

Class meets TTh 9:30-11:00 in ENS109

Unique No. 16737

Professor: Hao Ling

Office Hrs: TTh 11:00-12:30

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all other times by appointment

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References: Balanis, *Antenna Theory: Analysis and Design*, Wiley, 3<sup>rd</sup> edition, 2005.  
Balanis, *Advanced Engineering Electromagnetics*, Wiley, 1989.

Prerequisite: Graduate standing or consent of instructor. One prior introductory graduate electromagnetics or acoustics course (e.g., EE383L, EE 384N) is highly desirable, although not absolutely required.

**Course Objectives:**

To build up fundamental knowledge of electromagnetic principles and antenna analysis methods. To examine various antennas and to gain an in-depth understanding of an antenna-related topic through a term project.

Grading: Homework (40%) + Midterm (30%) + Term Project (30%)

**Course Outline:****I. Radiation from Induced Currents**

- 1.1. Review of Maxwell's Equations
- 1.2. Finding Fields from Sources in Free Space
- 1.3. Far Fields and Aperture Theory
- 1.4. Antenna Parameters

**II. Finding Induced Currents on Antenna Structures**

- 2.1. Approximate Induced Currents
- 2.2. Boundary Conditions
- 2.3. Theorems and Principles
- 2.4. Integral Equations
- 2.5. Method of Moments
- 2.6. Numerical Electromagnetics Code

**III. Different Types/Classes of Antennas**

- 3.1. Antenna Arrays
- 3.2. Helical Antennas
- 3.3. Microstrip Patch Antennas
- 3.4. Reflectors and Horns
- 3.5. Antenna Measurement