

COURSE SYLLABUS:
 Physics 222
 “Physics for Science and Engineering”
 (calculus level physics with laboratory)

Course Title: Physics for Science and Engineering

Instructor: Keith Clay Office: SC 114 & KC 302c Phone: 833-9111, ext. 4248
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Course webpage: <http://www.instruction.greenriver.edu/physics/keith/222>

Office	MTThF	10:30 AM - 11:00 AM	SC 114 (Auburn)
Hours:	TTh	1:15 PM - 2:15 PM	KC 302c (Kent)
(If you can't find me you can also try checking with the buiding secretary.)			

Class Meetings:

Section KCA:	KC 312	TWTh	2:20 PM – 4:50 PM
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Special announcements for Winter of 2013:

1. Notice that this class meets Tuesday, **Wednesday**, and Thursday. This change was made to minimize class time lost when instructor has important meetings out of town and to accommodate conflicts in schedules with math and engineering.
2. We will not have class on Monday January 7th, 8th, or 9th. We may miss additional days as well.
3. We will have class on the following Wednesdays: January 2nd, January 23rd, and February 6th, February 20th, March 6th.

Course Objectives: Successful students will develop skills in the following areas.

1. **Critical Thinking:** The most important and often the most difficult tasks involved with understanding a physical problem are the critical analysis of the situation, construction of a suitable mental model, and identification of relevant and irrelevant details. To make that identification, it is necessary to consider both *what you think you know* and *how you think you know it*. This is what is meant by critical thinking. Manipulation of the facts associated with these details is often relatively easy, but we must also learn...
2. **Problem Solving:** To pass this course, it is not sufficient to merely learn *about* physics. It is also necessary to learn *to do* physics. The problems presented in this course will require refinement of problem solving techniques you may already have as well as the development of methods which will most likely be completely new to you. Still, each method and technique is simply a tool that must be employed by a creative and practiced problem solver.
3. **Technical Writing:** Technical achievement is of little use if it cannot be communicated. The clear and accurate written expression of ideas, using the combined languages of English and mathematics is an essential part of this course. Clear and understandable expression is to be a part of all of the work in the course, but there will be specific writing assignments associated with lecture material as well as with the...
4. **Laboratory Investigation:** Laboratory work will be a very large part of this course. Students will complete laboratory exercises designed by the instructor as well as designing and carrying out their own projects which will include laboratory experiments.

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 graded homework assignments, essays, quizzes, exams, laboratory exercises, 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 graded homework assignments, quizzes, exams, laboratory exercises, 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 graded homework assignments, essays, essay questions on exams, and presentations and written reports on laboratory exercises.

4. **Responsibility:** All students will be responsible for doing their own work *and seriously thinking about what they are doing!* Although it is tempting, especially in laboratory situations, to allow others to do our work for us, the successful students will be those who actively participate in all activities. Previous students have found it very difficult to make up for lost time in this class, so it is important for all students to work at least at the same pace as the rest of the class.

Students often believe that brain power alone determines performance in physics class. This is not the case! Before an anonymous in-class test, students were asked to estimate the fraction of the work that they had personally completed. Students who completed less than 80% of the course work averaged only 35% on the exam. Those who completed all of the course work averaged 80%.

5. **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.

Prerequisites:

Do you need Physics 221 or the equivalent? Absolutely. The concepts of momentum, energy, and force will appear repeatedly throughout this course.

Do you need Calculus, or concurrent enrollment in Math 152? Definitely. Students will notice a substantial increase in the level of mathematical sophistication over that required in Physics 221.

Textbooks:

1. **Smart Physics: Mechanics, AND Smart Physics: Electricity and Magnetism** by Gary Gladding, et al. **INTERNET ACCESS IS REQUIRED (Notice: you need TWO books with access codes!)**

You will need an access code to view prelectures, complete checkpoints, and do homework. Most students also want to pay for the paper versions of the books as well but this is not completely necessary. At last check computer access codes cost \$25 and the books cost an additional \$20 each. Note: SmartPhysics is not the same as SmartPhysicsHelp.com.

Supplemental Reading Material:

Students often request alternative reading material to supplement their general texts. Several additional physics texts are available for in the study room across from the Physics Store Room These include textbooks by Halliday, Resnick, and Krane (2 volumes), Halliday, Resnick, and Walker, and Serway.

However: students should be aware that there is little evidence that time spent *reading* another book is going to substantially increase your understanding or your grades. It is much better to spend extra time *doing* more physics problems, *discussing* the things that you find confusing, and *asking yourself* the kind of critical thinking questions modeled in the books by McDermott or Sokoloff and Thornton!

There are very few *facts* that you need to learn for this class. It simply requires time and effort to really understand and use the facts that you will learn.

REQUIRED COURSEWORK:**Laboratory requirements:**

Introductory laboratory work will be based on the exercises in the *RealTime Physics* laboratory manual. These exercises are designed to illustrate and clarify the concepts of physics and not to test the laboratory skill of the students. Thus the laboratory grade will be based on participation and assessment of student understanding. Laboratory exercises will be collected periodically, and there will be at least one laboratory quiz.

