P301 - Electricity and Magnetism
Fall Semester 2017
COURSE INFORMATION

Instructor

Dr. Gregory W. Clark	Department of Physics, SCIC 112
Office Hrs :	Mondays & Wednesdays, 11:00 - 11:50 AM and by appointment.
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The Course

The electromagnetic interaction is one of the most basic interactions of the physical world. The theory of electricity and magnetism is the most complete classical physical theory that we have and has far-reaching implications in modern physics. PHYS 301 will build upon the basic understanding that you gained of electromagnetism in General Physics and introduce you to many new physical and mathematical ideas. The skills and concepts you learn in this course will serve you well. This course is designed for the needs of majors in physics, engineering science, and other majors in the sciences.

Text and References

David J. Griffiths, **Introduction to Electrodynamics**, Fourth Edition (Prentice Hall, 2013). This is a great text that is written in a nice, friendly and flowing style making it rather pleasant reading. Readings and assignments will be from the text or handouts. We will spend the semester concentrating on electrostatics and magnetostatics, so I hope to cover chapters one through eight (with perhaps just a tiny bit from four and six). It is often helpful to refer to alternative approaches to material, so I encourage you to peruse the texts that are available in the library and the Math/Physics Study Room (SCIC 113) as well as the wealth of materials available on the Web. Homework solutions will be placed in a folder in the Physics Study Room; please do not remove these solutions from SCIC 113.

Class Meetings

Classes will be held from 9:00 to 10:50 AM on T & R in SCIC 202. Please do not be late - tardiness will result in a deduction of Class Participation points. Discussion and dialogue are encouraged. Be sure to stop us at any time to ask questions if things are unclear! We will frequently work in *informal groups*, and sometimes *formal groups* during class (as in General Physics). Participation in class discussion and group work is mandatory. It is **your** responsibility to inform me of any anticipated absences from lecture or exams.

You will get the most out of class by reading the material beforehand; consider this a course requirement. I will give you a reading assignment every day. We will occasionally have pop-quizzes to help motivate timely reading. I will keep you updated on what sections and chapters you should be studying. We will cover chapters 1, 2, 3, 4 (partial), 5, 6 (partial), 7, and some of 8 (in pretty much that order). Portions of the remainder of the text will be covered in the companion semester to this course, PHYS 425, *Field and Wave Phenomena.*

Keep in mind that our goal is not only to learn about classical electricity and magnetism, but it is also to understand the formalism and method that lies behind it. The framework which underlies electromagnetism describes the most complete physical theory that we have and is emulated in other areas of physics, so you will be likely to encounter it again! Chapter 1 of the text will focus on a review of much of the relevant mathematical formalism.

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Homework, Examinations, and Grading

Homework will be assigned daily. Homework assigned on Tuesdays is due by 6:00 PM the following Friday; homework assigned on Thursday is due the following Tuesday by 6:00 PM. No late assignments will be accepted, except under extreme circumstances. This is, of course, meant to keep us all at the same pace. Be forewarned that it is not unusual for problem solving at this level to involve multiple sheets of paper! All assignments will be posted on the course web site at *http://users.manchester.edu/facstaff/gwclark/PHYS301/phys301hw.htm*.

For most problems you will find that it is best to work out the solutions on scrap paper and then write-up the solution in a well-organized final form to be turned in. Please use only one side of the page for all work, include your name, date, and course number on the upper-right hand corner of each page, and give yourself plenty of space. All problems should include an explanation of the problem, indicating clearly all known variables/quantities and any assumptions, a sketch of the problem (if relevant), a logical, readable, and flowing presentation of the solution, algebraically correct manipulation of variables, a boxed or circled answer, and any relevant analysis or justifications of your answer. If you use *Maple* or other computer software to help you with assignments, please include a printout of your work with the assignment. Please review the homework guidelines from General Physics; if you follow those, you'll be in good shape (see below). Plagiarism in any form (copying from classmates or solution manuals, data mining results, *etc.*) is forbidden and will result in failure of the work involved or from the course.

For some homework assignments you will find it helpful to use Maple 16, an advanced mathematical problem solving software package, which is available on the campus network. Students may purchase discounted copies of the software for their personal use; details will be forthcoming. If you use any software to help with your problem solving you must include a copy of the work with your homework submission.

