1 Course Information

Instructor
J. E. Ruyle
Office 332 Devon Energy Hall
e-mail ruyle@ou.edu
Office Hours MW 3-5 pm,
and by appointment

Prerequisites
Electromagnetic Fields I
Vector Calculus
Circuits II
Signals and Systems

Course Website
http://learn.ou.edu

Credit
3 undergraduate/graduate hours

Class Times
TR 4:30-5:45 p.m.

Textbook
Required:
Advanced Engineering Electromagnetics
Balanis 2nd ed.
Supplementary:
Engineering Electromagnetics Demarest

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 know, understand, and be able to apply Maxwell's equations. All material in electromagnetics stems and can be derived from Maxwell's equations. Learn to love them! After this course you will understand, be able to derive, and apply plane wave and waveguide equations. You will understand and be able to design some resonant structures, in particular empty cavities and linear antennas. Basic array theory will be introduced as well.

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 Policy (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 a report 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 10%
Midterm Project 20%
Midterm Exams 20% each
Final Exam 25%

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 should be turned in by the end of class on Tuesdays
- Homework will be posted in D2L by Tuesday morning of each week
- 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 6:30 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 a completion grade. Essentially, if you write something reasonable down for each problem and box an answer you will receive full-credit.
- Homework solutions will be posted on Tuesday evenings.

3.3 Homework Quizzes

There will be seven homework quizzes throughout the semester that will take place at the end of the class on Thursday. Essentially, if you understood the homework from the two weeks before, you will be fine for the quiz.

3.4 Midterm Project

More details will be given later. However, the project will cover the analysis of the field distribution in your microwave. You will experiment (microwave marshmallows or chocolate), simulate, analyze theoreticaly, and compile a report of your findings. The midterm project will be more extensive for the students in the graduate section of the course.

3.5 Midterm Exams

The midterm exams will be take-home (largely because I couldn't fit them in the course schedule). They will be handed out at the end of class on Tuesday and will be due in-class on Thursday of the same week. Since they are take-home exams, obviously, they will be open book and note. However, they are not open-neighbor. You must work the exam entirely by yourself.

3.6 Final Exam

There will be a final exam during the final exam period for this course - Monday May, 6th from 4:30-6:30 pm. This will be an open book open note exam as well.

4 Course Schedule

Fields Course Outline

Topic	Subtopic	Class Day		Assigned Reading	Recommended Reading	Homework Quiz	Exam	Project
Maxwell's Equations	Intro	1	15-Jan	1 (all sections)	10 (all sections)			
	Circuit-Field Relations	1						
	Boundary Conditions	2	17-Jan					
	Time-Harmonic	2						
	Power and Energy	2						
Plane Waves	Helmholtz	3	22-Jan	3 (all sections)	12 (all sections)			
	Basic Properties	3						
	Polarization	4	24-Jan	4 (all sections)		1		
	Poynting	4						
	Reflection and Transmisison	5	29-Jan	5.1-5.6				
	Normal Incidence	5						
	Oblique Incidence	6/7	31-Jan					
	Oblique Incidence	6/7	5-Feb					
	Multi-layer	8	7-Feb			2		
Waveguides	Rectangular Waveguide	9	12-Feb	8.1-8.4	13 (all sections)			
	Modes	10	14-Feb					
	Cutoff frequencies	10						
	Dielectric Waveguide	11	19-Feb	8.7				
Cavity Resonators	Rectangular	12	21-Feb			3		
	Spherical/Dielectric	13	26-Feb				THM1	
TL Theory & Network Pars	Transmission Line Theory	14	28-Feb	8.9	11 (all sections)			
	Transmission line Theory	15	5-Mar					Proj. assigned
	Network Parameters	16	7-Mar			4		
	Network Parameters	17	12-Mar					
Vector Potential	Derivation	18	14-Mar	6 (all sections)	14 (all sections)			
	Hertzian Dipole	19	26-Mar					
Antenna Parameters	Radiation Pattern	20	28-Mar			5		
	Polarization	20	28-Mar					
	Directivity	21	2-Apr					Proj. Due
	Radiation Resistance	21	2-Apr					
	Radiation efficiency	22	4-Apr					
	Gain/ Antenna Effective Area/Fri	22	4-Apr					
	Far Field/ Near Field	23	9-Apr					
	Reciprocity theorem	23	9-Apr	7.5		6		
Dipole	Hertzian with triangle current	24	11-Apr					
	Top-Hat Loaded dipole	24	11-Apr					
	Direction cosines	24	11-Apr					
	Half-wave dipole	25	16-Apr				THM2	
	Baluns	25						
	Image theory/ Monopole	26	18-Apr	7.4				
Array theory	2-element array	27	23-Apr			7		
	N-element array	28	25-Apr					
	Phased Arrays	28						
	Mutual Impedance	29	30-Apr					
	Antenna Measurements	30	2-May					
Finals Week			6-May				Final	