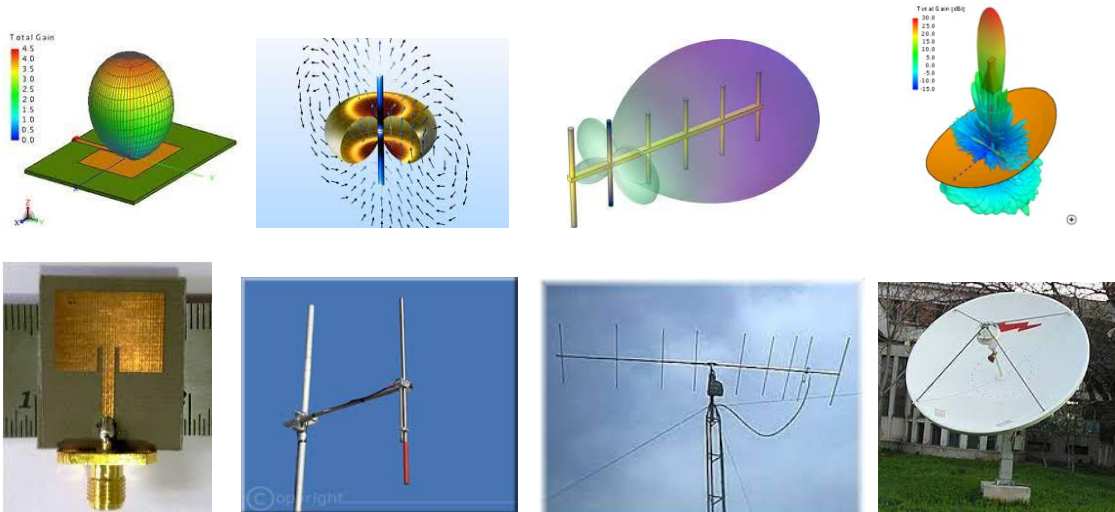


Class Time: Wednesdays, 6:00-9:50pm Room: TBD
Instructor: Shanti Garman, shantig@uw.edu // Instructor Office Hours: TBD
TA: TBD // TA Office Hours: TBD



Textbook:

Lecture notes and handouts (Required, see course site on UW Canvas > Files)
 Antenna Theory Analysis and Design, C.A. Balanis (not required)

Additional References (not required):

Antennas, J. Kraus, 2nd ed
 Antenna Theory and Design, Stutzman and Thiele 3rd ed
 Microstrip and Printed Antenna Design, By Randy Bancroft
 Microwave Engineering, D. Pozar (EE572)
 Fundamentals of Applied Electromagnetics, F. Ulaby 5th ed

Computer Software: Ansys EM (formerly Electronics Desktop) → EE Remote Access, or on your PC

Course Outline: This course covers the analysis and design of antennas which are used in modern communication devices. Students will be exposed to antenna design methods and measurement techniques.

Course Objectives

- Increase understanding of key antenna concepts and important parameters.
- Become familiar with various antenna types, including microstrip and printed antennas.
- Gain experience with antenna design and simulation using Ansys EM.
- Become familiar with antenna measurement techniques.

Course Topics (continues on next page)

1. Introduction to fundamental antenna concepts (radiation patterns, gain, input impedance, bandwidth, polarization, etc.)
1. Review of transmission line (TL) theory
2. Introduction to microstrip antennas (MSA)
 - a. Circularly polarized MSA
3. Array antennas and feeding network
4. Classic antennas: dipole, monopole, Yagi, log-periodic, bowtie, horn
5. Current antennas: Inverted-F, slot, phased array

Continued on next page

6. Antenna measurement techniques

Homework

The first assignment will be exercises to apply fundamental antenna concepts. Remaining homework assignments will be antenna design projects using Ansys EM for simulation.

- | | |
|--|-------------|
| 1. Fundamental Antenna Concepts | |
| 2. Simple probe-fed MSA design and simulations | Requires ED |
| 3. Microwave matching circuit design | Requires ED |
| 4. MSA matching circuit design | Requires ED |
| 5. Covered MSA design | Requires ED |
| 6. 1x4 Series array antenna design | Requires ED |

All homework reports must be prepared individually. However, collaboration and discussion with other students is highly encouraged.

Midterm Project: Antenna Deep-Dive Presentation

Final Project: 4x3 Series-Parallel MSA Array Requires ED

Lab Assignment: TBD

Antenna Impedance measurements

SDR-Based Lab (supplies will be provided)

Antenna Gain measurements

Grading Policy

| | |
|---------------------|-----------|
| Homework, Labs | 60% |
| Midterm Project | 10% (tbd) |
| Final Project | 15% |
| Class Attendance | 10% |
| Class Participation | 5% |

Ansys EM on EE Remote Server

Circuit simulations (MultiSIM type model), fast

EM 2D simulations (Method of Moment, MoM), somewhat slow

EM 3D simulations (Finite Element Method, FEM), can be very slow