

SPRING 2024

WELCOME TO PHY6347 - ELECTROMAGNETIC THEORY 2!



COURSE DESCRIPTION

PHY 6347 - Electromagnetic Theory 2 is the second semester of the graduate core sequence in Electromagnetism.

- **Class:** MWF Per. 7 (1:55-2:45 pm)
- **Prerequisite:** PHY 6346 - Electromagnetic Theory 1



INSTRUCTOR INFORMATION



Prof. Imre Bartos

- Office: NPB 2025
- Phone: (352) 392-3582
- Email: imrebartos at ufl.edu
[\(<https://ufl.instructure.com/conversations#filter=type=inbox>\)](https://ufl.instructure.com/conversations#filter=type=inbox)
- Office Hours: MW Period 6 (12:50-1:40 pm)



INCLUSIVITY

Physics, like all human endeavors, is something that is learned. Physics is practiced and advanced by a scientific community of individuals with diverse backgrounds and identities and is open and welcoming to everyone. I recognize the value in diversity, equity, and inclusion in all aspects of this

course. This includes, but is not limited to differences in race, ethnicity, gender identity, gender expression, sexual orientation, age, socioeconomic status, religion, and disability.

My aim is to foster an atmosphere of learning that is based on inclusion, transparency, and respect for all. I acknowledge the different needs and perspectives we bring to our common learning space and strive to provide everyone with equal access. I hope you truly believe, as I do, that by meeting the prerequisites, you belong in this physics class and are well-positioned for success.

Please don't hesitate to contact me with any concerns, or with any suggestions for improving the inclusivity of this course.



COURSE OBJECTIVES AND OUTLINE

Objectives:

1. Study electrodynamics at a theoretically sophisticated level.
2. Develop mathematical techniques useful for solving problems in E&M as well as other areas of physics.
3. Develop problem solving skills.
4. Connect learned material to research applications.

Outline:

- **Confined geometries**: waveguides, cavities, dielectric waveguides/fibers, losses and attenuation.
- **Radiation** from harmonic sources: dipole and higher multipoles, linear antenna, vector spherical harmonic expansion.
- **Scattering and diffraction**.
- **Special relativity**: Lorentz transformations, space-time vectors and tensors, proper time, velocity and acceleration as 4-vectors, energy-momentum, covariant formulation of electromagnetism.
- **Accelerated charges**; Cherenkov and synchrotron radiation, radiation losses.



TEXTBOOK

- Jackson: Classical Electrodynamics (3rd edition)

- Zangwill: Modern Electrodynamics (optional)



TECHNICAL SUPPORT

- **Canvas** (<http://helpdesk.ufl.edu/>)
 - Please contact the UFIT Help Desk:
 - (352) 392-HELP (4357)
 - <http://helpdesk.ufl.edu> (<http://helpdesk.ufl.edu>)
 - helpdesk@ufl.edu (<mailto:helpdesk@ufl.edu>)



COURSE POLICIES

- **Attendance Policy**
 - You are expected to attend lecture MWF as scheduled. You are also encouraged to attend office hours to clarify any doubts arising from your studies.
- **Lecture Slides Policy**
 - I will post my slides before class in case you would like to take notes on them.
- **Homework Policy**
 - Homework is due Wednesdays at 11:59 pm.
 - It is permissible to seek assistance on homework from me, or your classmates. This assistance may include help with interpreting the problem, identifying relevant information in the textbook or course videos, or identifying one's errors. Ultimately, however, submitted answers must be your own.



COURSEWORK AND GRADE

Class participation: A useful way to learn the material we discuss in class is to be present, be engaged and ask questions. Asking questions is also an important tool of scientific engagement that is essential when, e.g., attending conferences or research seminars. A part of your grade will come from the (qualitative) measure of your attendance of and engagement with the lectures and the final presentations of your classmates.

Homework: We will have weekly homework during the semester.

Exams: The class will cover 5 main topics during the semester (see above). We will finish each of these topics with an exam, which will take place during class. Each exam will be worth 10% of the final grade. For these exams, you can use any electronic / printed / handwritten materials but your internet connection must be turned off.

Final presentation: To connect the covered material with applications and state-of-the-art research, each student will give a 15-minute seminar style presentation on an original research paper of their choice (i.e. not review articles). The research paper will need to be related to the material covered in class, and ideally be from the subfield the student is planning to conduct research in.

