

**COURSE SYLLABUS:**  
Physics 201 Sections B and U  
“Physics for Science and Engineering”  
(calculus level physics with laboratory)

**Course Title: Physics for Science and Engineering**

**Instructor: Keith Clay      Office: SC 221      Phone: 833-9111, ext. 4248**

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**Course webpage: <http://www.instruction.greenriver.edu/physics/keith/201>**

Office hours:	Tuesday & Thursday	10:00 -10:30 AM
	Tuesday & Thursday	Noon – 1:00 PM
	Tuesday & Thursday	5:30 PM – 6:30 PM

**Class Meetings:**

<b>Section B:</b>	SC 117	MTThF	1:30 PM – 3:00 PM
<b>Section U:</b>	SC 117	TTh	6:30 PM – 9:30 PM

**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 may include laboratory experiments. Students will participate in the design and implementation of work that will be carried out by groups of three or four students. All students will be tested on their abilities to design, carry out, and interpret experiments.
5. **Team work:** The laboratory work will be completed by teams working together. It will be the responsibility of each member of the team to see that all members work together, to see that all members participate, and to see that all members of the team understand all phases of the work.

**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 work of the students choice and design.*

**Prerequisites:**

**Do you need High School Physics or equivalent?** Yes. Students without some physics background find the level and pace of Physics 201 very difficult. Some very good students find it necessary to drop Physics 201, take Physics 110 first, and then return to do extremely well in Physics 201, 202, and 203.

**Do you need Calculus, or concurrent enrollment in Math 124?** Definitely. Students often ask if they can pass the course without calculus. Maybe some could, but Isaac Newton was one of the smartest men who ever lived, and he could not do physics without calculus. This is not a math course, but calculus will be an essential part of the language used to describe the physical world.

**Textbooks:****1. *Physics for Scientists and Engineers*, 6th edition, by Serway and Jewett. REQUIRED!**

Your instructor apologizes for the price tag, but you should keep in mind that this is also the text for Physics 202, 203, and 208. **You should also know that as of the last time I checked, the price in the college bookstore was lower than most of the prices available online!** Since it takes so long to say “Serway and Jewett,” this book will often be referred to as “Serway” or “SJ”. This is a very useful reference book, and any student planning to continue study in physics, chemistry, or engineering is advised to keep this book for future reference (the money you get by selling it back will not pay for a replacement book if you decide you need one later!).

**2. *Physics 201 Interactive Exercises*, by GRCC Faculty REQUIRED.**

Your instructor wrote most of this himself so it must be good.

**Supplemental Reading Material:**

Students often request alternative reading material to supplement their general texts. Several calculus level physics texts are available for check out from the Physics Store Room (SC 118). These include textbooks by Halliday and Resnick (2 volumes), Knight, 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:**

Most 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. Students are **REQUIRED** to work together in groups during lab exercises.

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 will occupy almost half of the class periods. 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 8 or 9 problem sets from SJ assigned throughout the course of the term. There may also be problem sets from other sources. Some homework assignments will require the use of a computer either on this campus or at home. *You are not required to do the homework individually! In fact you are encouraged to work together!* Identical homework will be accepted if each is written in the hand of the author. Photocopies or computer reproductions will not be accepted. Every attempt will be made to get the results of the graded homework back to you as quickly as possible, but there are no guarantees. To facilitate rapid return of the homework the instructor may select only a fraction of the assigned problems to grade or a student grader may be used, or quizzes over assigned homework may be used. The instructor will review and keep responsibility for the grades assigned.

**Quizzes:**

There will be 8 or 9 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.

Since it is the purpose of quizzes to assess what individuals have learned, each student must do his or her own work. Copying or cheating on classroom quizzes will result in failed grades and submission to the campus cheating policy.

