

COURSE SYLLABUS:
“ELECTROMAGNETISM”

Physics 208

Calculus-level investigation of the relationships
between electricity, magnetism, and waves

Course Title: Electromagnetism

Web Page: <http://www.instruction.greenriver.edu/physics/keith/208>

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Office hours:	Monday	11:00 AM - noon
	Tuesday and Thursday	10:00 AM - noon

Class Meetings:

Tuesday, Thursday 9:00 – 9:50 AM SC 101

Prerequisites: The prerequisites for this course are Physics 202 and Math 125 or the equivalent. Both are absolutely required. Students must be concurrently enrolled in (or should have previously completed) Phys 203 and Math 126 as well. Some material discussed in this course will draw upon elements from Physics 203, Math 224, and Math 238, but students will be able to pick up the material as it arises.

NOTE: At the end of our course of study we will look at the relationship between electromagnetism and waves. Students studying electromagnetism who have no familiarity with differential equations (at least as they are handled in Physics 203) should try to learn a little bit about waves and “the wave equation.” A decent introduction can be found in any good physics text.

Assumed Competencies: Students taking this course must have already completed Physics 202 and Math 125 with satisfactory grades. It is assumed that these students will already be able to

- express and utilize basic principles of scientific investigation
- use units and dimensions as a tool for finding solutions and expressing results
- carefully and critically think through a scientific problem
- design an experiment to test a new hypothesis or play with a new idea
- express and utilize scientific ideas in both verbal and mathematical forms

Course Objectives: Since it is assumed that all students taking this course already have substantial scientific reasoning and investigation skills, the objectives for this course are very subject specific:

1. Students should be *familiar* with all four of Maxwell's equations and the Lorentz force law, understanding what each of these equations *means* and how each is used in physical situations.
2. Students should understand relationships between fields and potentials and some devices that rely upon them. Students should associate each of Maxwell's equations with at least one tool or device.
3. Students completing the course should be able to calculate quantities associated with electric and magnetic fields, although perhaps with "help" as in an "open book, open note" environment.
4. Students should be able to relate the wave equation to Maxwell's equations, and *derive* an expression for the speed of light from Maxwell's equations.

Relationship to Campus-wide objectives:

Green River Community College has identified several educational objectives for all courses and all students on the campus. The objectives of this course include many of these campus-wide objectives which will be directly and indirectly monitored and assessed. These overlapping objectives include enhancement of proficiency in the following areas:

1. **Critical thinking and problem solving skills:** If there were only one objective to this course it would not be the retention of any fact that is associated with the subject matter called physics. It would be the development of skills needed to analyze any problem carefully, logically, analytically and creatively, with a hopeful eye toward the creation of a viable problem solving strategy.

Critical thinking and problem solving skills will be assessed using homework assignments, quizzes, laboratory exercises, a class project, and ungraded assessment tests.

2. **Mathematical and quantitative reasoning:** Successful completion of this course requires the mathematical modeling of many complicated situations, often using models which are not intuitively obvious. Students often comment that physics courses stretch their ability to translate from the real world to mathematical abstractions and back again more than any other.

Mathematical and quantitative reasoning skills will be assessed using homework assignments, quizzes, laboratory exercises, a class project, and ungraded assessment tests.

3. **Clarity of communication and written expression:** Verbal exposition is often put to its most stringent test when technical material must be accurately and yet readably described. This course requires written discussion of highly technical subjects and precisely defined concepts, often blending the English language with the language of mathematics.

Communication and written expression skills will be assessed using homework assignments, quizzes, laboratory exercises, a class project, and ungraded assessment tests.

4. **Aesthetic appreciation:** The teacher of this class freely pursued the study of physics when a career in engineering or any number of other fields would have been much more lucrative and required less formal education. The reason for this was simply a deep and abiding love for the astounding beauty of the subject matter. Your teacher sincerely hopes that some appreciation of this beauty will rub off on each and all of his students, although aesthetic appreciation will not be directly assessed.

Aesthetic appreciation of physics will be assessed in part through the work done in preparing and presenting an in-class project of the students choice and design..

TEXTBOOK:

A Student's Guide to Maxwell's Equations, by Dan Fleisch. The book is available in a relatively inexpensive paperback form and as of this writing it is also available as a less-expensive eBook (for Kindle, etc.). The author also provides an extraordinarily useful website which includes homework problems, hints on how to do the homework problems, corrections to errors in the book, and podcasts which explain key points. Whichever version of the text you are using, you should read the corrections. The website can be found here:

<http://www4.wittenberg.edu/maxwell/index.html>

Laboratory requirements:

Labs will be informal, often made up as we go along. Be creative. Often students ask questions of the sort, "Would it be possible to..." or "what would happen if..." Providing nobody gets electrocuted, these are perfectly good questions to try to answer in the laboratory. There will be no lab grade.

