

# EE 483/L 583/L Antennas for Wireless Communications

## Spring 2017, 3-1 (4 credit hours)

**Final Exam Room & Time:** EP 336 from 5 - 6:50 pm Thursday, May 4, 2017

**Text:** *Antenna Theory: Analysis and Design* (3rd Edition), Balanis, Wiley, 2005

### **Chapter 2 Fundamental Parameters of Antennas**

- radiation pattern(s)
- power density/Poynting vector
- radiation intensity
- beamwidth, i.e., half-power beamwidth (HPBW) and first null beamwidth (FNBW)
- directivity & gain
- bandwidth
- polarization
- input impedance
- radiation resistance and loss resistance
- antenna efficiency
- vector effective length & effective area
- Friis transmission & radar range equations

### **Chapter 3 Radiation Integrals & Aux. Potential Functions**

- Calculate the magnetic ( $\bar{A}$ ) and electric ( $\bar{F}$ ) vector potentials given the electric ( $\bar{J}$ ) or magnetic ( $\bar{M}$ ) current densities, respectively, for simple problems.
- Calculate the electric and magnetic fields from  $\bar{A}$  or  $\bar{F}$ .
- Calculate the far-field electric and magnetic fields from  $\bar{A}$  or  $\bar{F}$ .

### **Chapter 4 Linear Wire Antennas**

- infinitesimal dipoles
- small dipoles
- finite length dipole
- half-wavelength dipole
- monopoles
- region separation

### **Chapter 5 Loop Antennas**

- small circular loop
- circular loop w/ constant current
- circular loop w/ nonuniform current

**Chapter 6 Arrays**

- Be able to design/analyze linear arrays with uniform amplitude & spacing and linear progressive phase shift

**Folded Dipoles - Chapter 9.5 & notes**

- Be able to analyze/design a folded dipole

**Matching Techniques - Chapter 9.7 & notes**

- Be able to analyze/design a T-Match, modified T-Match, Gamma match, Modified Gamma match, and/or Omega match

**Helical Antennas - Chapter 10.3.1 & notes**

- Be able to analyze/design a normal mode helical antenna
- Be able to analyze/design an axial mode helical antenna

**Yagi-Uda arrays - Chapter 10.3.3 & notes**

- Be able to design a standard Yagi-Uda antenna

**Log-periodic dipole arrays (LPDA)- Chapter 11.4 & notes**

- Be able to design an LPDA

**Chapter 14 Microstrip Antennas**

- Be able to analyze/design a rectangular microstrip patch antenna

**Numerical Electromagnetics Code (NEC)**

- Be able to model and find parameters for a simple wire antenna