

1 Course Information

Instructor

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Office Hours M 1:30-3:30 pm, T 9-10:30 am,
and by appointment

Prerequisites

Electromagnetic Fields I

Vector Calculus

Circuits II

Signals and Systems

Course Website

<http://learn.ou.edu>

Credit

3 undergraduate hours

Class Times

TR 10:30-11:45 am

Textbook

Required:

Antenna Theory: Analysis and Design Balanis 3rd ed.

Supplementary:

Antenna Theory and Design Stutzman & Thiele

Class Format

This class will not be pure lecture. There will be class discussion and activities. Participation is expected.

1.1 Course Objectives

Upon completion of this course, you will understand the basics of antenna theory and design. You will possess the knowledge, and understand the critical thinking processes necessary, to design, construct, and measure an antenna (including antenna designs not specifically covered in this course) to meet performance requirements for a system. By the end of this course, you should also be able to evaluate the validity of antenna measurement results and performance specifications through critical thinking.

2 Class Policies

1. Maintain collegial atmosphere in classroom

- Participate in discussion
- Be respectful of other students
- Put cell phones on silent
- Do not use cell phones or laptops in class (I want you to participate in the class!)
- Ask questions
- Let me know when you are lost

2. Contact with the instructor

- E-mail is the best way to contact me for a quick question
- For long questions please come to office hours
- If you can't come to office hours e-mail me for an appointment

3. Extra Credit

- No extra credit will be given in this course.

4. Attendance

- Class attendance is expected
- Make every attempt to be on-time to class
- If late to class please try to minimize the distraction that you create

5. Academic Integrity

- It is your responsibility to read and understand the Academic Integrity (<http://www.ou.edu/provost/integrity/>).
- Plagiarism and copying will not be tolerated. If caught, all parties involved will receive a zero for the assignment. If caught multiple times, then the repeat offenders will receive a failing grade for the course. There will be multiple reports due for this course, please educate yourself on the proper use of citations and what constitutes plagiarism.

6. Reasonable Accommodation

- Any student in this course who has a disability that may prevent him or her from fully demonstrating his or her abilities should contact me personally as soon as possible so we can discuss accommodations necessary to ensure full participation and facilitate your educational opportunities.

7. Late Assignments

- No late assignments will be accepted for this course (exception noted in Homework section).
- If you will not be in town when an assignment is due, either give the assignment to another student to turn in for you, or turn in the assignment before you leave town.

8. Religious Holidays

- It is the policy of the University to excuse the absences of students that result from religious observances and to provide without penalty for the rescheduling of examinations and additional required classwork that may fall on religious holidays.

3 Assignments

3.1 Grading

Homework 5%

Homework Quizzes 20%

Midterm Project 35%

Final Project 35%

Paper Set Summaries 5%

The Undergraduate and Graduate grading will be completely separate. The grading scheme will be as below:

90-100	A
80-89	B
70-79	C
60-69	D
59 and below	F

3.2 Homework

- Homework will be posted weekly on D2L by the end of the day on Tuesday and should be turned in by the end of class the following Tuesday
- You may collaborate with other students on homework (I in fact encourage you to do so!); however, there is a line between collaboration and copying. If students are caught copying, then both students will receive a zero on the assignment. If caught twice, then I will report you both to the disciplinary committee.
- Late Policy: After class, homework will be accepted until 5 pm at 15% off. It will not be accepted after that unless the student has a University accepted excuse.
- Assignments are expected to be turned in before a student leaves town if a student must miss class the day the assignment is due
- There will be homework problems assigned from the book and handouts of problems written by me
- Homework will be graded based upon a completion grade

3.3 Homework Quizzes

- Every other Thursday there will be a homework quiz on the previous two weeks of homework.
- Homework solutions will be posted after 5 pm on Tuesdays.
- The homework quiz will be distributed at the beginning of class and collected at 10:45 am.
- The homework quiz will be one of the problems from the homework assignment.

3.4 Midterm Project

More details will be given later. However, the project will cover the analysis of the effects of a finite ground plane on a monopole antenna using a classroom version of a full-wave solver. A report will be required describing the antenna behavior changes.

3.5 Final Project

More details will be given later. The final project will involve the design and construction of a TV antenna. A report will be required showing test results and justifying all design decisions made.