Homework (problem sets):

There will be roughly four million homework problems. Do more if you feel like it. Due to popular demand they will not be graded, and some may be done together in group format during class time.

Quizzes:

There will be quizzes given throughout the term (probably four or five of them). Most will be take-home and some may be done in class. Each classroom quiz will contain one long or several short questions, intended to be easily finished in 30 minutes. Take home quizzes may occasionally replace or supplement homework sets.

Exams:

There will be some sort of final exam (take-home or in-class). Since the published final scheduled for this class is likely conflict with the final for other courses, the final exam will not be held during the regularly scheduled time slot printed in the schedule. Another time will be announced later.

Attendance:

Due to the small number of class meeting times, missing a class is not a great idea. However, since all of the students in this class have proven themselves as capable learners, it is assumed that students can make up missed material and learn what they need to know on their own. Attendance will only be taken for the information of the instructor and will not directly influence student grades.

Extra Credit Projects:

There will be no extra credit projects for this class. Students are usually better off concentrating on the regular class work. Keep in mind that it can be difficult to find projects that demonstrate interesting *physics* as opposed to exciting *technology*.

Late homework, exams, etc.:

All assignments must be turned in within one day of the due date. Nothing will happen to students who turn in an assignment one day late *but that means the next **day** which is before the next day of class.* Students turning in late assignments will not be hung upside-down by their ankles. Students should police their own work and prove to themselves that they can keep up in their studies without threats from the teacher. Work that is late will be counted for 80% of the points and all work must be turned in within two weeks of the due date. Also keep in mind that students who wait until the last day of the quarter to turn in two weeks worth of assignments usually wind up in psychiatric care.

“Guests” in the classroom:

Due to GRCC policy, no one who is not either registered for the class or an employee of GRCC will be allowed in the classroom during lecture or laboratory periods. This includes children, friends, and prospective students. If a guest appears in class, it is my understanding that the GRCC administration will send out a pack of big, bad, and very hungry wolves to stare at the guest and make comments like, “Mmmm, nice ankles,” until the guest becomes very nervous and leaves.

Class Projects: There will be no class project.**Grades:**

Grades for this class will be computed from the following five components which will be awarded “class points” approximately as follows:

Course component:	Class points:
Participation/Exercises	25 points
Homework (roughly 6 problem sets)	25 points
Quizzes	25 points
Final Exam	25 points

So how many points do I need to get an A? To pass?

The instructor reserves the right to modify the grading scheme at any time if he believes it is to the benefit of the class as a whole. In general a total of 96 points or more will earn a grade of 4.00, a total of 76 points will earn a grade of 2.00, and the scale is linear ($\text{Grade} = (\text{points} - 56)/10$).

Other grades:

A grade of “I” will only be given in emergency situations and only if at least 75% of the work is completed satisfactorily. A grade of “P” can only be given if requested in writing at the registrar’s office before the deadline published in the catalog (students should know that completion of a course with a grade of “P” is *not* considered completion of a prerequisite for another class).

Material Covered:

The “material covered” for this course will overlap with material covered in both Physics 202 and in Physics 203. The difference here will be the depth of understanding expected and the computational skill demanded. The *tentative* schedule for material covered in this course is the following:

Time:	Subject:	Fleisch Chapters
WEEK 1:	Electric fields and potentials	None - from Keith
WEEK 2:	Flux and Gauss' law	1
WEEK 3:	Gauss, Potentials, and Magnetism	2
WEEK 4:	Magnetic fields and forces	From Keith
WEEK 5:	Magnetic fields and Ampere's law	From Keith
WEEK 6:	Faraday's law: generators	3
WEEK 7:	AC circuits and more on inductors	From Keith
WEEK 8:	Transformers and inductors	From Keith
WEEK 9:	Ampere-Maxwell Law	4
WEEK 10:	Electromagnetic Waves	5
WEEK 11:	Intro to Special Relativity	From Keith

Material may be added or removed from the schedule as time and interest allow.

“Guests” in the classroom:

Students seeking to visit the class must obtain instructor permission. Due to GRCC policy, any one who is not registered for the GRCC class or an employee of GRCC may be prohibited from attending the class during lecture or laboratory periods. This includes children, friends, visiting students, and prospective students. Exceptions will be made in the cases of students who require the assistance of others for the completion of essential classroom tasks or for students who are registered for another section of Physics but have made arrangements with their teachers to attend at a special time.

