

EE574/PMP574

Spring 2020

2/5/2020

**Title: Antennas: Analysis and Design**

**Instructor:** Yasuo Kuga Office hour: TBD, 543-0478, [ykuga@uw.edu](mailto:ykuga@uw.edu),

**Class time:** TBD, Room: TBD

**TA:** TBD Office hour: TBD

**Textbook**

Lecture notes and handout

Antenna theory and design Stutzman and Thiele 3rd ed (not required)

**References:**

Microwave Engineering, D. Pozar

Microstrip and Printed Antenna Design, By Randy Bancroft

**Computer Software:** Ansys Electronics Desktop (EE Remote Access)

**Course outline:**

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

**Course objectives:**

Become familiar with the antenna measurement techniques.

Become familiar with antenna design with ED.

Become familiar with the microstrip and printed antennas.

**Course materials:**

1. Introduction to antennas
  - Definitions and radiation patterns
2. Review of TL and cavity resonators
3. Introduction to microstrip antennas (MSA)
4. Green's function technique applied for MSA
5. Circularly polarized MSA
6. Broadband and dual-band MSA
7. Array antennas and feeding network
8. Inverted-F antennas
9. Meanderline dipole and monopole antennas
10. Tapered slot antennas
11. Printed Yagi and bowtie antennas
12. Far- and near-fields antenna measurement techniques

**Project and homework (tentative):**

Several antenna design projects will be assigned.

**HW assignments (tentative):**

- |   |                            |
|---|----------------------------|
| 1. Simple probe-fed MSA design and simulations, | Requires ED                |
| 2. Microwave matching circuit design,           | Requires ED                |
| 3. MSA matching circuit design,                 | Requires ED                |
| 4. Covered MSA design,                          | Requires ED                |
| 5. Array antenna design,                        | Requires ED                |
| 6. Final project                                | Requires ED 3D simulations |

**Lab assignment (tentative):**

1. Antenna measurements

**Grading policy:**

The final grade will be based on the projects. No exam.

All reports must be prepared by each student. There is no group report in EE574/PMP574.

However, collaboration and discussion with other students are highly encouraged.

**Ansys Electronics Desktop (ED) on EE Remote Server**

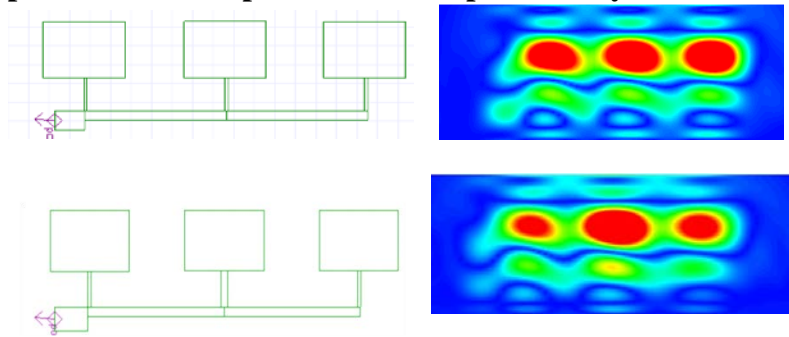
Circuit simulations (MultiSIM type model), fast

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

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

**Figures from the previous HW and final project**

**HW: Tapered and non-tapered series-fed patch array antenna**



**2019 Final project: Design of 4x3 microstrip array antennas at 5.8 GHz**

