

## ECE 4990/6990

### Antennas

#### Quiz #1

#### I. Antenna Patterns

- A. Power patterns and field patterns
- B. Reactive and radiation fields
- C. Antenna field regions
  - 1. Reactive near field
  - 2. Radiating near field
  - 3. Far field
- D. Pattern definitions (isotropic, directional, omnidirectional, principal plane patterns)
- E. Pattern parameters  
(main lobe, major lobe, minor lobe, side lobe, back lobe, HPBW, FNBW)
- F. Antenna average power (Poynting vector)

#### II. Antenna Performance Parameters

- A. Radiation intensity
- B. Directivity / beam solid angle
- C. Numerical evaluation of directivity
- D. Antenna gain
- E. Antenna efficiency
- F. Antenna impedance
  - 1. Loss resistance, radiation resistance, reactance (associated power components)
  - 2. Maximum power transfer
  - 3. Impedance matching
  - 4. Transmitting and receiving systems
- G. Transmission line fundamentals
- H. Polarization (polarization ellipse)
  - 1. Linear polarization
  - 2. Circular polarization
  - 3. Elliptical polarization
- I. Effective aperture (scattering area, loss area, capture area)

#### III. Antenna System Performance

- A. Friis transmission equation
- B. Radar range equation
- C. Radar cross section

(1) 8.5x11" formula sheet allowed

Integral tables provided

Differential operators provided