E&CE 675: Radiation and Propagation of Electromagnetic Fields

Fall 2019

Instructor: Safieddin Safavi-Naeini

Description:
The course covers theoretical foundations of engineering electromagnetics as applied to antenna and waveguiding structures, propagation, and scattering of radio waves. Applications in antenna engineering, RF/microwaves, and photonics will be presented.

Detailed Description:
- Review of Maxwell’s equations, boundary conditions, and potential theory
- Fundamental concepts and theorems: electromagnetic equivalence, reciprocity, Green’s function representation, electromagnetic radiation
- Antenna theory: simple antennas, antenna array, antenna characteristics
- General theory of guided waves
- Planar structures (multi-layer planar lines and antennas, periodic structures)
- Propagation and scattering of electromagnetic waves
- High frequency electromagnetics: microwave/millimeter-wave antennas, quasi-optical systems and methods, THz, and photonics

Textbook:
1. Lecture Notes, parts of the Ref. 1 (J-M Jin) and papers from the current literature.

References:

Related Background:
- Basic knowledge of electromagnetic fields and waves and RF/microwave circuits equivalent to E&CE 475, engineering mathematics, and basic programming skills.