3.6 Paper Set Summaries

Throughout the semester the graduate students in this course will be reading, reporting, and presenting many pivotal papers in antenna theory. So that the undergraduates in the course can benefit from this exercise as well, you will be writing summaries of the presentations given by the graduate students.

4 Course Schedule

Antenna Course Outline	Subtopic	Class	Assigned Reading	Homework	Handout	Die	HW Quiz	Graduate Student Paper Set	Grad Project
Plane Waves	Helmholtz	1	14-Jan Handout						
	Basic Properties	1	Handout		A				
	Polarization	2	16-Jan Handout and 2.12	2.30	A				
	Poynting	2	Handout and 2.3		A				
Vector Potential	Derivation	3	21-Jan 3.1-3.5			HW 1			
	Hertzian Dipole	3	4.1-4.2.2						
Antenna Parameters	Radiation Pattern	4	23-Jan 2.1-2.2.3	2.1, 2.3					
	Polarization	4	2.12	2.35, 2.43					
	Directivity	5	28-Jan 2.6 and 4.2.7	2.14, 2.15, 2.29		HW 2			
	Radiation Resistance	5	4.2.2	2.49					
	Radiation efficiency	6	30-Jan Wheeler Paper and 2.8	2.51			1		
	Gain/ Antenna Effective Area	6	2.9	2.49, 2.92, 2.95					
	Far Field/ Near Field	7	4-Feb 4.2.3-4.2.6, 2.2.4, 4.4	4.18		HW4			
	Reciprocity theorem	7	3.8						
	Mutual Impedance	8	6-Feb 3.8.2						
	Antenna Measurements	9	11-Feb 17		B	HW 5, Summary 1 (G) Summary 1 (L)		Isotropic Antenna	
Dipole	Hertzian with triangle current	10	13-Feb 4.3 and 4.4				2		
	Top-Hat Loaded dipole	10	4.2 and 4.3						
	Direction cosines	11	18-Feb Handout	4.1		HW6			
	Half-wave dipole	11	4.5-4.6	4.22, 4.26					
	Baluns	11	9.7.6						
	Image theory/ Monopole	12	20-Feb 4.7 and 4.7.2	4.49, 4.51					
	2-element array	13	25-Feb 4.7.5 and 6.2			HW 7, Summary 2 (G) Summary 2 (L)		Electrically Small	
Array theory	N-element array	14	27-Feb 6.3	6.3, 6.7, 6.14			3		
	Phased Arrays	15	4-Mar 6.3.3	6.20, 6.24		HW8			
	Non-Uniform Amplitude	16	6-Mar 6.8	6.12, 6.15, 6.17					
	Planar Arrays	17	11-Mar 6.1	6.73		HW9			
	Mutual Impedance Revisited	18	13-Mar 8.6 and 8.7	8.14		Midterm Project (L)	4		
	Yag-antenna	18	10.3.3	10.39					
Loop	Circular/Duality	19/20	25-Mar 5.2	5.29		HW10, Summary 3 (G) Summary 3 (L)		Thinned and Random Arrays	
	Square	19/20	27-Mar 5.2.2 and 3.7	5.23					
	Large/ Folded Dipole N-turn and with ferrite	21	1-Apr 5.6.1 and 5.4	5.9, 5.10		HW 11			Problem Statement
Aperture	Sid/ Babinat's	22	3-Apr 5.7	5.12			5		
	Equivalence/Radiation Integrals	23	8-Apr 12.2/12.3, 12.4, 12.5	12.1, 12.25, 12.26		HW 12			Lit Review Draft
	TL Theory Review	24	10-Apr Notes and Slides						
	Slot TL Model	24							
	Duality	25	15-Apr 12.8			HW13			LR Comments
	Fourier Transform	25	12.9						
	Horn antenna	26	17-Apr 13			Final Project Parts Lists	6		Lit Review
	Parabolic Dish Antenna	26	15.4						
Microstrip antennas	Patch TL	27/28	22-Apr 14.1, 14.2.1, Paves article	14.4, 14.6, 14.7	C	HW14		Microstrip Antennas	Proposal Draft
	Patch Cavity	29	29-Apr 14.2.2	14.17		HW 15, Summary 4 (G)	7		Proposal Comments
Broadband/ FI antennas	Log-Periodic Antenna	30	11			Summary 4 (L)			
	Spirals	30	1-May			HW 15, Final Project, Summary 5 (G)		Frequency Independent Antennas	Proposal
Finals Week									