COURSE INFORMATION – Fall 2020

Physics 333: Electricity and Magnetism (CRN: 70097)

Class: Speare 113, MWF 9:50–10:40 am

Zoom Office Hours `https://zoom.us/j/2128387113` Mon. and Wed. 16:00–18:00, or by appointment

Class Instructor: Dr. Richard Sonnenfeld
Office: Workman 347
Cell Phone: 575-838-7113 (until 10 pm)
Email: Richard.Sonnenfeld@nmt.edu

1 Content

1.1 Place of Phys 333 in the NMT Curriculum

Welcome to the first semester of Electromagnetic Theory. It is a required course for all Physics majors and is also an option for physics minors, electrical engineers, and geophysicists. While this course contains valuable material on its own, it also provides necessary foundations for Radiation and Optics (Phys 334).

1.2 Course Description & Prerequisites

Maxwells four short equations use the language of vector calculus to describe problems involving charge, current, voltage, electric fields, and magnetic fields. These equations will be developed and unpacked, with applications to statics and varying electric fields and magnetic fields, electric circuits, and dielectric materials. Conductors and conductivity of metals, semiconductors and gasses will be considered. Additional topics may include magnetic materials.

Prereq's: PHYS 1320 or PHYS 222; PHYS 242; MATH 332; transfer students may take PHYS 241 as a corequisite Coreq: MATH 335

1.3 Learning Outcomes

Course

Calculate fields and currents from common charge and current distributions. Apply magnetic induction in common situations. Comfortably use vector calculus to describe physics. Develop intuition about the effects that conductors/dielectric and magnetic materials have on electric and magnetic field.

Program

`https://www.nmt.edu/academics/physics/Outcomes.php`

1.4 Website

Canvas:

https://nmt.instructure.com/login/canvas

You can download assignments and upload your reading assignments and check your grades. (Log in with your 900 #).

1.5 Questions and Corrections in Lecture

I strongly encourage questions in lecture, and know it takes courage to ask a question in front of 20 of your peers. Questions make the lecture much more interesting and relevant for all. Extra credit points will often be given for questions, and always for corrections or clarifications.

1.6 Text and Supplementary Material

Required Textbook: *Introduction to Electrodynamics*, David Griffiths, 4th edition.

Supplementary Textbook: *Electricity and Magnetism*, Edward Purcell and David Morin, 3rd edition[1].

1.7 Recommended Technology

Laptop or Tablet with Touch-screen It will be helpful to have a touch screen in class to participate in "using the board".

Computer with large screen and video camera For home use, this is ideal. The same laptop that you bring to class is an adequate alternative.

Headset with built-in microphone Zoom works much better with a headset (rather than the on-board microphone of your laptop or tablet.

[1] I will have two copies of this book on Reserve at the library

1.8 Programming

Some problems will require numerical calculations. You may use any software that you are familiar with. I am personally familiar with Matlab and Python with matplotlib. I do not know Mathematica or Maple, so I will not be able to help you if you choose those. I will provide example python code in some cases.

2 Honesty

New Mexico Techs Academic Honesty Policy can be found at:
`http://www.nmt.edu/student-handbook`
It applies to all courses even if the instructor does not mention it. Here are some choice excerpts

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2.0 Academic Dishonesty and Academic Research Misconduct

2.1 Academic dishonesty is defined as an act of academic fraud. It could be any of the following:
2.1.1 Cheating: the use of unauthorized material during a test OR HOMEWORK ASSIGNMENT, or the act of
copying ANY ACADEMIC DOCUMENT from another student;
(There are answer keys for our text, and Chegg has lots of answers.  I do not support using these
sources for solutions.)
2.1.2 Plagiarism: the unauthorized use or use without proper citation of either someones published
work, unpublished material in someone elses computer files or material derived from the Internet;
2.1.3 Theft: any form of unauthorized procurement of academic documents, e.g., exams, student reports;
2.1.4 Falsification: any form of illegal alteration of academic documents for any purpose including
improper alteration of experimental data obtained in the laboratory;
2.1.5 Impersonation: the act of having another person substitute for oneself at an examination;
2.1.6 Obstruction: interference with or sabotage of the work of any other person including through
vandalism or theft;
2.1.7 Assistance: the act of helping another to commit fraud in any of the abovementioned ways.
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I have found Tech students to act honorably, with few exceptions. For those lapses of judgement I have taken actions ranging from failing the exam/homework in question to failing the student for the course, this is consistent with the handbook.

3 Grading

Your grade includes homework (45%), exams (45%), and Reading Assignments (10%).

