



University of Texas at El Paso
EE 4382/5306 – Antenna Theory/Engineering
Fall 2017

Course Information

Course Websites:	http://emlab.utep.edu/ee4382_AntennaEngineering.htm
Meeting day and time:	MW, 4:30pm – 5:50pm
Room:	ENGR E340
Final Exam:	N/A
Course designations:	EE 4382 – 001 EE 5306 – 001
CRNs:	36123 18574
Credit hours:	3
Lecture hours:	3

Course Description: Introductory antenna theory and design. Fundamentals and definitions, simple radiating systems, arrays, line sources, wire antennas, broadband antennas, and antenna measurements.

Instructor Information

Jesus J. Gutierrez, Ph.D. Student

Office: ENGR E-315
Office Hours: MW – 1:00 – 3:00 pm
E-mail: jjgutierrez4@utep.edu

Course Materials

- **Textbook:** Antenna Theory: Analysis and Design, 4th Edition
Constantine A. Balanis
Wiley, 2016
ISBN 978-1-118-64206-1
- **Textbook:** Antenna Theory and Design, 3rd Edition
Warren L. Stutzman, Gary A. Thiele
Wiley, 2012
ISBN 978-0-470-57664-9
- **Textbook:** Advanced Engineering Electromagnetics, 2nd Edition
Constantine A. Balanis
Wiley, 2012
ISBN 978-0-470-58948-9

Students should maintain a well-organized notebook that archives their syllabus, lecture notes, homework solutions, and quizzes.

Prerequisites

By Course (with grade of “C” or better):

- EE 3321 – Electromagnetic Theory

By Topic:

- Fundamental laws of electricity
- Electromagnetic Concepts: Maxwell’s Equations, Electromagnetic Waves
- Differential Equations, Vector Analysis

Course Outline

Topics covered in this course include:

1. Antenna radiation mechanism
2. Theory of point sources, Hertzian dipoles, half-wave dipoles
3. Fundamental Parameters and figures of merit of antennas
4. Linear Wire Antennas
5. Loop Antennas
6. Antenna arrays: Linear arrays
7. Broadband Antennas
8. Traveling Wave Antennas, Broadband Yagi-Uda Array, Logarithmic Array
9. Frequency Independent Antennas
10. Microstrip and Patch Antennas, Mobile Communication Antennas
11. Fundamentals of Antenna Measurements

Course Outcomes

By the end of the semester, the student will demonstrate the ability to:

- Understand the basics and theory behind antenna radiation mechanisms, point sources, small-wave dipoles, and half-wave dipoles
- Understand and apply the various figures of merit for antennas such as radiation pattern, gain, polarization, efficiency, bandwidth, and others.
- Learn about, and design various types of wire antennas, such as dipoles, loops, arrays, yagi-uda, and logarithmic
- Understand the principles behind broadband and frequency-independent antennas, and design them
- Learn about patch antennas, microstrips, MIMOs, mobile antennas.
- Understand the fundamentals of antenna measurements: what is an anechoic chamber, what is a Vector Network Analyzer (VNA), Two-Port Parameters of Antennas, how to measure transmission and reflection using the VNA and anechoic chamber.

Contribution to Professional Component

EE4382 is a Senior level core course that builds on topics covered primarily in Junior and Sophomore required courses.



Relationship to (ABET) Program Outcomes

- Ability to apply knowledge of mathematics, science, and engineering:
Students use mathematical concepts in the analysis of antennas.
- Ability to identify, formulate, and solve engineering problems:
Students solve problems and observe simulations of different types of antennas.
- Ability to communicate effectively:
Students solve problems and discuss antennas topics in class.
- Ability to use computers to enhance problem solving:
Students observe simulations to solve problems and visualize solutions involving antennas

Rules and Policies

Grading

Student achievement in the course objectives will be assessed using a combination of homework three (3) exams, and a final project.

Student grades are protected by the Privacy Act of 1974.

Your course grade will be determined by your weighted performance in the following categories:

Homework	20%	90% – 100% → A
Exams (3)	60%	80% – 89% → B
Final Project	20%	70% – 79% → C
		60% – 69% → D
		0% – 59% → F

For some students, there may be a “gray area” between two-letter grades in the final distribution, so two people getting the same weighted average grade could get different letter grades. If you are in one of these gray areas, whether you get a higher or lower grade depends primarily on two factors: (a) class participation and (b) whether your performance has been improving or declining over time.

