

EE 447 - Antenna Theory and Design

1997-1999 Catalog Data

EE 447-4. Antenna Theory and Design. Linear dipole antennas, antenna arrays, thin-wire antennas, moment method analysis examples (vee dipole, folded dipole, etc.), broadband and frequency-independent antennas. Computer-aided design and analysis of wire antennas, feed networks and antenna arrays using antenna CAD software. Prerequisite: EE 346.

Textbook

Stutzman and Thiele, *Antenna Theory and Design*, John Wiley, 1998

Supplementary Material

1. *Antenna Theory*, Balanis, Harper & Row, 1982
2. *Antennas*, Kraus, McGraw-Hill, 1988
3. *Antenna Engineering Handbook*, H. Jasik, Editor, McGraw-Hill, 1961
4. *Electromagnetic Waves and Radiating Systems*, Jordan & Balmain, Prentice-Hall, 1968
5. *American Radio Relay League (ARRL) Antenna Handbook*, ARRL, 1984
6. *Microwave Antenna Measurement*, Hollis, Lyon and Clayton, Scientific Atlanta, Inc., 1970

Coordinator Computer Usage

Each student will become familiar with computer-aided design (CAD) software for antennas (e.g., MiniNEC) and for associated circuits such as feed networks and impedance matching circuits (e.g., Touchstone), through assigned problems and class projects.

Topical Prerequisites

Each student should:

- ◆ have basic understanding of EM radiation
- ◆ be familiar with plane wave propagation in free space
- ◆ understand transmission line analysis and Smith charts
- ◆ know differential equation solution methods
- ◆ be familiar with Maxwell's equations and boundary conditions.

Learning Objectives

For each student to:

- ◆ understand the operation of dipole and loop antennas
- ◆ understand the principle of antenna arrays
- ◆ know the basic parameters to specify antenna characteristics
- ◆ design matching transformers and baluns
- ◆ design wire antennas and line source radiators for a specified pattern
- ◆ design uniform antenna arrays for a specified radiation pattern.

Laboratory

Students are expected to design a number of different types of antennas and im-

Projects

pedance-matching networks to specifications provided by the instructor.

Estimated ABET Category Content

Engineering Science 2 credit hours or 50%
Engineering Design 2 credit hours or 50%