PHYSICS 333 – Electricity and Magnetism I

CLASS DETAILS:
• Meeting Times: Tuesday/Thursday, 10:00-11:15am  
  Rm 201 Hodges Hall
• Course Web Site: Through http://ecampus.wvu.edu
• Instructor: Dr. Paul Cassak  
  Rm 107 Hodges Hall
• Contact Info: pcassak@mix.wvu.edu  
  (304) 293-3422, ext. 1458

OFFICE HOURS:
• In Rm 107 of Hodges Hall unless announced otherwise.
• Monday 4-5pm, Thursday 2-3pm + by appointment + whenever the door is open
• Please come by for help with concepts, homework, or other advice!

PREREQUISITES:
• Catalog says – PHYS111 & PHYS112 (or equiv.), MATH 261 (Elem. Diff. Eqs.)
• Also important – MATH 251 (Multivariable Calculus)

COURSE OBJECTIVES:
This course is the first of a two-semester sequence in classical electromagnetic theory at an intermediate level. The objective of this course is to develop a deeper 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 covered in this course are germane to essentially every field in modern physics!
• The topics to be covered are: electrostatics (Coulomb’s Law, Gauss’ Law, potential theory, field energetics, multipole techniques, the effect of matter, mathematical techniques), boundary conditions, and electric currents

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!)

EXPECTED LEARNING OUTCOMES:
Upon successful completion of this course, students will:
1) have developed a deeper physical understanding of electromagnetism.
2) have a deeper appreciation of the mathematics of classical electromagnetic theory.
3) be comfortable applying the techniques of vector calculus to physical systems.

TEXTBOOK:
Electromagnetic Fields (2nd Edition), Roald K. Wangsness  *ON RESERVE*

OTHER BOOKS OF INTEREST:
• Introduction to Electrodynamics (3rd Edition), David J. Griffiths  *ON RESERVE*
• 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 physical understanding, not rote memorization.
• It is expected that you will put forth a sincere effort into learning.
• It is expected that you will read the book before class.
• As with all classes, I don’t give grades – you earn them. This course should be treated as “guided independent study.” You should not expect that attendance is sufficient or that the lectures are complete. Important topics will be left out.
• It is expected that you will be considerate of your fellow classmates and myself – I will turn my cell phone ringer off, too.

HOMEWORK / QUIZZES:

• Homework problems are intended to challenge you beyond mere regurgitation. Problems are not chosen randomly – they will often cover topics that would be covered in class if time allowed!
• If you’re stuck on homework, talk to your classmates or come see me for help!
• 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.

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. As such, 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 exams is not permitted, so copying on homework would put you at a severe disadvantage during exams.

• To approach the way science is really done, please include a list of collaborators and references used for the homework (other than Wangsness or class notes) at the top of your homework. This list will have no bearing on your grade.

EXAMS:

There are three scheduled exams in addition to the final exam. Tentative dates are September 24, October 15, and November 10 (PLAN ACCORDINGLY!). The final is December 16, 11am-1pm. Exams will be taken during class time. Do not miss the scheduled exams!

Exams are like long quizzes. To reiterate – exam 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.

GRADE BREAKDOWN:

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
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</thead>
<tbody>
<tr>
<td>Homework (120) + Quizzes (60) + Class Participation (20)</td>
<td>200 points</td>
</tr>
<tr>
<td>Three exams (100 points each, low one counts half)</td>
<td>250 points total</td>
</tr>
<tr>
<td>Final Exam</td>
<td>200 points</td>
</tr>
<tr>
<td>Total</td>
<td>650 points</td>
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</tbody>
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GRADING SCHEME:
Grades will be awarded roughly as follows:

A 100-90%
B 90-80%
C 80-70%
D 70-60%

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.

GRADING POLICIES:
• Homework is to be turned in at the beginning of class on the date it is due. Due to the quizzes and the circulation of homework solutions, late homework has a diminished impact. Late homework will be graded by the same standards as on-time homework, but there is a penalty for lateness of 50% for the first week, 100% penalty for more than one week.
  o If you don’t finish an assignment on time, it behooves you to submit what you have and turn the rest in late.
• Partial credit is awarded, so develop your ideas logically. Show your work (credit is given for the process, not the solution!) and draw sketches where appropriate.
• Take pride in your work. If your solution is illegible, I can’t give credit.
• Grading appeals must be made within one week of when the submission is returned.

ATTENDANCE POLICIES:
• Consistent with WVU guidelines, 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 due to any other reason will be at the discretion of the instructor.

SOCIAL JUSTICE STATEMENT:
WVU policy – “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.

“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 Disability Services (304-293-6700).” The University has many programs in place. Please let me know if I can be of any assistance, but do so with sufficient notice.

ACADEMIC INTEGRITY STATEMENT:
WVU policy – “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.”