Later in the term there will be many laboratory exercises that *will not* come from *RealTime Physics*. These will often require more thinking and writing on the part of the students and these labs will be impossible to make up late. These labs will be graded generously but they will be graded.

Attendance: Attendance is absolutely *required* for the laboratory component of this course. Students who miss a single lab may lose 10% of their lab grade. Students who must miss more than one lab may have difficulty passing the course!

Meeting times: There will be one laboratory period almost every week. Lab periods may occupy half or all of a class period. Students in these classes are often confused about which classes are classes and which are labs. **THIS IS A GOOD THING!** You will learn the most by doing and thinking, not by sitting and taking notes (although you need to do that, too!)

Grades: Most of the lab grade will come from successful attendance and participation in lab exercises. Some lab work will be collected and graded, and there will also be one lab “quiz” in which students will need to demonstrate that they know how to use the equipment. (WARNING: If you allow your lab partners to do all of the “hands-on” work during lab, you will not pass this quiz!)

Homework (problem sets):

There will be *16 problem sets* assigned throughout the course of the term. All but one will come from Smart Physics but the first one will come from other sources. *You are not required to do the homework individually! In fact you are encouraged to work together!* All Smart Physics homework assignments will require the use of a computer either on this campus or at home. Your homework grade will be based on *completion* of assignments. Students will receive full credit for assignments completed on time. Students will receive 90% credit for assignments completed within 48 hours of the due time.

Quizzes:

There will be eight or nine quizzes given throughout the term. Each classroom quiz will contain one long or several short questions, intended to be easily finished in 30 minutes, however take-home quizzes may also be given and these will in general be longer and more involved.

Exams:

There will be one midterm exam. It will take up an entire meeting period. It will be scheduled roughly in the middle of the quarter. The exact date will be announced well in advance.

Tentative midterm date: February 7th (subject to change)

Final Exam date:
Physics 222 KCA: Tuesday, March 19 th 2:20 PM – 4:20 PM

Attendance and tardiness:

Lack of attendance can result in a loss of participation points for this class.

There is also overwhelming evidence that physics students (strong ones and weak ones) learn more when they teach themselves and teach each other. You are expected to answer questions in class, speak to each other during class discussion times, and work together cooperatively during lab times. **THE LANGUAGE OF PARTICIPATION IN THIS CLASS IS ENGLISH!** Students should expect to lose some or all of their participation points if they insist on relying on other languages. Feel free to ask for help with English or to use dictionaries and translators *during class time*. As with collaboration, you may not use dictionaries and translators during quizzes or exams.

Pre-lectures and other material from *Smart Physics*:

Completion of pre-lectures and checkpoints from Smart Physics will contribute to your participation grade for this class. These will be due at the date and time posted on the SmartPhysics website for each assignment. Students will receive 50% credit for pre-lectures and checkpoints completed up to 24 hours after the due time.

Extra Credit Projects:

There will be NO EXTRA CREDIT PROJECTS THIS TERM!!! None will be accepted. Don't ask. Students who have extra time that could be devoted to an extra credit project should devote that time to learning the material in the course. With all of the books and teaching materials available, there should be a mode of learning that suits every student. Take advantage of it and concentrate on learning the basics rather than spending time on additional subjects

Grades:

Grades for this class will be computed numerically based on the fraction of a total of 100 possible points. Grades will be awarded for the following six components, with the indicated points for each:

Course component:	Fraction of grade:
Homework	20 points
Quizzes	20 points
Midterms	20 points
Laboratory exercises	10 points
Participation/Project	10 points
Final Exam	20 points

(These point totals are subject to change if the instructor believes it would benefit the class.)

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

Numerical grades will be computed based on the following mathematical formula:

Take your total number of points. Subtract 56 points. Divide by ten.

For quick reference, you may also look up grades in the following table:

Percent of Total Points	Numerical Grade		Percent of Total Points	Numerical Grade		Percent of Total Points	Numerical Grade
97-100	4.0		86	3.0		75	1.9
96	4.0		85	2.9		74	1.8
95	3.9		84	2.8		73	1.7
94	3.8		83	2.7		72	1.6
93	3.7		82	2.6		71	1.5
92	3.6		81	2.5		70	1.4
91	3.5		80	2.4		69	1.3
90	3.4		79	2.3		68	1.2
89	3.3		78	2.2		67	1.1
88	3.2		77	2.1		67	1.1
87	3.1		76	2.0		66	1.0

Students are strongly encouraged to keep track of their own progress in this class. Relevant grades will be posted on Angel as soon as they are available. Due to the vagaries of how averages are computed, the final grade you receive may not be *exactly* the same one that is predicted by Angel or the one you calculate for your self.

A grade of "I" will only be given in emergency situations and only if at least 75% of the work is completed satisfactorily. *Note that a grade of "I" cannot be given simply to save a grade point average! There must be a REASON for requesting an incomplete.*

A grade of "P" or "NC" can only be given if requested in writing at the registrar's office before the deadline printed in the quarterly schedule. Students should know that completion of a course with a grade of "P" is usually *not* considered completion of a prerequisite for another class.

