



Spring 2023 Course Syllabus for

Applied Electromagnetics

University of Texas at El Paso

College of Engineering

Department of Electrical & Computer Engineering

COURSE INFORMATION

CRN:	27441 (EE 4347), 26433 (EE 5390)
Course Prefix & Number:	EE 4347 & EE 5390
Course Title:	Applied Electromagnetics
Course Website:	https://empossible.net/academics/emp3302/
Meeting Day & Time:	Tuesday & Thursday, 10:30am – 11:50am
Room:	Psychology Building, Room 307
Final Exam:	Friday, 12 May 2023, 10:00am – 12:45pm
Credit Hours:	3
Lecture Hours:	3

Catalog Description – The study of static and time-varying electromagnetic principles and laws and 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
Research Website:	https://raymondrumpf.com/research/
Academic Website:	https://empossible.net/academics/

COURSE MATERIALS

The following items are required for this course:

- Reliable access to the internet.
- Working UTEP e-mail account.
- 30 cm ruler, compass, and colored pens/pencils.
- Engineering graph paper and blank Smith charts for homework assignments.
- Binder/notebook for notes, homework, exams, and other handouts.
- TI-85 scientific calculator, or equivalent. Programmable calculators are allowed.
- Access to a computer with:
 - MATLAB -- Manual available at: <https://www.mathworks.com/help/matlab/index.html>
 - Microsoft Office (Word, PowerPoint, Publisher) – See [Microsoft Office 365](#).
- **Textbook**
Elements of Electromagnetics, 7th Ed.



Oxford University Press, 2018, 920 pages
ISBN-13: 978-0-19-069861-4, ISBN-10: 0-19-069861-6

You can install MATLAB on your laptop or computer following the UTEP link:

https://www.utep.edu/technologysupport/ServiceCatalog/SOFTWARE_PAGES/soft_matlab.html

You will be required to create a Mathworks account to download both the software and the license using your UTEP username and password. If a student has no computer with access to the internet, from UTEP's Technology Support Center has borrowing services for laptops and tablets:

https://www.utep.edu/technologysupport/TSCenter/TSC_EQ_LaptopsTablets.html

If you encounter technical difficulties beyond your scope of troubleshooting, please contact the [UTEP Help Desk](#) as they are trained specifically in assisting with technological needs of students. Please do not contact the course instructor for this type of assistance. The Help Desk is much better equipped to assist you in this regard!

UTEP Technology Support

Web: <https://www.utep.edu/technologysupport/>
Phone: 915-747-4357 (HELP)
Chat: [Chat With Us](#)
Library: Room 300
Online: [Submit a Service Request](#)

Students should maintain a well-organized notebook that archives their syllabus, lecture notes, homework problems, and tests. Students are also encouraged to purchase a USB Drive or use a cloud service like Dropbox or OneDrive to save their homework, lecture notes, tests, and other digital work.

PREREQUISITES/COREQUISITES

Prerequisites

By Course (with grade of "C" or better):

- MATH 2313 – Calculus III
- MATH 2326 – Differential equations
- EE 2351 – Electric Circuits II
- EE 2353 – Continuous Time Signals and Systems
- PHYS 2421 – Fields and Waves
- EE 3321 – Electromagnetic Field Theory

By Topic:

- Fundamental laws of electricity and magnetism
- Differential equations
- Vector calculus
- Basic knowledge of electromagnetic fields and waves
- Programming
- MATLAB

Corequisites

None

COURSE OUTLINE

Topics covered in this course include:

1. Review of basic electromagnetics (i.e. EE 3321)
2. Maxwell's equations
3. Electromagnetic waves
4. Wave scattering
5. Transmission lines
6. Waveguides
7. Computational electromagnetics
8. Smith charts

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 the basics of waveguides and their applications.
- Understand the basics of computational electromagnetics.
- Understand the basics of Smith charts.

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 electrostatics (i.e. waves).

Relationship to (ABET) Program Outcomes

- Ability to apply knowledge of mathematics, science, and engineering:
Students apply physics and mathematical principles in the analysis of electromagnetic phenomena.
- Ability to identify, formulate, and solve engineering problems:
Students solve problems and observe simulations regarding electromagnetic phenomena.
- Ability to communicate effectively:
Students solve problems in class and discuss their findings in groups.
- Ability to use computers to enhance problem solving:
Students use MATLAB to visualize electromagnetic fields and related phenomena.

