Physics 4351b: Electromagnetic Theory II

Covid-19 Edition, Winter 2021 (Version 1.2, January 27, 2021)

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Office Hours: These will be on-line with times set via an OWL poll

Method of Delivery: This is a blended course. We will physically meet in our classroom (UCC-56) only once, for the second midterm test. There will also be an in-person final exam scheduled by the University. All instruction will be on-line. Both synchronous and asynchronous modes of instruction are supported.

- *Synchronous Instruction*: I will lecture (via Microsoft Teams) at our scheduled class times (M/W/F 9:30-10:30am). The class will be a typical "blackboard" lecture, but captured via my iPad and displayed on the shared screen. Each lecture will generate a pdf (my handwritten lecture notes) and video of the lecture. I will post the pdf lecture notes on the course's OWL site, and I will share the lecture video via Microsoft Stream.

- *Asynchronous Instruction*: All synchronous lecture material is posted, either on OWL or on Microsoft Stream, and can be accessed and viewed at any time. The lecture notes and videos will remain posted for the entire duration of the course.

I hope many of you will choose to attend the synchronous lectures. The regular lecture schedule provides a structure to the course that will help you keep pace. In addition, you can ask questions during the lectures.

You must have access to the following software tools:

Software tool	Used for...
Web Browser for OWL	Course announcements, grades, pdf lecture notes, assignments
Microsoft Teams	Synchronous lectures, office hours
Microsoft Stream	Lecture videos
Zoom	Midterm 1

As all Western students have a Microsoft Office 365 subscription, these tools are available for free. Note that the web-based Office 365 tools are sufficient for the course.

Text: *Introduction to Electrodynamics, Fourth Edition*, by David J. Griffiths. This is the same text as used in Physics 3300A (Electromagnetic Theory I). I will follow this text very closely. The 3rd Edition can also be used in pinch as the changes between editions is small.

I will also briefly discuss quantization of the electromagnetic field, a topic not covered in the Griffiths text. Here I will use Sections 14.2 (The Hamiltonian for the Electromagnetic Filed) and 14.3 (Quantizing the Radiation Field) from *A Modern Approach to Quantum Mechanics, 2nd Edition*, by John S. Townsend. As this is the text for Quantum Mechanics I (Physics 3200B) and Quantum Mechanics II (Physics 4251A), all students should have access to this supplementary material.

Prerequisite: Physics 3300a. Success also requires a good command of vector calculus.

Content: This course covers Chapters 8 through 12 of the Griffiths text. Topics include:

- Chapter 8: Conservation Laws
- Chapter 9: Electromagnetic Waves
- Chapter 10: Potentials and Fields; Quantizing the Radiation Field
- Chapter 11: Radiation
- Chapter 12: Relativistic Formulation of Electromagnetism

Evaluation: Four assignments, two mid-term tests, and a final exam will determine your grade. Both the mid-term tests and the final exam are in-person exams.

Component	Date	Weight
Assignment 1	Friday, January 22	7.5%
Assignment 2	11:59pm Sunday, February 7	7.5%
Midterm 1	Wednesday, February 10 (Zoom)	15.0%
Assignment 3	Friday, March 12	7.5%
Midterm 2	Wednesday, March 24	20.0%
Assignment 4	Friday, April 9	7.5%
Final Exam	Final exam period: April 12-23	35.0%

Details.-

1. There are two mid-term tests worth 35% of your final grade (15% for the first test and 20% for the second). The dates are in the table above. The first mid-term will test the entire course up to that point, while the second mid-term will test mainly material covered since the first test.

2. The first midterm will be remotely-proctored using Zoom. This is necessary as, at the time of writing, all in-person course components have been delayed until after Reading Week.

3. There is a final exam during the April examination period worth 35% of your grade. The final exam is a three hour, cumulative test of the entire course.

4. The remaining 30% of your grade will come from four problem sets (worth 7.5% each). The due dates for the problem sets are in the table above and are tentative.

5. The midterms and final are closed-book exams. A formula sheet will be provided. This will include the inside front and back covers of the text (Vector derivatives; Fundamental theorems; Basic equations of electrodynamics; Fundamental constants; Spherical and cylindrical coordinates). No other notes or aids will be allowed.

6. A Sharp EL-5xx series calculator, or other calculator without text capacity, is permitted during the tests. No other electronic devices, are permitted.

Additional Course Policies:

- **Passing Grade**: To obtain a passing grade in this course you must satisfy two criteria: (1) obtain a weighted-average of at least a 50% on all course components, and (2) obtain a weighted-average of at least 50% on the two midterms and the final exam. This policy <u>does not imply</u> that if you fail a test, you fail the course.

- **Late Assignments:** Late assignments will be penalized 15% per day for up to five days. Weekends are included in the day count. Assignments will not be accepted after five days.

- **Missed Midterms:** Students can self-report absences for course components worth less than 30% of the course final grade. Log into the Western Student Centre (student.uwo.ca), click on the Self-Reporting Absence link, and follow the instructions. The complete self-reporting policy is described here:

  Link: www.uwo.ca/sci/counselling/procedures/academic_consideration_for_absences

  Each test will have a single make-up if necessary. If a student cannot make the scheduled make-up, their other test components will be re-weighted as follows:

  - **Missed midterm 1**: The 15% will be placed as an extra 5% on midterm 2 and an extra 10% on the final exam. Therefore midterm 2 will be worth 25% and the final exam, 45%, of the final grade.
  - **Missed midterm 2**: The 20% will be placed on the final exam, making it worth 55% of the final grade.
  - **Missed both midterm 1 and 2**: The 35% will be placed on the final exam, making it worth 70% of the final grade.

- **Missed Final Exam:** Documentation must be provided to an academic counsellor in your home faculty in order for you to receive permission to write a make-up (usually scheduled for May 1). If you miss the make-up, documentation must be again provided, and you will write the exam at the next sitting of this courses final exam (typically one year later).

- **Final Grade Distribution:** The Department of Physics and Astronomy, in rare cases, may adjust the final course marks in order to conform to Departmental policy.

Academic Misconduct: Scholarly offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, in the following pdf document:

www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

- **Cheating:** University policy states that cheating is a scholastic offence which can result in an academic penalty, including expulsion from the program. If you are caught cheating, there will be no second warning. Cheating also includes having available any electronic devices other than a watch and an approved calculator at tests and exams. You may not have a cell phone accessible during tests or exams, even to use it as a calculator or watch.

- **Plagiarism:** Students must write their essays and assignments in their own words. Whenever students take an idea or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing (such as footnotes or citations). Plagiarism is a major academic offence.

  The most common form of plagiarism in a course such as Physics 4351 is for students to copy solutions from the Instructors Solutions Manual for the Griffiths text. Be aware that it is quite easy for me to detect solutions copied from the Solutions Manual.

  My experience is that attempting to do the course assignments yourself has a net positive effect on your mark, even if you lose marks on the assignments. This follows from the weighting of the course components in which 70% of the marks come from tests and exams in which you will not have access to solutions. Note that working on problems in a group and discussing solution approaches is not a form of plagiarism. However each student must submit solutions in his or her own words. Identical assignments will be treated as a case of plagiarism.

Student Support: Students who are in emotional or mental distress can find many options to seek help at Health and Wellness Western.

Link: www.uwo.ca/health/psych

Religious holidays: For purposes of this policy, the University has approved a list of dates which are recognized religious holidays which require members of those religions to be absent from the University; this list is updated annually and is available at Departmental, Deans' and Faculty advising offices.

Accessibility: Please contact me if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) for any specific question regarding an accommodation.

Link: academicsupport.uwo.ca