3.1 Reading Assignments

You will be asked to read roughly one section a lecture. It is really important to actively read (which means checking derivations and making notes). However, all I will ask is for you to ask one or two questions about the reading assignment. Readings will be graded on a 10 point scale. Try to ask a specific question about what was unclear, or seemed contradictory or inconsistent with what you already knew. If you aren't confused at all, ask the kind of question that you think others might find confusing. I will use your questions to guide class discussion.

Reading assignments must be typed and submitted as .pdfs. Late reading assignments will incur a one point penalty per week.

3.2 Homework

Homework and its due dates are posted on Canvas. Homework shall be done on paper. If you are unable to attend the class where it is due, you may submit a scanned copy. The scan must be of high quality, ideally from a scanner, but a scanning app is acceptable. If the scan cannot be easily read, the homework will not be graded.

Homework **shall** be done one piece of paper (or more, if requred) per problem. This makes it easier to grade.

Problems should *almost always* show a 3x3 inch figure, the fundamental equations used, and an orderly series of steps leading from fundamentals to answer. Numerical answers without physical units are incomplete, and points will be deducted.

Each problem **shall** have the *SPN* on the top right corner, circled. Where appropriate, the final answer (either formula or number) **shall** be included in a box (or a different color) **next to** the problem number.

3.3 Exams

Exams are in-class "short" answer and take-home (posted in afternoon, due following morning). You may bring a scientific calculator but no notes to the in-class portion. Involved formulae like the Laplacian in spherical coordinates will be provided. Basic constants (e.g. charge of an electron) or physics laws (e.g. Gauss's Law, Ampere's Law) will not be provided. These should be memorized. You may use your textbook (but no web

resources) for the take-home portion. You may not collaborate on take-home exams. If an "in-class" exam is done via Zoom. I will ask you to sit in front of your (live) video camera during the exam[2].

4 Getting Help

I encourage you to form a homework team (live or Zoom) and will help connect you to other students if you need this help. Collaborating on homework to crack the solution is fine but the work you submit should be your own. I have added a "Discussion section" to Canvas if this is helpful for the homework.

I am glad to answer your questions on the discussion board of Canvas, in office hours, or via e-mail.

4.1 Disabilities

New Mexico Tech is committed to protecting the rights of individuals with disabilities. If you have (or think you may have) a Disability, visit the Office of Counseling and Disability Services (OCDS) with all speed and get a documentation letter. To schedule an appointment, please call 835-6619. Though OCDS is supposed to send a letter to all instructors, I would welcome an individual contact from you to make sure that I am aware of requested accommodations.

4.2 Sex 'n Drugs 'n Rock-n-Roll (and Family and Money)

I think I have covered the five areas of a college students life that can cause serious problems (though Rock-n-Roll in itself is rarely to blame). For those times when one of these gets out of hand, you should know that New Mexico Tech offers mental health and substance abuse counseling at OCDS. The confidential services are provided free of charge by licensed professionals. Also, Socorro Mental Health can be reached at 575-835-2444. Finally – if you need to talk to someone desparately in the middle of the night, there is the New Mexico Crisis line at 1-855-662-7474.

4.3 Emergencies and Cel Phones

Cel phones should be set to vibrate during class. You are all encouraged to register your cel-phone with Tech's emergency notification system.

4.4 Mutual Respect*[3]:

New Mexico Tech supports freedom of expression as well as a respectful learning environment. As stated in the New Mexico Tech Guide to Conduct and Citizenship: New Mexico Techs primary purpose is education, which includes teaching, research, discussion, learning, and service. An atmosphere of free and open inquiry is essential to the pursuit of education. Tech seeks to protect academic freedom and build on individual responsibility to create and maintain an academic atmosphere that is a purposeful, just, open, disciplined, and caring community.

4.5 COVID-19 Safety Issues for Face-to-Face Instruction*:

Students must follow campus-wide safety protocols, including mandatory use of face coverings and maintaining a minimum of 6 ft social distance from other students and faculty. Students should not enter the classroom earlier than 10 minutes prior to start of class, and should exit the classroom within 10 minutes of the end of class. Students who fail to comply are subject to disciplinary procedures.

4.6 Title IX Reporting*:

Sexual misconduct, sexual violence and other forms of sexual misconduct and gender-based discrimination are contrary to the Universitys mission and core values, violate university policies, and may also violate state and federal law (Title IX). Faculty members are considered Responsible Employees and are required to report incidents of these prohibited behaviors. Any such reports should be directed to Techs Title IX Coordinator (Dr. Peter Phaiah, 20D Brown Hall, 575-835-5187, titleixcoordinator@nmt.edu). Please visit Techs Title IX Website (`www.nmt.edu/titleix`) for additional information and resources.

Good luck, and have a great semester!

[2] You do not need permission to disable your camera briefly for Biobreaks

[3] All sections with *'s are boiler-plate from the Dean of Students.