Students are NOT obligated to tell their instructors when a course is being taken for a P or NC grade!

Safety:

The safety of students and staff is of paramount importance to GRCC. Experiments and assignments in this course are not extremely dangerous but there will be scientific equipment all around us and some experiments involve objects moving with some speed. Reasonable precautions must be taken.

The big picture:

Follow directions and don't do anything foolish. If you aren't sure about a safe method to perform a laboratory task, ask your instructor. If you believe someone else is behaving in a way that threatens your safety, politely speak up right away. Communication is central to safety.

Wear eye protection when appropriate. In labs which involve the risk of objects flying through the air, some form of *safety glasses* or *goggles* must be worn. Students can use eye protection owned by the college or they may bring their own if they object to wearing shared equipment. If a student does not have personal eye protection when it is needed for a lab exercise, that student must borrow eye protection from the college or forfeit the exercise.

Failure to follow safety procedures may result in a lowering of the course grade or expulsion from the class (with a failing grade). Following instructions and using common sense will be enough to prevent this from happening. For the safety of all concerned, students **MUST** be able to follow spoken instructions in ordinary English.

Late homework, exams, etc.:

Exams and quizzes cannot be made up except in extraordinary circumstances. If a student knows that a forthcoming exam will compete with an urgent scheduling conflict, the student must notify the instructor *in advance!* In some cases it will be possible to make special arrangements for that student.

Homework will be accepted on the day after it is due, but full credit will not be given. Late homework will be accepted in accordance with the policy listed on the course SmartPhysics website (90% credit for assignments completed within 2 days of the due date).

Due to the nature of laboratory work, it will often be impossible to make up a late laboratory. Again, students who know of their inability to attend a specific lab should tell the instructor in advance. **No late work will be accepted during (or after) the last two weeks of the school term.**

Material Covered:

An accurate schedule of material covered and relevant due dates will be found on the Smart Physics website for this class. The schedule for material covered in this course will be roughly the following:

Time (approx.):	Subject:	
WEEK 1:	Review and "The Fundamental Theorem"	SP unit #1
WEEK 2:	Rotational Motion	SP unit #2
WEEK 3:	Rotational Dynamics and Statics	SP units 3 & 4
WEEK 4 & 5:	Rotational Statics and Angular Momentum	SP units 5 & 6 & 7
WEEK 5 & 6:	Fluids and Fluid Potential	SP units 8 & 9
MIDTERM EXAM		
WEEK 7:	Electric Forces and Fields	SP units 10 & 11
WEEK 8:	Electric Fields	SP units 12 & 13
WEEK 8:	Electric Potential	SP units 14 & 15
WEEK 9:	Circuits I and capacitors	SP units 16 & 17
WEEK 10:	Circuits II and Kirchoff	SP units 18 & 19

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 who have trouble with the mathematics associated with their physics work may find additional help in the Math Learning Center (wherever that is).

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, often removing confusion and solving problems at the same time! When all else fails, remain calm, sit back, and THINK!*

Class breaks and interruptions:

Official class breaks are required for all class periods of length two hours or longer. For class meetings that are between one and two hours long, class breaks are optional, *and official class breaks will usually not be scheduled!*

However, 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. Exception: During an exam or quiz you will FAIL if the instructor sees your cell phone.

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. Students caught cheating on a quiz or exam will fail the course. 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.

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 need an alternative medium for communicating, or are particularly dependent on any one specific medium, please let me know before class so that appropriate accommodations can be made.

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 have already documented a disability or other condition which would qualify you for special accommodations, or if you have emergency medical information or special needs I should know about, please notify me during the first week of class. You can reach me by phone at 833-9111, extension 4248. Or, you can schedule an office appointment to meet me in the Marv Nelson SC Building, office number 221 during my posted office hours or at another mutually determined time. If this location is not convenient for you, we will schedule an alternative place for the meeting. If you use an alternative medium for communicating, let me know well in advance of the meeting (at least one week) so that appropriate accommodations can be arranged.

SYLLABUS QUIZ (Due Monday)

NAME: _____ Phys 222 SECTION:____ (If your answer isn't "KCA", you are lost)

When are Keith's office hours? Where is his office? (How many does he have?)

What is the minimum that will happen to students caught collaborating on a quiz?

What will happen to students who are caught collaborating on homework?

Are students in this class required to own a paper textbook? Explain.

Are students in this class required to have Internet access and work online more than once a week? Explain.

A physics 222 student walks up to Keith and says, "Hey, I'm sorry I didn't get the Smart Physics done when it was due this morning. Can I turn it in tomorrow?" What's the answer?

Another student walks up to Keith and says, "Hey, I'm sorry I didn't take the quiz yesterday. Can I do it tomorrow?" What's the answer?

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

Would a grade of "Pass" help you toward your career goals? (Okay, you don't need to answer this here, but you should know the answer for purposes of your own educational planning. A grade of "Pass" will not allow you to advance to the next physics class, nor will it be accepted by many schools of science or engineering.)

I have read the syllabus for Physics 222.

Signed,

(Signature of student)

(Date)