TEACHING METHODOLOGIES

This is NOT an online class, but many of the lectures and demonstrations are prerecorded and made available to you 24/7 at any time during the semester. Some information will be supplemented with excerpts from other sources and made available on the course website or via e-mail. The course is intended to have a close relationship between the student and professor,



especially when getting computer codes to work in MATLAB. The notes are highly visual to better understand the underlying mathematics.

RULES & POLICIES

Grading

Student achievement will be assessed using a combination of class participation, homework, and project exams. Student grades are protected by the Privacy Act of 1974. Your course grade will be determined by your weighted performance in the following categories:

Participation.....	20%	90% to 100%	A
Homework (~10).....	30%	80% to 89%	B
Midterm Exams (~2).....	30%	70% to 79%	C
Final Exam.....	20%	60% to 69%	D
		0% to 59%	F

Homework Policy

Homework will be assigned on a weekly basis and graded on a 100-point scale. Homework is due at by 4:59pm on the assigned due date. No late assignments will be accepted. Homework must be completed with a high level of professionalism and be formatted properly. Points will be deducted for sloppy work, incorrect formatting, and poor or incorrect content.

Always do your own work. Do not ever copy work from others, from the internet, or from any source other than yourself. Students suspected of cheating or copying homework will be promptly submitted to the Office of Student Conduct and Conflict Resolution and the incident will remain part of your permanent record at UTEP.

Formatting Requirements

Points will be deducted and answers will be graded as incorrect if any of the following requirements are violated.

- 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.
- (Optional) For your own records, it is recommended that you include a copy of the original assignment after the cover page and before your work.
- Double-sided pages are acceptable unless you are using engineering paper. The back side is very difficult to read. Anything written on the back of engineering paper will be considered missing from the assignment.
- You must staple the assignments at the upper-left corner at least 3 millimeters away from the edge of the paper to ensure the assignment remains stapled. No additional binding will be accepted.
- Unless otherwise instructed, you must solve all homework assignments by hand and show all work. You may only use a calculator or a computer for doing basic arithmetic, or to verify that your answer is correct.
- Homework shall be neat, well organized, and writing clear.



- Final all calculations. Unfinished calculations will be graded as incorrect. For example, 3π , $\sqrt{14}$, and $\sin(0.2)$ are not final answers. Instead, these should be given as 9.4248, 3.7417, and 0.1987.
- Answers must include proper units or the answer will be graded as incorrect.
- You must clearly identify final answers by drawing a box around them or it will be graded as incorrect.
- Never draw a box around intermediate answers or it will be assumed you do know what is the real final answer and it will be graded as incorrect.
- Graphics should be professional and of high-quality by meeting all of the items identified in the *Graphics Checklist*.
See <https://empossible.net/wp-content/uploads/2021/08/Graphics-Checklist.pdf>.
- Answers and work must be provided in the order the problems were asked in the original assignment.
- All computer codes shall be provided at the end of the assignment in an Appendix, not mixed with the answers.
- Graphics checklists shall be provided as the last page of the submitted assignment.

Exam Policy

Two midterm exams will be given in this class in addition to a final exam. In-class exams will not extend after the end the scheduled class. Students will generally be allowed programmable calculators and one 8.5”×11” sheet of paper with whatever they wish to have written or printed on it. Usually there is one midterm exam that is closed-book and no calculators allowed.

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, show up to lectures on time, and not leave the lecture early. 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 instructor. I promise I will respond!

- Participate in class activities. They are designed to challenge you and to teach you.
- Complete any reading assignments, video watching, or other learning activities before class.
- 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.
- Always turn off cell phones, pagers, or anything else that may distract the 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 your notebook. Keep everything well organized.
- The grading rubric for class participation will be based on the frequency and quality of the contributions to class:
 - 18 - 20%: Attends class regularly and often contributes to class participation by raising thoughtful questions or asks for clarification if something is not clear, responds seriously and honestly to surveys and questions, builds on other students' ideas or questions, and actively participates in class assignments by working in groups to solve problems or to explain/help a fellow classmate.
 - 15% - 17%: Attends class regularly and sometimes contributes to class participation in the aforementioned ways.
 - 11% - 14%: Attends class regularly but rarely contributes to class participation in the aforementioned ways.
 - < 10%: Attends class regularly but never contributes to class participation in the aforementioned ways.

