EEL 4410 – Introduction to Fields and Waves
Department of Electrical & Computer Engineering
Florida International University
Spring, 2026

Classroom	**:**	EC 2830
Class Time	**:**	Tue. & Thu. 11:00 am - 12:15 pm
Faculty	**:**	Dr. Constantinos Zekios
Office Hours	**:**	Mon. Wed. 11:00 am - 12:00 pm
Office	**:**	EC 2945
Phone	**:**	305-348-2270
Email	**:**	kzekios@fiu.edu
Prerequisite	**:**	MAC 2313 or MAC 2283 Calculus III for Engineering, and EEL 3110C Circuit Analysis and Lab.
Textbook	**:**	Fawwaz T. Ulaby, Umberto Ravaioli, "Fundamentals of Applied Electromagnetics", Edition 8, Publisher Pearson Education, ISBN-10 0136681581.

Course Description

This course covers basic electromagnetic theory. Namely, (a) it acts as a bridge between electric circuits and electromagnetics, introducing students to transmission line theory, (b) it presents electrostatic, and magnetostatic phenomena as special cases of time-varying fields, and (c) it explores time-varying fields and propagation offering students a glimpse into the wide range of applications for electromagnetics within our modern technological society.

Course Objectives aligned with ABET

Level I – Remembering (Knowledge):

- Identify the fundamental principles of electromagnetics.
- Recall Maxwell's equations and their role in electromagnetic field theory.
- List the key properties of electric and magnetic fields, wave propagation, and boundary conditions.

Level II – Understanding:

- Explain the operating principles of electromagnetic fields and waves.
- Describe the behavior of electromagnetic waves in different media and their interactions with materials.
- Summarize the key concepts of electrostatics, magnetostatics, and electrodynamics.

- Explain the significance of vector calculus in electromagnetics and its applications.

Level III – Applying:

- Utilize Maxwell's equations to formulate and analyze electromagnetic problems.
- Apply boundary conditions to solve electrostatic, magnetostatic, and wave propagation problems.
- Solve transmission line problems using distributed circuit models and impedance matching techniques.
- Implement analytical and numerical methods to solve electromagnetics problems in practical applications.

Level IV – Analyzing:

- Analyze the behavior of electromagnetic waves in different media, including reflection, refraction, and transmission.
- Compare different methods for solving electromagnetic problems, including analytical and computational approaches.
- Assess the impact of dielectric and conductive materials on electromagnetic field behavior.
- Evaluate the limitations of idealized models in real-world electromagnetic applications.

Level V – Evaluating:

- Critique different electromagnetic modeling techniques and assess their accuracy in practical applications.
- Assess the implications of electromagnetic interference (EMI) and compatibility (EMC) in engineering systems.

Level VI – Creating:

- Design and develop solutions for real-world electromagnetic problems, such as motors, batteries, antenna design, wave propagation, and RF circuit modeling.
- Innovate solutions for modern electromagnetics applications.

ABET Relationship of course to program outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to communicate effectively with a range of audiences.
3. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Topics Covered

1. Transmission line theory
2. Electrostatic phenomena
3. Magnetostatic phenomena
4. Electrodynamic phenomena

Relationship of course to program objectives

In this course, the student will have to show:

1. an ability to apply knowledge of mathematics, science, and engineering,
2. an ability to identify, formulate, and solve engineering problems,

3. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Grading Scheme

Homework	**40**
Quizzes	**15**
Midterm Exam	**25**
Final Exam	**25**
Project	**25**
Total Points	**125**

Tentative Grading Scale

A	**95-100**	**B+**	**87-89**	**C+**	**77-79**	**D**	**60-69**	**F**	**0-59**
A-	**90-94**	**B**	**83-86**	**C**	**70-76**				
		B-	**80-82**						

University's Code of Academic Integrity

Florida International University is a community dedicated to generating and imparting knowledge through excellent teaching and research, the rigorous and respectful exchange of ideas, and community service. All students should respect the right of others to have an equitable opportunity to learn and honestly to demonstrate the quality of their learning. Therefore, all students are expected to adhere to a standard of academic conduct, which demonstrates respect for themselves, their fellow students, and the educational Mission of the University. All students are deemed by the University to understand that if they are found responsible for academic misconduct, they will be subject to the Academic Misconduct procedures and sanctions, as outlined in the Student Handbook.
More information can be found at http://academic.fiu.edu/academic_misconduct.html

Department Regulations Concerning Incomplete Grades

To qualify for an Incomplete, a student:

1. Must contact (e.g., phone, email, etc.) the instructor or secretary before or during missed portion of class.
2. Must be passing the course prior to that part of the course that is not completed
3. Must make up the incomplete work through the instructor of the course
4. Must see the Instructor. All missed work must be finished before last two weeks of the following term.

University policies on sexual harassment, and religious holidays, and information on services for students with disabilities

Please visit the following websites:
http://academic.fiu.edu/
http://drc.fiu.edu

Course Policies:

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- **Late Homework:** Late homework will not be accepted and will not be graded.
- Students are encouraged to ask questions and to discuss course topics with the instructor and with each other.
- **Any work submitted should display the student's name and should be signed, as the students' own work, and that no unauthorized help was obtained.**
- Cell phones, communicators, MP3 players, head sets are not allowed to be used in the class.
- **DO NOT** send any assignments, homework or projects by email.
- Attendance is required. Students are required to attend every lecture. You are fully responsible for all materials covered in class.
- The professor reserves the right to change course materials or dates at any time during the semester.
- The professor reserves the right to change or modify the syllabus at any time during the semester.
- The services of Turnitin.com will be used.
- The services of Honorlock will be used. The minimum requirements and the details of Honolock are described at https://fiuhelp.force.com/canvas/s/article/Honorlock-students
- The services of Zoom will be used, and lectures might be recorded based on what the Professor chooses. Zoom is a video conference tool that students can use to interact with the professor and fellow students by sharing screens, chatting, broadcasting live video/audio, and taking part in other interactive online activities. Zoom will be used to conduct lectures, office hours, and questions about the course and assignments.
- Actively participate in class by asking questions, answering instructor's questions and interact with your peers as directed by the instructor. Because this course works like a system your active contribution and participation are essential for the success of the course.

- Do not disturb and disrupt the class by talking to each other, using the classroom computers, typing on the keyboards, engage in other activities that do not relate to the class.
- No food or drinks are allowed in classroom.