**Exams:**

Exams may not be taken late. If you have a problem with the timing of a scheduled exam, contact your instructor *in advance*. There will be one midterm exam roughly five weeks into the quarter (the exact date will be announced well in advance). It will be 90 minutes long. Students are required to do their own work on exams. Failure to do so will result in *failed grades* and discipline under the policy on cheating. **The final exam for will be held at the times printed in the quarterly course schedule:**

<b>Section B</b>	<b>Wednesday, December 12<sup>th</sup></b>	<b>1:00 PM – 3:00 PM</b>
<b>Section U</b>	<b>Tuesday, December 11<sup>th</sup></b>	<b>6:30 PM – 8:30 PM</b>

**Class Project:**

There will one two-part project required of all students. Although students may plan and consult together, each student is required to turn in his or her own work. **Identical assignments will not be accepted!** Part of the project involves analysis of a physics problem with computers, and although students who work together will produce similar results, it is impossible to produce identical computer programs without copying. Don't do it! Students turning in identical work will be referred to the dean and subject to the college policies on cheating.

**Attendance and tardiness:**

This class will not be graded on attendance, but students should be aware that due to the "hands-on" nature of what is done during class, it is very difficult to pass the class if attendance is lacking. Even students who do not believe they need to attend usually miss out on learning when they miss class.

If you must arrive late to class, come in quietly, sit down, and shut up! Do not start conversations. Do not ask the people around you what is going on. This is very disturbing to those who are trying to learn.

**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:

<b>Course component:</b>	<b>Fraction of grade:</b>
Homework	20 points
Quizzes	20 points
Midterms	20 points
Laboratory exercises	10 points
Class Project(s)	10 points
Final Exam	20 points

Note that these point totals are subject to change if the instructor believes it would be to the benefit of the class (and the grades of the class) as a whole.

**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 (ouch!). 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
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Students are strongly encouraged to keep track of their own progress in this class. At any point in the course, students may compute their *average percentage* on completed material and use this table to estimate a grade. Students should note, however, that it is ultimately your instructor who makes the decision as to how many points each student actually has! Grading is a subjective exercise and the grade you receive may not be *exactly* the one that you calculate for your self.

Every attempt will be made to let you know what was and was not an acceptable score on the material that is handed back to you. Students should be forewarned that grades below 50% are not uncommon on individual quizzes and taken by themselves are not disastrous (providing there are other grades to lift the overall average). An *estimate* of your current grade will be distributed after the midterm is returned. Please remember that this is only an *estimate*.

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!*

**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. Roughly 20% of the possible points will be deducted from homework turned in on the class day after it is due **IF THE SOLUTIONS HAVE NOT YET BEEN DISTRIBUTED!**

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:**

The schedule for material covered in this course will be roughly the following:

<b>Time (approx.):</b>	<b>Subject:</b>	<b>SJ Chapters</b>
WEEK 1:	Science, Measurement, and Units	1
WEEK 2:	Coordinates, Position, and Motion	2 & 3
WEEK 3:	Position, Velocity, and Acceleration	2
WEEK 4:	Two Dimensional Motion	4
WEEK 5:	Newton's 1 <sup>st</sup> Law & Momentum	5 & first part of 9
WEEK 6:	Newton's 2 <sup>nd</sup> and 3 <sup>rd</sup> Laws	5
WEEK 7:	Friction and 2D forces	5 & 6
WEEK 8:	Work and Energy	7
WEEK 9:	Conservation of Energy	8
WEEK 10:	Conservation of Energy & Momentum	8 & part of 9

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

**“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, visiting students, and prospective students. The only exceptions that will be made will be 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 201 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. As of this writing, GRCC has not chosen an official physics tutor but there are many talented students available. 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 (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, 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. Since our class meetings 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:**

**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. *Comments, discussions, or actions of a racist, sexist, or otherwise degrading nature will absolutely not be tolerated.*

**Cheating:** Students who are caught cheating will similarly be referred to an academic dean for further discipline. The results of this discipline can range from failing the assignment in question 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 SC Office 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 Thursday)

NAME: \_\_\_\_\_ (please print)  
PHYSICS 201 Section: \_\_\_\_\_

**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 Thursday.

When are Keith's office hours? Where is his office? Name one thing he has a picture of on his office door.

What score will be awarded to a physics 201 student who gets a score of 90% on a homework assignment that was turned in one day late?

Of the graded assignments of Physics 201 (other than quizzes and exams), for which assignment(s) are you...

**required** to work together?

**allowed** (but not required) to work together with **identical assignments accepted**?

**allowed** only to plan and consult together with **no identical assignments accepted**?

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.)

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.)

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I have read the syllabus for Physics 201.

Signed,

\_\_\_\_\_  
(Signature of student)

\_\_\_\_\_  
(Date)

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