Examinations will be given on three dates during the semester. There will be two regular examinations: Thursday, 28 Sept 2017, & Thursday, 02 Nov 2017. The *cumulative* final exam will be given during Final Exam Week; the date/time will be announced by the Office of the Registrar.

Grading will be based on homework and exam performance. The grade distribution will be:

Total Class Participation, Quizzes, and Homework score	24%
Each Regular In-class Exam (28 Sept & 02 Nov 2017)	23%
Final exam (To be announced)	30%

It is vitally important the you ask many questions as we go through this semester. Please stop me in class if needed and see me outside of class as you need to. Work together with and challenge your classmates. I think you will find the theory of electromagnetism both challenging and fascinating!

Academic Integrity

Academic dishonesty in any form is a serious offense. Academic dishonesty includes, but is not limited to, cheating on exams or quizzes; submitting another's work as your own, in whole or in part; failing to correctly cite any sources used; and falsifying documentation. All written and oral assignments must be your original work and may not be submitted concurrently with another class without specific written permission of both instructors. Academic dishonesty will not be tolerated, and may result in failure on the assignment or in the course. It is your responsibility to know what constitutes academic dishonesty; ignorance of the policy is not a valid excuse. Please consult The Source Handbook for the specific university policy. It is your responsibility to know what constitutes plagiarism; please address any questions about plagiarism before any assignment is due.

Be sure you know Maxwell's Equations from memory:

Differential Form:

$$\vec{\nabla}\cdot\vec{E} = \frac{\rho}{\varepsilon_o} \qquad \vec{\nabla}\times\vec{E} = -\frac{\partial\vec{B}}{\partial t}$$

$$\vec{\nabla}\cdot\vec{B} = 0 \qquad \vec{\nabla}\times\vec{B} = \mu_o\varepsilon_o\frac{\partial\vec{E}}{\partial t} + \mu_o\vec{J}$$

Integral Form:

$$\oint\vec{E}\cdot d\vec{a} = \frac{Q_{f,encl}}{\varepsilon_o} \qquad \oint\vec{E}\cdot d\vec{l} = -\frac{d}{dt}\int\vec{B}\cdot d\vec{a}$$

$$\oint\vec{B}\cdot d\vec{a} = 0 \qquad \oint\vec{B}\cdot d\vec{l} = \mu_o I_{f,encl} + \mu_o\varepsilon_o\frac{d}{dt}\int\vec{E}\cdot d\vec{a}$$

For your convenenience ... (also available on the course website)

General Physics - Homework Checklist

___ Name, course number, assignment number on upper right corner of each page.
___ Questions/problems clearly labeled in left margin in requested format (*i.e.,* Q 2-5, P 4-34).
___ Staple in upper left-hand corner.
___ Only one side of the page of 8.5" × 11" loose-leaf paper used (please, no pages ripped from spiral-bounds).
___ Handwriting is legible and work is well-organized.
___ Appropriate variable names are used for all physical quantities (*e.g.*, m for mass, v for velocity).
___ All physical quantities should include correct units.
___ Insure that the work you turn in is your own and not copied from a classmate or data-mined from the web.

For all questions, you should include ...
___ a brief summary of the question (so you can understand it without the text).
___ a reproduction of any relevant figures from the text and/or your own relevant sketches.
___ a statement of the overlying principle behind the question.
___ the use of appropriate variable names for all physical quantities.
___ clear, well-labeled sketches, free-body diagrams, vector diagrams, before/after sketches (when applicable).
___ answers to the questions with an explanation as to the reasoning behind your responses. Answers without any explanation will be given zero credit.

For all problems, you should include ...
___ a brief summary of the problem (so you can understand it without the text).
___ a statement of the overlying principle behind the problem (your starting point) and any associated equations.
___ a list of all given quantities in complete mathematical statements (including units and any conversions).
___ the use of appropriate variable names for all physical quantities.
___ a reproduction of any relevant figures from the text.
___ clear, well-labeled sketches, free-body diagrams, vector diagrams, before/after sketches (when applicable).
___ a clear definition of a coordinate system, if applicable.
___ a series of statements on how you are solving the problem (narrative).
___ any suitable graphs generated from a spreadsheet, Maple, or MATLAB.
___ a copy of any Maple or MATLAB (or other) code used to solve any aspect of the problem.
___ any blank formulae that you are using for the solution
___ complete and valid mathematical and algebraic statements in a logical order.
___ final result/answer boxed or circled expressed as a complete mathematical statement with a reasonable number of significant figures and appropriate units.
___ a reflection on your final result (Does it make sense? What does it mean?).