Grades in the course are awarded based on an overall course score calculated as follows:

Assignment	Grade Percentage
Class Participation	10%
Homework	20%
Exams	50%
Final Presentation	20%



GRADE SCHEME

There is no curve in this class; if you earn at least 85% of the available points in this class, you will get an A, and so on down the list:

Grade	Range
A	100% to 85%
A-	< 85% to 80%
B+	< 80% to 75%
B	< 75% to 70%
B-	<70% to 65%
C+	< 65% to 60%

Grade	Range
C	< 60% to 55%
C-	< 55% to 50%
D+	< 50% to 45%
D	< 45% to 40%
D-	< 40% to 35%
E	<35%



UNIVERSITY POLICIES

• UNIVERSITY POLICY ON ACCOMMODATING STUDENTS WITH DISABILITIES

- Students requesting accommodation for disabilities must first register with the [Disability Resource Center \(http://www.dso.ufl.edu/drc/\)](http://www.dso.ufl.edu/drc/) (352-392-8565) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodations. Students with disabilities should follow this procedure as early as possible in the semester. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations. Students may also find these links to the accessibility features of [Zoom \(https://zoom.us/accessibility\)](https://zoom.us/accessibility) and [Mastering Physics \(https://support.pearson.com/getsupport/s/article/Mastering-Accessibility-for-Users-with-Disabilities\)](https://support.pearson.com/getsupport/s/article/Mastering-Accessibility-for-Users-with-Disabilities) helpful, as well as information about [accessibility at UF \(https://accessibility.ufl.edu/\)](https://accessibility.ufl.edu/).

◦ Accessibility Policies and Resources

[\(https://zoom.us/accessibility\)](https://zoom.us/accessibility) [\(https://support.pearson.com/getsupport/s/article/Mastering-Accessibility-for-Users-with-Disabilities\)](https://support.pearson.com/getsupport/s/article/Mastering-Accessibility-for-Users-with-Disabilities)

- [Accessibility at UF \(https://accessibility.ufl.edu/\)](https://accessibility.ufl.edu/)
- [Academic Support for UFO \(https://ufonline.ufl.edu/resources/academic-support/\)](https://ufonline.ufl.edu/resources/academic-support/)
- [Student Support Services \(https://oas.aa.ufl.edu/programs/uf-sss/\)](https://oas.aa.ufl.edu/programs/uf-sss/)

• UNIVERSITY POLICY ON ACADEMIC MISCONDUCT

- Academic honesty and integrity are fundamental values of the University community. Students should be sure that they understand the [UF Student Honor Code \(https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/\)](https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/).
- **University Honesty Policy**
 - UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest

standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The [Honor Code \(https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/\)](https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

- **NETIQUETTE (COMMUNICATION COURTESY)**

- All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions.

- **COURSE EVALUATION**

- Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Please see the [guidance on how to give feedback \(https://gatorevals.aa.ufl.edu/students/%C2%A0\)](https://gatorevals.aa.ufl.edu/students/%C2%A0). Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or directly via the [GatorEvals \(https://ufl.bluera.com/ufl/\)](https://ufl.bluera.com/ufl/) website. [Summaries of course evaluation results \(https://gatorevals.aa.ufl.edu/public-results/\)](https://gatorevals.aa.ufl.edu/public-results/) are available to students.

- **ATTENDANCE AND MAKE-UP POLICY**

- Excused absences and allowances for make-up work are consistent with [university attendance policies \(https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/#absencestext\)](https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/#absencestext). [_\(http://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/#absencestext\)](http://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/#absencestext) and require appropriate documentation.

- **SOFTWARE USE**

- All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

- **STUDENT PRIVACY**

- There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see the [FERPA \(http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html\)](http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html) page by the Registrar.



HEALTH & WELLNESS RESOURCES

- *U Matter, We Care*
 - If you or someone you know is in distress, please contact umatter@ufl.edu, [\(mailto:umatter@ufl.edu\)](mailto:umatter@ufl.edu) (352) 392-1575, or visit [U Matter, We Care website \(https://umatter.ufl.edu\)](https://umatter.ufl.edu) to refer or report a concern and a team member will reach out to the student in distress.
- *Counseling and Wellness Center* (<https://counseling.ufl.edu>)
 - Visit the [Counseling and Wellness Center website \(https://counseling.ufl.edu\)](https://counseling.ufl.edu) or call (352) 392-1575 for information on crisis services as well as non-crisis services.
- *Student Health Care Center*
 - Call (352) 392-1161 for 24/7 information to help you find the care you need, or visit the [Student Health Care Center website \(https://shcc.ufl.edu\)](https://shcc.ufl.edu).
- *University Police Department* (<https://police.ufl.edu>)
 - Visit the [UF Police Department website \(https://police.ufl.edu\)](https://police.ufl.edu) or call (352) 392-1111 (or 9-1-1 for emergencies).
- *UF Health Shands Emergency Room / Trauma Center*
 - For immediate medical care call (352) 733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608. Visit the [UF Health Emergency Room and Trauma Center website \(https://ufhealth.org/emergency-room-trauma-center\)](https://ufhealth.org/emergency-room-trauma-center) for more information.