Department of Electrical and Computer Engineering
San Diego State University
Spring 2001

EE 645  Antennas and Wave Propagation

Instructor
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Office Hours : MW: 3:00-4:00 p.m.; 7:00-8:00 p.m.

Schedule
Class : Monday and Wednesdays, 5:30 – 6:45 p.m., Room E427
Final Examination : Friday, May 18, 2001, 4:00 p.m. – 6:00 p.m.
Midterm : Around the third week of March

Pre-requisites
(1) Undergraduate electromagnetic field theory (EE 340 or equivalent)
(2) Transmission lines or distributed circuits (EE 450, 540, or equivalent)

Textbook
(John Wiley, 1998)

Work Load
1. Readings : From text; handouts, outside resources, professional journals
2. Practice Problems : assigned problems, with a problem set per topic
3. Midterm and final examination
4. Term Paper : reporting a through study of specific antenna types
   (topics and reading resources selected in consultation with the instructor)

Grading
Letter grades, based on performance on each of the following factors
   Homework  10%  Midterm  25%
   Term Paper 25%  Final Exam  40%

Policies
Midterm and final exam are open-book. There are no makeup exams.
Report topic must be selected by end of February, and approved.

Goal
This course is intended for engineers in the wireless, radar, and broadcast fields,
who need to understand the characteristics and parameters of antennas,
constraints and tradeoffs in the selection of specifications, design methods for
some of the common families of antennas, and the basic principle of antenna
synthesis. In addition, the propagation of radio waves, and its effect of system
design and parameter selection in a communication system, will be discussed.

Purpose
1. To understand the terminology and performance measures of antennas
2. To understand the trade-offs among various performance specifications
3. To understand the applicability and limitations of various types of antennas
4. To gain an overview of several major families of antenna types
5. To understand the nature of wave propagation in earth’s atmosphere
6. To identify the propagation characteristics in various modes of propagation
7. To be able to read the current professional literature in the field

Major Topics
1. Antenna parameters and specifications
2. Elementary antennas : dipoles, loops, and slots
3. Antenna Arrays : linear, multidimensional, and phased
4. Antenna families : resonant, aperture, and reflector
5. Antenna Synthesis
6. Wave propagation : line of sight, tropospheric, ionospheric
7. Obstacles, diffraction, multipath, and fading
References


Term Paper on Antennas and Propagation

Purpose
To give the student an exposure to the current professional literature in this field
To provide an opportunity for, and experience in, reading the professional literature
To serve as a case study in information search and focused browsing
To serve as a learning opportunity requiring organization of thoughts on a subject
To show how a new, unfamiliar subject can be approached and understood

Procedure
1. Select a topic of interest to you, and a small set (between 1 and 3) of papers on it
   (it may be easier to first find the articles and then select the topic)
2. Get the topic and papers approved by Dr. Gupta
3. Read the articles, including any background reading needed to understand them
4. Prepare a report on the most significant issues reported in the articles

Topic
1. Should be related to the topics encountered in this course
2. Should be as narrowly defined as possible
3. Should be accessible in level and treatment
4. Should have recent literature (say from within the past 10 years) available on it

Suggestions
Articles with a great deal of detail of a technology having small shelf-life, are not suitable
Select articles that deal with a specific problem, issue or theme are easier to follow
Articles that backup an observation or measurement with theory or understanding are best
Articles with extensive numerical simulation results need to be supplemented with insight

Report Content
Problem statement: what is interesting about it; how does it compare with alternatives
Emphasis: what is the goal; what performance measures are to be optimized and why
Conclusion: what is the central point, or result, or distinguishing or novel feature
Define: any new terms, performance measures, requirements driving the specifications
References: Only the relevant ones, actually consulted, listed at the end

Submission
Length: Typically between 5 and 15 pages depending on the nature of topic
Due Date: The last day of classes
For reference, please attach a copy of the (principal) article on which the report is based

Periodicals
Both research journals and trade magazines are good sources of articles for the report
Antennas and Wireless propagation Letters
Electromagnetics
Electronics Letters
IEEE Antennas and Propagation magazine
IEEE Transactions on Antennas and Propagation
IEE Proceedings – Part H. Microwaves, Antennas, and Propagation
Journal of Electromagnetic Waves and Applications
Microwaves and RF
Microwave and Optical Technology Letters
Microwave Journal
Radio Science