PHYC50-2019: Electromagnetic Theory

Course Instructor:

Prof. Salam Tawfiq Office: SW-511 Tel: 416-287-7243

e-mail: tawfiq@utsc.utoronto.ca

Course Meeting Times

Lectures: 2 hours / week & Tutorial: 1 hour / week

Office hours: Monday 13.00-14.00 and Wednesday 13.00-14.00 or by appointment

Textbook and References

Introduction to Electrodynamics, by ***David J. Griffiths,*** 3rd or 4th edition *(Prentice Hall).*

This book is one of the best-written books in this subject. Most students like the language and the style of the book. We will follow the book very closely, any material, which is not covered in the book will be delivered by the instructor and posted on Blackboard.

References:
Edward M. Purcell, Electricity and Magnetism, Second Edition (McGraw-Hill) (different approach than Griffiths);

G. Pollack and D. Stump, Electromagnetism, Addison-Wesley, 2002.

A. Zangwill, Modern Electrodynamics , Cambridge University Press, 2012

Course Objectives

The primary objective of the course is for students to gain a working knowledge of electromagnetism including electric and magnetic fields, potentials, and their sources using the language and more advanced tools of mathematics to obtain physical insights into their behavior. Students will

Analyze and apply electric and magnetic field concepts. What are sources of static EM fields?

How do boundaries affect the physics? How do different sources and geometries produce different field configurations? What energies are involved? How do we analyze magnetostatics? How is energy propagated in EM waves? Mostly for classical fields both in free space and in matter.

Academic Expectations: Collaboration

Attendance and Participation is expected to be mandatory were students are encouraged to attend for both tutorials and lectures, which is very important to better understand the material covered.

Adhering to high standards of academic integrity is an important part of your undergraduate experience. The standards are obvious when it comes to exams.

Collaboration, such as working with others to conceptualize a problem, define approaches to the solution, or debug code, is often a gray area, and faculty in different courses may have different approaches to this issue.

In this course, discussion is allowed as long as it is identified. Plagiarism, such as copying someone else's solution or from other sources, such as Internet, is not allowed. The write-ups must always be your own. Modifying someone else's Assignment to make it your "own" is unacceptable. In case of doubt, consult the course instructor.

If you choose to collaborate with other students on the homework problems, indicate their names and the nature of your joint work. Ensure that your collaborator does the same on his/her assignment. A useful discussion of these issues may be found at http://ctl.utsc.utoronto.ca/home/integrity.

E-Mail: I will only respond to e -mails sent from a recognized University of Toronto address. Please put PHYC50 in the subject line of any course-related e-mails. Will try to respond within 24 hours during Monday to Friday. ***I will not accept solutions to Assignments via e-mail.***

Assignments, Tests & Exam

- There will be two midterm Tests to be held according to the Registrar's schedule.
- There will be 5 to 6 problem during the semester with 4 to 5 problems in each Assignment.
- During the last two weeks (exam period, as set by Registrar's office) there will be a comprehensive final exam, which covers all the material.

Problem Set Policy & Submission Checklist

1. Stable all pages of each set before coming to class after writing your name & student number. Penalties may be assigned to assignments with pages that are not stapled together.
2. The Instructor reserve the right to send the assignment paper(s) to TURNITIN service in case there is significant overlap with publisher notes or solutions.
3. Each homework problem must be on a separate sheet of paper. If you need more than one sheet you should staple them together.
4. You need to attempt all questions on the assignment though only 3 questions only will be graded from each problem set. Missing any problem mean 20% deduction will be applied.
5. Turn paper copies in before class starts on the due date. No late work will be graded. If it is submitted the same day after the lecture, a penalty of 50% will be applied. No paper will be accepted after 5.00 PM on the due date.
6. When collaborating, be sure to write the name(s) of those you discuss with on the top of your homework.

Note that collaboration is not sharing code files or copying someone's answers. It is discussing concepts and asking questions to help clarify your own difficulties with the problem set.

For all graded problems, in addition to any mathematical work, I expect clear written statements at each stage in the solution. Full marks will not be awarded without this.

Another problem that sometimes arises is that of legibility. It takes a lot of time to grade problems for the marker. You will likely be more successful on your problem sets if you do what you can to not frustrate the marker. Please put some effort into ensuring that your work is clearly written.

In case some problem sets require the use of computers. Programming with Python, Mathematica (or MATLAB) is not an end in itself but a means to investigate more complex phenomena using visual, analytic and numerical methods. The code itself is not an adequate solution to the problem; you must interpret your results and answer the questions posed. You should approach the problem with the goal to understand and explain the physical phenomena investigated and the behavior of the system for variations of the parameters.

Grading: ***(Tentative and will be discussed with students)***

ACTIVITIES	PERCENTAGES
Problem sets	20%
Two Midterm tests	30% (15% each test)
Final exam	42%
End of term paper	8%
Note: There is ***No makeup tests in this course***, if you miss test-1, for acceptable documented reasons, then test-2 will worth 30%, however, if you miss test-2 your final exam worth 60%	

The tentative calendar below provides information about the Topics covered in this course. This schedule follows the textbook by ***David J. Griffiths***. However, you may use other books that cover the same topics.

CHAPTER #	TOPICS	
Chapter-3	Review of Electrostatics & Magnetostatics (first class) , then Method of Images & Laplace's equation	Week-1
Chapter-3	Boundary Conditions & Separation of Variables	Week-2
Chapter-3	Multipole Expansions & Electric Field of a Dipole	Week-3
Chapter-4	Polarization & Dielectric	Week-4
Chapter-4	Boundary Value Problems & Energy and Forces	Week-5

CHAPTER #	TOPICS	
Chapter-6	Bound Currents & Ampere's Law in Magnetized Materials	Week-6 & 7
Chapter-7	Linear and non-Linear Media & Inductance and Maxwell's Equations	Week-8
Chapter-8	Charge and Energy & Poynting's Theorem	Week-9
Chapter-8	Momentum, & Maxwell's Stress Tensor	Week-10 & 11

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and the Access*ability* Services at UTSC as early as possible in the term. The Access*ability* Services will determine reasonable accommodations for this course.

GOOD LUCK