

**COURSE SYLABUS:** Physics 110 Intro to College Physics  
*Algebra-level Physics with Laboratory*

**COURSE WEB PAGE:** <http://www.instruction.greenriver.edu/physics/keith/110>

**Instructor:** Keith Clay

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Office hours:	M, T, Th, F	10:30 AM – 11:30 AM
	T, Th	3:00 PM – 4:00 PM
	<i>Email or call first if you can!</i>	Other times by appointment

**Class Meetings:**

SC 120	M, T, Th, F	9:00 AM – 10:30 AM
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**Course Objectives:** Successful students will develop skills in the following areas.

- 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...
- 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.
- 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...
- 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. Students will participate in the design and implementation of projects 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.
- 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 project.

**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 brainpower 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 101, High School Physics, or the equivalent?** No. This course is intended to be an introduction to the concepts of physics and no previous physics course is required. Taking Physics 101 before Physics 110 might not be very useful.

**Do you need Math 97, Math 116, or Intermediate Algebra?** Definitely. This is not a math course, but mathematics will be an essential part of the tools used to understand the physical world. Galileo wrote that “the book of nature is written in the language of mathematics.”

Intermediate Algebra is required for this course. You should be comfortable with symbolic algebra as a tool for solving equations. A large part of your work in this class will consist of recognizing situations that can be described mathematically and translating a description in English into a description using mathematics. You should be able to recognize a linear equation and know how to graph it. You should be able to use a scientific calculator. Key concepts in trigonometry will be introduced.

**Textbooks:****1. *Collete Physics*, by Knight, Jones, and Field. REQUIRED!**

Your instructor apologizes for the price tag, but you should keep in mind that this is also the text for Physics 111 and 112. **You should also know that you are required to have a copy of the accompanying workbook and as of the last time I checked, the price in the college bookstore for the pair bundled together was lower than the prices available online!** Since it takes so long to say the name, this book will often be referred to as “Knight” or by the initials “K, J, & F”. This is an extraordinarily useful reference book, and any student planning to continue study in science is advised to keep this book for future reference.

If you are absolutely certain that you only need to take Phys 110 and not Phys 111 or Phys 112 you *might* be able to save money by buying a paperback copy of “Volume 1” which includes only the first thirteen chapters, but *you will still need to buy the workbook and buying them separately might increase the cost.*

**2. *Workbook* to accompany *Collete Physics*, by Knight, Jones, and Field. REQUIRED!**

You will need the workbook with you during class, so you have to carry it with you. You will not need the textbook during class so you only need to carry that with you for study.

**3. *Materials from Physics With Computers*, by Appel, Gastineau, Bakken, and Vernier. PROVIDED!**

Consider yourself fortunate. Future classes may have to buy this.

**Supplemental Reading Material:**

Students often request alternative reading material to supplement their general texts. Several algebra level physics texts are available for check out from the Physics Store Room (SC 118). These include textbooks by Serway and Vaughn, Giancoli, and Van Heuvalen.

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 this class.

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 *Physics with Computers* 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. There may be 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:** Lab periods will be intermixes with non-lab periods. Sometimes a class will start with lab exercises and end with a lecture or discussion or run the other way around. Students 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 (but 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 ten problem sets from Knight 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!* 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 will only check to see that work was completed. It will be up to students to review homework solutions. The instructor will review and keep responsibility for the grades assigned.

**Quizzes:**

There will be roughly eight quizzes given throughout the term. **The lowest quiz score will be dropped and will not count toward the final grade.** In general, 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.

Quizzes may not be taken late! However, since your instructor understands that disasters may strike at any time, one quiz score (the lowest score) will be dropped from your final grade. If a student misses one quiz, that quiz will be given a score of zero and will become the quiz that is dropped. For obvious reasons, students should try not to miss quizzes.

**Exams:**

There will be one midterm and one final exam. The midterm will be in mid-February and you will receive plenty of warning as to the exact date. It will require an entire 90-minute class period. As currently scheduled, **the final exam will be held from 9:00-11:00 AM on Wednesday, March 18<sup>th</sup>.**

**Class Project:**

There will be one class project required of all students. The class project will combine laboratory, computer, and individually written work. Although students are encouraged to work together to get the project done, each student must turn in an individual lab report *and identical reports from multiple students will not be accepted for credit!* Students should work together, help each other to understand, and ultimately go write up individual reports on their own.

The subject of the class project will be analysis of forces involved in motion based on digital analysis of video. GRCC physics has facilities to digitally record the three-dimensional motion of an object in flight. Students will work in teams to record the motion of an object and then analyze the motion to identify and measure relevant forces.

**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. Students who miss a class often ask, “What did we do yesterday?” as if a fifteen second answer can replace class attendance. Experience has shown that it cannot.

**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
Laboratory exercises	10 points
Midterm	20 points
Class Project	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
95-100	4.0		85	3.0		75	2.0
94	3.9		84	2.9		74	1.9
93	3.8		83	2.8		73	1.8
92	3.7		82	2.7		72	1.7
91	3.6		81	2.6		71	1.6
90	3.5		80	2.5		70	1.5
89	3.4		79	2.4		69	1.4
88	3.3		78	2.3		68	1.3
87	3.2		77	2.2		67	1.2
86	3.1		76	2.1		66	1.1
			0 – 65	0.0			

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>K,J,&amp;F Chapters</b>
WEEK 1:	Science, Measurement, and Mathematics	1
WEEK 2:	Coordinates, Position, and Motion	2
WEEK 3:	Position, Velocity, and Acceleration	2
WEEK 4:	Motion in two dimensions	3
WEEK 5:	Forces and Motion I	4 and part of 9
WEEK 6:	Forces and Motion II	4 and 5
WEEK 7:	Forces and Motion III	5
WEEK 8:	Circular motion	6
WEEK 9:	Momentum	9
WEEK 10:	Energy and work	10
WEEK 11:	Conservation of Energy	11

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 110 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:**

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.

**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 333 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.

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## SYLLABUS QUIZ (Due Thursday)

NAME: \_\_\_\_\_ (please print)

PHYSICS 110 Section: \_\_\_\_\_ (Hint: section A is at 9:00 in the morning)

**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 your instructor.

When are the meeting times and meeting rooms for Physics 110 A?

When are Keith Clay's office hours? Where is his office? Name one thing that appears on his office door.

What happens to your grade if you can't attend on the day of a quiz?

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.)

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I have read the syllabus for Physics 110.  
Signed,

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

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

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