EXPECTATIONS

What should you expect from the course instructor?

- Instructor will do all that they can to ensure your learning and success in this class.
- Instructor will provide students with clear instructions and expectations.
- Homework will be graded and feedback on your performance will be provided as quickly as possible after the due date.
- Solutions to the homework will be provided after all homework has been collected and graded.
- Instructor will respond to student e-mails within 24 hours.

What should the instructor expect from students?

- At the start of the course, students shall review the syllabus, calendar, and course material.
- Students should plan to study/work for a minimum of six hours per credit hour each week of the course. This includes reviewing the notes, reading supplemental material, completing the homework, and other assignments such as the final project.
- Students will be active participants in the class and provide the instructor feedback of their understanding of course material and progress on course assignments.



- Students are expected to behave professionally at all times. Bullying, verbal abuse, insubordination, or personal attacks will not be tolerated in any form. Inappropriate behaviors may result in an administrative withdrawal from the course and/or dismissal from the course and from the program.

COVID-19 PRECAUTIONS

Please stay home if you: (1) have been diagnosed with COVID-19, or (2) are experiencing COVID-19 symptoms. If you are diagnosed with COVID-19, please let the course instructor know as soon as possible, and alternative instruction will be provided. The Student Health Center is equipped to provide COVID-19 testing.

The Center for Disease Control and Prevention recommends that people in areas of substantial or high COVID-19 transmission wear face masks when indoors in groups of people. If you wish to get the vaccine, it is widely available in the El Paso area, and will be available at no charge on campus during the first week of classes. For more information about the current rates, testing, and vaccinations, please visit epstrong.org.

ACADEMIC DISHONESTY

Academic dishonesty is prohibited and is considered a violation of the UTEP [Handbook of Operating Procedures](#) (HOOP). 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

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>

Plagiarism Detecting Software

Some of your course work and assessments may be submitted to *SafeAssign*, a plagiarism detecting software, or other similar tools. *SafeAssign* may be used to review assignment submissions for originality and will help you learn how to properly attribute sources rather than paraphrase.



CAMPUS RESOURCES FOR LEARNING

UTEP provides a variety of student services and support:

Technology Resources

- [Help Desk](#): Students experiencing technological challenges (email, Blackboard, software, etc.) can submit a ticket to the UTEP Helpdesk for assistance. Contact the Helpdesk via phone, email, chat, website, or in person if on campus.

Academic Resources

- [UTEP Library](#): Access a wide range of resources including online, full-text access to thousands of journals and eBooks plus reference service and librarian assistance for enrolled students.
- [University Writing Center \(UWC\)](#): Submit papers here for assistance with writing style and formatting, ask a tutor for help and explore other writing resources.
- [Math Tutoring Center \(MaRCS\)](#): Ask a tutor for help and explore other available math resources.
- [History Tutoring Center \(HTC\)](#): Receive assistance with writing history papers, get help from a tutor and explore other history resources.
- [RefWorks](#): A bibliographic citation tool; check out the RefWorks tutorial and Fact Sheet and Quick-Start Guide.

Individual/Well-Being Resources

- [Military Student Success Center](#): Assists personnel in any branch of service to reach their educational goals.
- [Center for Accommodations and Support Services](#): Assists students with ADA-related accommodations for coursework, housing, and internships.
- [Counseling and Psychological Services](#): Provides a variety of counseling services including individual, couples, and group sessions as well as career and disability assessments.

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

<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 17	Classes begin
Jan 18	First day of Applied EM!!! 😊
Mar 13-17	Spring Break – no classes 😞
Mar 30	Course drop/withdraw deadline
Mar 31	Cesar Chavez Day – no classes 😞
May 4	Last day of classes 😞
May 5	Dead day
May 12	Final Exam, Friday, 12 May 2023, 10:00am – 12:45pm

COPYRIGHT STATEMENT FOR COURSE MATERIALS

All materials used in this course are protected by copyright law. The course materials are only for the use of students currently enrolled in this course and only for the purpose of this course. They may not be further disseminated.