electrostatic Discharge, ESD  
Shielding material and technique  
Design and fabricate PCB, EMI measurement techniques