

COLORADO STATE UNIVERSITY
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING



EE 444 – Antennas & Radiation, Fall 2007

COURSE SYLLABUS

(1) Course Details:

Instructor: BRANISLAV M. NOTAROS, Associate Professor, Engineering C101C, Phone: (970) 491-3537

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Class Meetings: Tuesday, Thursday 5:00pm-6:15pm, Engineering E106

Office Hours: Tuesday 12:30pm-2:00pm, Thursday 12:30pm-2:00pm, or by appointment

Textbook: *Antenna Theory and Design*, Second Edition, Warren L. Stutzman and Gary A. Thiele, John Wiley & Sons, 1998.

Additional References (not required):

- *Antenna Theory: Analysis and Design*, Constantine A. Balanis, Second Edition, John Wiley & Sons, 1997.

- *Antennas for All Applications*, Third Edition, John D. Kraus and Ronald J. Marhefka, McGraw Hill, 2002.

(2) Course Description:

Antenna fundamentals, antenna arrays, and basic types of antennas for wireless communication. Electromagnetic theory is first reviewed. Mathematical solution of Maxwell's equations for radiation problems is introduced. Basic antenna parameters are defined and discussed. Electrically small antennas are analyzed. Theory of receiving antennas is presented. Topics in antenna arrays include the array factor, pattern multiplication, multidimensional arrays, and phased arrays. Several types of antennas are studied, including wire, microstrip, and aperture antennas.

(3) Evaluation of Students and Grading Policy:

- Homework and projects (~15%)
- Exam 1 (~25%)
- Exam 2 (~25%)
- Final Exam (~35%)

(4) Organization of Course Topics:

| | <i>No. of Weeks (tentative)</i> |
|---|---------------------------------|
| 1. Electromagnetic fundamentals | 2 |
| 2. Antenna fundamentals and definitions | 3 |
| 3. Some simple radiating systems and antenna practice | 2 |
| 4. Antenna arrays | 3 |
| 5. Line sources | 1 |
| 6. Resonant wire and patch antennas and arrays | 1 |
| 7. Fundamentals of broadband and aperture antennas | 2 |

(5) Course Objectives/Outcomes:

- The course will provide students with mathematical fundamentals of the antenna theory, along with a physical understanding of how antennas radiate.
- Students will develop analytical skills in antenna engineering and will understand basic antenna design principles.
- Students will develop an in-depth understanding of several classes of antennas commonly used in wireless-communication industry.
- Students will acquire a fundamental understanding and appreciation of the theory and practice of antenna arrays.
- The course will expose students to examples of real-world antenna problems.
- The students will be able to analyze and design standard antenna elements and antenna arrays.
- The course will enable students to identify interesting and important topics for senior design projects and for further learning and research.