

*Spring 2019 Course Syllabus for*  
**Applied Electromagnetics**

*University of Texas at El Paso  
College of Engineering  
Department of Electrical and Computer Engineering*

**COURSE INFORMATION**

Course Prefix and Number:	EE 4347
Course Title:	Applied Electromagnetics
Course Website:	<a href="http://emlab.utep.edu/ee4347/appliedem.htm">http://emlab.utep.edu/ee4347/appliedem.htm</a>
Meeting day and time:	M/W, 4:30pm – 5:50pm
Room:	UGLC 208
Final exam:	Monday, May 13, 4:00pm – 6:45pm
CRN:	28326
Credit hours:	3
Lecture hours:	3

**Catalog Description** – The study of static and time-varying electromagnetic principles and laws in their application to modern technology, natural phenomena, as well as to scientific and industrial devices and systems from DC to microwave frequencies.

**INSTRUCTOR INFORMATION**

**Dr. Raymond C. Rumpf**

Office: ENGR A-337  
Telephone: (915) 747-6958  
E-Mail: [rcrumpf@utep.edu](mailto:rcrumpf@utep.edu)

**COURSE MATERIALS**

The following items are required for this course:

- Access to the internet
- TI85 scientific calculator, or equivalent
- Access to MATLAB. Manual available at: <http://www.mathworks.com/help/techdoc/>
- 30 cm ruler, compass, and colored pens/pencils
- Engineering graph paper and blank Smith charts for homework assignments
- Textbook: *Elements of Electromagnetics* (7<sup>th</sup> Ed.)  
Matthew N. O. Sadiku  
Oxford University Press 2015  
ISBN: 978-0-19-932138-4

Students should maintain a well-organized notebook that archives their syllabus, lecture notes, homework, quizzes, and all other materials related to this course.

## PREREQUISITES

By Course (with grade of “C” or better):	By Topic:
<ul style="list-style-type: none"><li>• MATH 2313 – Calculus III</li><li>• MATH 2326 – Differential equations</li><li>• EE 2351 – Electric Circuits II</li><li>• EE 2353 – Continuous Time Signals &amp; Systems</li><li>• PHYS 2421 – Fields and Waves</li><li>• EE 3321 – Electromagnetic Field Theory</li></ul>	<ul style="list-style-type: none"><li>• Fundamental laws of electricity</li><li>• Differential equations</li><li>• Vector calculus</li><li>• Fields and waves</li><li>• Maxwell’s equations</li><li>• Electrostatics and magnetostatics</li><li>• Programming</li><li>• MATLAB</li></ul>

## COREQUISITES

None.

## COURSE OUTLINE

Topics covered in this course include:

1. Review of Maxwell’s equations
2. Electromagnetic properties of materials
3. Electromagnetic waves
4. Transmission lines
5. Waveguides
6. Computational electromagnetics
7. Smith charts
8. Electromagnetic devices

## LEARNING OUTCOMES

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

- Describe and analyze electromagnetic wave propagation.
- Describe and analyze scattering from an interface
- Describe and analyze transmission lines and associated problems.
- Understand and be able to solve simple problems using Smith charts
- Understand the basics of waveguides and their applications.
- Understand the basics of periodic structures in electromagnetics and their applications.

### *Contribution to Professional Component*

EE-4347 is a senior level core course that builds on topics covered primarily in EE 3321 “Electromagnetic Field Theory.” This course is heavier on applications than it is theory.

### Relationship to (ABET) Program Outcomes

- Ability to apply knowledge of mathematics, science, and engineering:  
*Students use concepts from physics and calculus in the analysis of electromagnetic problems.*
- Ability to identify, formulate, and solve engineering problems:  
*Students solve problems and observe simulations of electromagnetic problems.*
- Ability to communicate effectively:  
*Students solve problems and discuss electromagnetic issues in class.*
- Ability to use computers to enhance problem solving:  
*Students observe MATLAB to solve problems and visualize solutions.*

## RULES AND POLICIES

### Grading

Student achievement in the course objectives will be assessed using a combination of homework, quizzes, the final exam, and class participation. Participation includes attendance, asking and answering questions during the lecture, and providing honest and useful feedback to the course instructor. 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 .....	30%	90% – 100% → <b>A</b>
Quizzes .....	30%	80% – 89% → <b>B</b>
Participation .....	20%	70% – 79% → <b>C</b>
Final Exam .....	20%	60% – 69% → <b>D</b>
		0% – 59% → <b>F</b>

