Phys 333 – Electricity and Magnetism I

CLASS DETAILS:
• Meeting Info: TR, 11:30am-12:45pm Rm G04 White Hall
• Course Web Site: http://ulysses.phys.wvu.edu/~pcassak/phys333.html
• Instructor: Paul Cassak Rm 333 White Hall
• Contact Info: Paul.Cassak@mail.wvu.edu (304) 293-5102

OFFICE HOURS:
• In Room 333 of White Hall unless announced otherwise
• Wednesdays at 2:30-3:30pm + Mondays at 2:30-3:30pm (except for 9/23, 10/21, 11/18, and 12/2) + by appointment + whenever the door is open
• Please come by for help with concepts, homework, or other advice!

PREREQUISITES:
• Catalog says – PR: Phys 111 (General Physics 1) and Phys 112 (General Physics 2) or equiv. and PR or Conc.: Math 261 (Elementary Differential Eqs.)
• Also important – Math 251 (Multivariable Calculus)

COURSE OBJECTIVES AND EXPECTED LEARNING OUTCOMES:
This is the first of a two-semester sequence in classical electromagnetic theory at an intermediate level. The objectives of this course are to develop a deep understanding of electromagnetic fields and techniques used to solve problems in electromagnetism. This course is an essential part of a basic knowledge of physics – the topics in this course are germane to essentially every field in modern physics!

Three course goals are that after this semester, you will be able to:
(1) remember basic facts and equations of classical electromagnetic theory,
(2) understand mathematically and physically the aspects of classical electromagnetism discussed in the course, especially vector calculus, and
(3) be able to apply intermediate classical electromagnetic theory to systems of interest and analyze such systems.

From the undergraduate catalog, the topics we will discuss are: electrostatics, electrostatics in matter, magnetostatics, magnetostatics in matter. See the schedule for further details. This course cannot cover everything; the goal here is to build a foundation and expose you to many examples of its uses, which will prepare you to learn more theory and applications in the future. The textbook is methodical and very amenable to self-study. E&M has a very rich history that we will not have the time to cover – you’re encouraged to read about it!

TEXTBOOK:
• Required - Electromagnetic Fields (2nd Edition), Roald K. Wangsness
• Optional - Introduction to Electrodynamics (3rd Edition), David J. Griffiths

OTHER BOOKS OF INTEREST:
• A Student’s Guide to Maxwell’s Equations, Daniel Fleisch
• Electricity and Magnetism, Vol. II, Edward M. Purcell
• Div, Grad, Curl, and All That: An Informal Text on Vector Calculus, H. M. Schey
• The Feynman Lectures on Physics, Vol. II, Richard Feynman
CLASS EXPECTATIONS:
• This course has very different expectations than 100-level courses! Your focus should be on genuine physical understanding, not rote memorization. This means not just completing course activities for the sake of completing them. Explicitly pursue the generation of knowledge at all levels, from immediate recall on big picture concepts, to a deep physical and analytical understanding.
• It is expected that you will put forth a sincere effort. We will do some “active learning” techniques - please be willing to try it out and embrace their benefits.
• It is expected that you will read the book before class.
• Mere attendance is insufficient to obtain the desired level of understanding. Reading course resources, attending lectures, participating in classroom activities, and doing homework is necessary but not sufficient. You won’t deeply learn the material unless you choose to (and you put in the effort).
• It is expected that you will be considerate of your fellow classmates and myself.
  – Be at class on time and prepared for course activities.
  – Cell phones and computers should not be used during class time.

COURSE LOGISTICS:
The class will have traditional lecture on theoretical and mathematical aspects of the material and numerous examples. In addition, we may take some class time for problems to be done in small groups. Traditional homework will be assigned as well. Keep in mind, you are expected to spend 6-9 hours on this course outside of class. Two goals for the course are that (1) you are putting in that kind of effort and (2) you are spending this time on genuine educational activities. Using your time efficiently and purposefully is an important aspect of learning and doing physics.

HOMEWORK/QUIZZES:
• Homework is given approximately once a week; sometimes every 1 1/2 weeks.
• Problems in the homework are intended to challenge you beyond mere regurgitation. The problems are not chosen randomly – they often cover topics that would be covered in class if time allowed, or address aspects that often cause students trouble.
• If you’re stuck on homework, talk to your classmates or come see me for help!
• Feedback is appreciated - if homework assignments are too onerous, let me know!
• On days homework is due, a short quiz will be given at the beginning of class. Questions often come directly off the homework, but may also include “big picture” questions requiring a written answer. Quizzes also serve the purpose of providing a general feel for the style of questions that may appear on exams.

FESTIVALS OF KNOWLEDGE (AKA, EXAMS):
There are three scheduled “festivals of knowledge” (otherwise known as “exams”) in addition to the final festival of knowledge. Tentative dates are September 19, Thursday, October 17, and Tuesday, November 14, all of which are Thursdays (PLAN ACCORDINGLY!). The final is Thursday, December 19, 8-10am. Festivals will be taken during class time. Do not miss the scheduled times! Questions will not reward simple regurgitation of notes and homework. Success in science (and this class) comes from a deep understanding of the physics; the tests attempt to reward such an understanding.

EXAM ATTENDANCE POLICY:
Consistent with WVU policy, students absent from regularly scheduled examinations because of authorized University activities will be able to take them at an alternate time. Make-up exams for absences for any other reason are at the discretion of the instructor.
GRADING BREAKDOWN AND SCHEME:
Your grade will be based on the following materials with the given weighting:
• Homework (30%)
• Quizzes (10%)
• Class participation/group problem solving (10%).
• Festivals of knowledge (30% - that is 12% each, but your low score counts 1/2)
• Final festival of knowledge (20%)
Homework grading will be weighted to make more time consuming problems/assignments worth more points. Grades will be awarded roughly as follows:

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<th>Grade</th>
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<tr>
<td>A</td>
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Some regard will be paid to natural breaks in the grade distribution. I reserve the right to adjust grade scales (i.e., curve) in the interest of fairness and propriety if warranted.