Outside help:

Physics students are encouraged to make use of tutoring services should they find the need for outside help. GRCC employs physics tutors in the Tutoring and Help Center. Physics help may be found in the tutoring center on the second floor of the Holman Library. Students may find mathematical help in the Math Learning Center (SMT 355). Again, you are strongly encouraged to use your classmates as sources of outside help. *There is ample evidence that talking to your classmates is the best source of clarification and understanding because it will force YOU to think through your own difficulties! When all else fails, remain calm, sit back, and THINK!*

Special needs:

Any student who needs special accommodations because of a disability, needs emergency medical information kept on hand, or requires any other special accommodations to be shared with me in the event of a building evacuation, please contact me at extension 4248.

If you believe you qualify for course adaptations or special accommodations under the Americans With Disabilities Act, it is your responsibility to contact the Disabled Students Services Coordinator in the LSC and provide the appropriate documentation. If you need an alternative medium to communicate, or are particularly dependent on any one specific medium, please let me know before class so that appropriate accommodations can be made. You can reach me by phone at 833-9111, extension 4248, or you can visit my office. If you use an alternative medium for communicating, let me know well in advance of our meeting (at least one week) so that appropriate accommodations can be arranged.

Class breaks and interruptions:

If you need to leave the classroom, stretch, take a break, please do so. This is much better than falling asleep during class and disturbing your neighbors with an annoying “thud” when your head hits the table. Try to take your breaks in a manner that disturbs your colleagues as little as possible.

You should know that GRCC policy officially prohibits the answering of pagers and cellular phones during class periods. Although your instructor understands that emergencies may occasionally arise when sick family members or other crises are concerned, a repeated pattern of classroom interruption by electronic gadgets will be considered grounds for discipline.

Discipline:

If anything happens in class that you feel might require disciplinary action, **please talk about it!** Talk to each other. Talk to your teacher. We will all be better off if we can settle differences without official disciplinary procedures. This section of the syllabus is about what happens if that fails.

Standard Procedure: You should be aware that the standard course of discipline at GRCC begins with a student’s expulsion from the classroom for **three class periods**. If those class periods include exams, quizzes, or other assignments then the student will **receive a score of zero** on those assignments.

The law: You should also know that due to changes in the law, students may be *legally liable in a court of law* for words or actions that might create an atmosphere viewed as hostile by other students.

Disruptions: In accordance with GRCC policy, students who disrupt the academic atmosphere of the class will be asked to leave and will be referred to an academic dean for further action. Disruptions of academic atmosphere include any behavior that interferes with the ability of faculty or other students to perform the work necessary for this class.

Inappropriate discussion: Discussions in the classroom should concern matters relevant to the class or topics of general interest that are not demeaning or insulting. Courts have ruled that explicitly sexual discussions lead to an academically hostile atmosphere (see paragraph beginning with “The law”, above). *Comments, discussions, or actions of a racist, sexist, or otherwise degrading nature will absolutely not be tolerated. Be careful about your use of words such as gay, black, white, etc.* Again, if you feel there are inappropriate discussions in our out of class, **please talk to each other**.

Cell phones: GRCC policy is that all cell phones must be turned off during class. Your teacher recognizes that emergencies do happen. If you feel you need to answer your cell phone during class, please leave the room quietly and take the call outside. You do not need to ask permission, just try not to disturb your fellow students.

Computers: The computers in the classroom are to be used only for academic purposes. Students may use them to check schedules or register for classes *only during class breaks*. While class is in session they should be used only for physics (absolutely no games!). Violation of this policy will result in expulsion from the class for three days.

Cheating: Cheating (such as collaborating on quizzes or exams) can cause a wide range of disciplinary actions. As a minimum, students who are caught cheating on an assignment will receive a zero on the assignment. Further discipline can range from loss of points for one section of the class to failure of the class and probation or expulsion from GRCC. Many of students cheat and most of them do not get caught. However, those that do are in universal agreement: cheating is not worth the risk.

Please keep in mind that you are in college to learn, and if you are cheating you ultimately only cheat yourself out of learning and skills that you would otherwise get from this class. You don’t need to cheat to pass the class. Don’t do it.

SYLLABUS QUIZ (Due Thursday)

NAME: _____ (please print)

PHYSICS 208 Section: _____ (Just kidding. There's only one.)

Instructions: Read the syllabus, answer the questions below, and sign the form at the bottom indicating that you have read the syllabus. Return this to the teacher on Tuesday.

When are the meeting times for Physics 208A?

When are Keith's office hours? Where is his office? How many times does the word "ankles" appear in this syllabus?

What happens to Physics 208 students who turn in assignments one day late? Ten days late? What usually happens to Physics 208 students who don't turn in assignments until the last day of the quarter?

What is the name and room number of the room in the SC building where additional physics textbooks can be found and used by the students?

When is the deadline for applying for a Pass/Fail grade? (Check the quarterly schedule.)

I have read the syllabus for Physics 208
Signed,

(Signature of student)

(Date)