Homework Policy

- Homework is an integral part of the course. It is crucial that you promptly and effectively do all your homework, as it will be very useful for your learning and preparing for the tests.
- Your homework must be your own work. Students suspected of cheating or copying homework will be submitted to the Office of Student Conduct and Conflict Resolution and will remain part of your permanent record at UTEP.

~ Missed Homework ~

- There will be a due-date for each homework assignment. If for some reason you cannot finish the homework on the due-date, you can complete it later, but the grade will be reduced proportionately to the days passed after the due date.

Exam Policy

- There will be 3 exams, each one accounting for 20% of the final grade.
- Duration of the exam will be one (1) hour and twenty (20) minutes of the class.



- Full work must be shown for full credit. Work must be neat and well organized.
- The final answer must be boxed and given proper units.
- Students suspected of cheating will be submitted to the Office of Student Conduct and Conflict Resolution and will remain part of your permanent record at UTEP.
- The tentative schedule for the exams and the covered topics is shown in the chart below. This may be subject to change:

Date	Exam
Monday, September 25	Exam #1
Monday, October 30	Exam #2
Monday, November 27	Exam #3

~ Missed Exams ~

A missed exam can be made-up IF AND ONLY IF:

- (1) the reason for missing the exam is beyond the student's control, e.g. such as a medical excuse, jury duty, death in the family or automobile accident, or
- (2) prior consent is obtained from the instructor for missing the exam based on a non-frivolous reason, e.g. such as a job interview, conference, or out-of-town job related travel. In either case, the student must submit a written and signed statement describing the reasons for missing the exam, with appropriate documentation, and petition for a makeup exam. Medical excuses require a note from the doctor. **A missed exam will carry zero grade if these conditions are not met.**

Attendance Policy

Students are required to attend class and to show up to lectures on time. The course instructor reserves the right to turn away late comers and to withdraw students from the course that are repeatedly absent. Students missing more than two lectures should seriously reflect on their commitment to this course, as missing classes is highly correlated with poor performance. Students absent from lecture are still held responsible for all information discussed, homework assigned, and exams administered during that missed lecture.

Etiquette

The following items are expected from you as part of being a student in the class:

- Ask questions! Despite how “silly” or “dumb” you may think your question is, it is very likely that other students have the same question. Confusion on even small details in course material can cause bigger problems and hold you back. If you are truly embarrassed by your question, send an anonymous e-mail to the course instructor. I promise I will respond!
- Respond honestly to polls and provide real-time feedback to instructor about the course. This will contribute greatly to the quality of the course and to your success in it.
- Visit the course instructor during office hours, or by appointment, if needed.
- Treat e-mail correspondence as a professional exchange of information.
- Turn off cell phones, pagers, or anything else that may distract the class.

- Purchase the text book with the correct edition.
- Read the assigned sections of the book.
- Bring all of your course materials (text book, notebook, pens/pencils, paper, calculator, and ruler) to every class.
- Show proper etiquette during class. Do not talk, make excessive noise, or otherwise distract the class. You will be asked to leave and it will affect your grade.

Academic Dishonesty

As an entity of The University of Texas at El Paso, the Department of Electrical and Computer Engineering is committed to the development of its students and to the promotion of personal integrity and self-responsibility. The assumption that a student's work is a fair representation of the student's ability to perform is the basis for departmental and institutional quality. All students within the Department are expected to observe appropriate standards of conduct. Any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts. Any case involving academic dishonesty will be referred to the Office of the Dean of Students. The Dean will assign a Student Judicial Affairs Coordinator who will investigate the charge and alert the student as to its disposition. Consequences of academic dishonesty may be as severe as dismissal from the University. See the Office of the Dean of Students' homepage (Office of Student Life) at <http://studentaffairs.utep.edu/dos> for more information.

You can also refer to the IEEE website for information on our code of ethics: <http://www.ieee.org/about/corporate/governance/p7-8.html>

American Disabilities Act

The University is committed to providing services, equipment, and accommodations to individuals with documented disabilities to provide them with equal opportunities to participate in programs, services, and activities in compliance with Sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990, and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.sa.utep.edu/cass.

Discrimination

I do not discriminate, nor will I allow discrimination, on the basis of race, color, national origin, sex, religion, age, disability, genetic information, veteran's status, sexual orientation, or gender identity. Members of the UTEP community are protected from discrimination and harassment by the State and Federal Laws.