In accordance with university guidelines, students will have their performance evaluated solely upon performance in the course work as measured against established academic standards (i.e., not prejudicially, capriciously, or arbitrarily) and every effort will be made to return graded materials within two weeks of submission.

GRADING POLICIES:
• Homework is due at the beginning of class on the day it is due. Homework turned in up to a week late will be graded by the same standards as on-time homework, but with a penalty of 50%. After one week, homework will be graded by the same standards, but no credit is given.
  o If you don’t finish on time, submit what you have and turn the rest in late!
• Partial credit on homework and festivals is awarded, so develop your ideas logically. Show your work (credit is for the process, not the solution!) and draw sketches as needed.
• Take pride in your work. If your solution is illegible, I can’t give credit.
• Grade appeals must be made within 1 week of the assignment being returned.

COLLABORATION POLICY:
Science is fundamentally a collaborative endeavor. It is very rare in the modern world for someone to sit alone in a room and make important contributions to science. Consequently, working together on homework is encouraged! However, an important balance must be reached. Copying someone else’s solution is not allowed in science, nor will it be allowed in this class. Collaboration on festivals is not permitted, so copying on homework would put you at a severe disadvantage during festivals.
• To approach the way science is really done, please include a list of collaborators and references used for the homework (other than the textbook or class notes) at the top of your homework. This list will have no bearing on your grade.
• An appropriate technique is to try the homework on your own first, then discuss it with your classmates, then try again on your own.
RELEVANT WVU POLICIES AND STATEMENTS

SOCIAL JUSTICE STATEMENT:

“West Virginia University is committed to social justice. I concur with that commitment and expect to maintain a positive learning environment based upon open communication, mutual respect, and nondiscrimination. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color or national origin. Any suggestions as to how to further such a positive and open environment in this class will be appreciated and given serious consideration.”

INCLUSIVITY STATEMENT:

“The West Virginia University community is committed to creating and fostering a positive learning and working environment based on open communication, mutual respect, and inclusion. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with the Office of Accessibility Services (304-293-6700). For more information on West Virginia University’s Diversity, Equity, and Inclusion initiatives, please see http://diversity.wvu.edu.”

SEXUAL MISCONDUCT STATEMENT:

“West Virginia University does not tolerate sexual misconduct, including harassment, stalking, sexual assault, sexual exploitation, or relationship violence [BOG Rule 1.6]. It is important for you to know that there are resources available if you or someone you know needs assistance. You may speak to a member of university administration, faculty, or staff; keep in mind that they have an obligation to report the incident to the Title IX Coordinator (https://titleix.wvu.edu/staff). If you want to speak to someone who is permitted to keep your disclosure confidential, please seek assistance from the Carruth Center, 304-293-9355 or 304-293-4431 (24-hour hotline), and locally within the community at the Rape and Domestic Violence Information Center (RDVIC), 304-292-5100 or 304-292-4431 (24-hour hotline). For more information, please consult WVU’s Title IX Office (https://titleix.wvu.edu/confidential-resources).”

STATEMENT ON THE SALE OF COURSE MATERIALS:

“All course materials, including lectures, class notes, quizzes, exams, handouts, presentations, and other materials provided to students for this course are protected intellectual property. As such, the unauthorized purchase or sale of these materials may result in disciplinary sanctions under the Campus Student Code.”

ACADEMIC INTEGRITY STATEMENT:

“The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, I will enforce rigorous standards of academic integrity in all aspects and assignments of this course. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the Student Conduct Code at http://www.arc.wvu.edu/admissions/integrity.html. Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see me before the assignment is due to discuss the matter.”
STATEMENT ON WEAPON POLICIES:

“West Virginia University would like to reassure the community that, regardless of recent changes in state laws permitting the concealed carry of weapons, including firearms, a different section of state code (61-7-14) permits the University to prohibit open or concealed carry of any firearm or deadly weapon on property within the custody or control of WVU. So while a person may be allowed generally to carry a concealed weapon without a permit, that permission will not extend to WVU property. Violation of this statute is a misdemeanor and can result in a fine of up to $1,000 and up to six months in jail, or both. In addition, it violates University codes of conduct, and for students can result in disciplinary action up to and including expulsion. For employees, it can result in termination.”

ADVERSE WEATHER STATEMENT:

“In the event of inclement or threatening weather, everyone should use his or her best judgment regarding travel to and from campus. Safety should be the main concern. If you cannot get to class because of adverse weather conditions, you should contact your instructor as soon as possible. Similarly, if your instructor(s) are unable to reach the class location, they will notify you of any cancellation or change as soon as possible, using agreed upon methods to prevent students from embarking on any unnecessary travel. If you cannot get to class because of weather conditions, instructors will make allowances relative to required attendance policies, as well as any scheduled tests, quizzes, or other assessments.”

STUDENT EVALUATION OF INSTRUCTION STATEMENT:

“Effective teaching is a primary mission of West Virginia University. Student evaluation of instruction provides the university and the instructor with feedback about your experiences in the course for review and course improvement. Your participation in the evaluation of course instruction is both strongly encouraged and highly valued. Results are strictly confidential, anonymous, and not available to the instructor until after final grades are released by Admissions and Records. Information about how you can complete this evaluation will provided by your instructor.”