Manchester University Essential Information

Title IX student conduct reporting requirement

Manchester University is committed to fostering a safe community where the infinite worth of all individuals is respected. Title IX and institutional policy prohibit discrimination on the basis of sex and gender identity. Consequently, sexual misconduct-including harassment, domestic and dating violence, sexual assault, and stalking - is also prohibited at Manchester. Faculty, staff and administrators encourage anyone experiencing sexual misconduct, dating/domestic violence, or stalking to talk to someone about what happened, so they can get the support they need and Manchester University can respond appropriately.

If you wish to speak confidentially with a Manchester employee/on-campus representative about an incident of sexual misconduct, please contact:

MU Counseling Services (260-982-5306)
MU Campus Pastor (260-982-5243)
MU Health Services (260-982-5306)
North Manchester Campus Victim Advocate (260-563-4407)

Off-campus resources include the following:
Hands of Hope (Service to North Manchester Campus-24/7 Hotline 260-563-4407)
Fort Wayne Sexual Violence Treatment Center
(Service to both Fort Wayne & North Manchester Campuses-24/7 Hotline 260-423-2222)
YWCA of Northeast Indiana (Domestic Violence & Sexual Violence: 260-447-7233)

If you wish to file a report of sexual misconduct, please contact: Dean of Student Experience/Title IX Coordinator Allen Michaelson at 260-982-5052 or/and Manchester University Campus Safety (260-982-5999)

If you have questions about institutional policies and procedures regarding sexual misconduct, please contact the Title IX Coordinator. If you would like to make a police report contact the North Manchester Police Department (260-983-8555) or Fort Wayne Police Department (260-472-1222).

You can learn more about Title IX and survivor support at the following websites:
https://www.manchester.edu/about-manchester/university-priorities/title-ix &
https://www.manchester.edu/student-life/care-initiative/care-intitiative-home.

Manchester University strives to uphold privacy and confidentiality as much as possible and only shares information received with those who have a need to know in order to respond. Individuals who desire anonymity in discussing and seeking assistance about sexual misconduct should contact and/or be referred to a confidential employee.

Student disability and reasonable accommodation policy

Manchester University, in compliance with federal guidelines, is committed to assuring students with disabilities equal access to programs and activities however, it is the student's responsibility to self-disclose the disability. Students who feel they may need an accommodation based on the impact of a disability should contact Mia Miller, the Disability Support Coordinator, to establish eligibility and to coordinate reasonable accommodations. Students whose accommodation requests are approved will be provided with confidential letters to deliver to their professors. Each letter verifies the disability and documents the need for auxiliary aids and services and/or academic adjustments/accommodations. Students are encouraged to meet with each professor early in the semester to discuss academic implications as they relate to each specific course and to request appropriate accommodation. The Disability Support Services office is in the Success Center (second floor of the Jo Young Switzer Center) and can be reached by phone at 260-982-5888 or 260-982-5499 to schedule an appointment.

Medical emergency evacuation schedule

Students should speak to the instructor immediately if (1) they may require medical attention during class, or (2) they have a disability, chronic condition, or a temporary injury that may limit or affect their ability to evacuate the classroom/building in an emergency. The student and the instructor should discuss the student's specific needs and the types of precautions that should be made in advance of such an event. In the event of a fire or other situation requiring emergency evacuation, students with ambulatory disabilities are to go with or without assistance to the nearest stairwell area. Faculty and staff will assist with evacuation management efforts until such time as the Campus Safety and/or Police and Fire Departments arrive on the scene to assist in student evacuation from the building. Elevators are not to be used for evacuation by any persons.

Students who need special arrangements in the event of an evacuation should also register with Mia Miller in the Success Center as early as possible in the semester to help facilitate the provision of needed emergency assistance.