### Homework Policy

Homework will be graded on a 100 point scale. Unless otherwise directed, solve all problems by hand and show all work. Homework is due by midnight on the assigned due date. In order to provide solutions in a timely manner, no homework assignments will be accepted after three days following the due date and 20 points will be deducted for every day late. Homework must be completed with a high level of professionalism and be formatted properly (see Format below). Points will be deducted for sloppy work, incorrect formatting and if not all of the work is shown. **Always do your own work. Do not ever copy work from others, from the internet, or from any source other than yourself.**

**Format** – Unless otherwise indicated, all homework assignments will be submitted as a single paper document stapled in the upper left corner with no additional binding. The first page must be a cover sheet with the student’s name, student’s 800 number, date of the assignment, course information, and assignment number. No problems or work shall appear on the cover sheet. For your own records, it is recommended that you include a copy of the original assignment after the cover page and before your work. Homework shall be neat, well organized, and the writing clear. All work required to solve the problem must be shown. Answers must be provided in the order they were asked in the original assignment. Final answer(s) must be clearly boxed and given proper units. Do

not box intermediate results. Finish all calculations. For example,  $3\pi$ ,  $\sqrt{14}$ , and  $\sin(0.2)$  are not appropriate final answers. These should be given as 9.4248, 3.7417, and 0.1987 respectively, with the correct number of significant digits for the problem. If you are using engineering paper, do not use the backside because this is hard to read. You may only use a calculator or computer for basic arithmetic and to check your answers. It is not necessary to repeat the question or problem in your answer, but you may if you wish. If the assignment involves computer programming, all of the codes shall be placed at the end of the assignment in an appendix unless specifically requested to do otherwise.

### *Exam Policy*

Rules for work and formatting on exams is the same as for the homework. Please refer to Homework Format above for more information. All electronic devices like mobile phones, computers, etc., must be powered off and stored away during exams. No devices or calculators with internet access are allowed during the exams. If you need to use the restroom during an exam, you must leave all electronic devices behind in the classroom. Unless stated otherwise by the course instructor, all exams are closed-book and only calculators, extra blank paper, pens and pencils are allowed. No textbooks, notecards, or “cheat sheets” of any kind are allowed unless specified otherwise by the instructor. Keep your eyes and attention on your own exam. Keep your exam appropriately covered to prevent cheating by other students. When possible, sit at least two seats away from other students. Do not copy answers from others or provide answers to others during the exam.

**Missed Exams** – A missed exam can be made-up 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. In some cases, absence can be forgiven if the reason is not frivolous and coordinated with the course instructor well before the lecture is missed.

### *Participation Policy*

The following items are expected from students as part of their participation grade:

- 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 instruction. I promise I will respond!
- Respond honestly to poles and provide real-time feedback to instructor about the course. This will contribute greatly to the quality of the course and your success in it.
- If needed, visit the course instructor during office hours, or by appointment.
- Treat e-mail correspondence as a professional exchange of information.
- Power off cell phones, pagers, or anything else that may distract the class.
- Purchase the text book with the correct edition.
- Read 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.
- Maintain a good quality notebook. Keep everything well organized including notes, tests, homework, etc.

### 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. Acts of scholastic dishonesty such as cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in the 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 will not be tolerated. Any case involving academic dishonesty will be referred to the Office of Student Conduct and Conflict Resolution (OSCCR) and will remain part of your permanent record at UTEP. OSCCR staff 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.

*Office of Student Conduct and Conflict Resolution*

<https://www.utep.edu/student-affairs/osccr/>

Phone: (915) 747-8694

E-Mail: [studentconduct@utep.edu](mailto:studentconduct@utep.edu)

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 UTEP Disabled Student Services Office was established for the purpose of providing appropriate and reasonable accommodations as mandated in Section 504 of the Rehabilitation Act of 1973 (<http://www.dol.gov/oasam/regs/statutes/sec504.htm>) and the Americans with Disabilities Act (<http://www.ada.gov/>). If you have needs regarding learning disabilities, please help by reporting your special needs to the course instructor the first week of classes.

For addition help, contact the Center for Accommodations and Support Services (CASS):

(915) 747-5148

[cass@utep.edu](mailto:cass@utep.edu)

<http://sa.utep.edu/cass/>

## **DISCRIMINATION**

I do not discriminate, nor will I allow discrimination, on the basis of age, gender, color, ethnicity, national origin, religion, disability, sexual orientation, or favorite sports team. Members of the UTEP community are protected from discrimination and harassment by the State and Federal Laws.

## **IMPORTANT DATES**

Jan 21	Dr. Martin Luther King, Jr. Holiday – University closed
Jan 23	First class!!! ☺
Apr 5	Course drop deadline
Mar 18 – 22	Spring Break – No classes
May 8	Last class. ☹
May 10	Dead Day
May 13	Final Exam, 4:00pm – 6:45pm