

## PH 202: General Physics I

Linn Benton Community College: Spring 2017, 5 c.h.

**Instructor:** Ryan Scheirer [scheirr@linnbenton.edu](mailto:scheirr@linnbenton.edu), MH-111, (541) 917-4234

**Office Hours:** TBD, and by appointment

### When and where this course meets:

**Lecture:** MW 3:00pm – 4:20pm, F 3:00 pm – 3:50 pm, MH 113 **CRN 44057**

**Laboratory:** Tuesday 2:00 pm – 4:50 pm, MH 114 (CRN 30889)

**Final:** Wednesday, June 14, 3:00 pm - 4:50 pm

### Math requirements for this class and for physics in general:

As you have seen in PH201 we use symbolic language for a large part of what we do in physics. You do use your math skills! To be successful in Physics, we've created the following prerequisites for this class:

- Completion of PH201 General Physics with a "C" grade or better.

Physicists rely heavily upon the compact language of mathematics to speak to one another regardless of what part of the world they might come from. An added benefit of this class is that you will leave it with a greater understanding of just what all that math you've been studying is about.

The two most important mathematical skills that you will need for this course are solving simultaneous equations and adding, subtracting and finding components of vectors. **If you have not taken PH201 at LBCC, you are advised to review the material from MTH 111 and MTH 112 at your earliest convenience.**

### Required Materials:

**Text:** *College Physics: A Strategic Approach*, 3/E, by Randall D. Knight, Brain Jones, and Stuart Field; Pearson Publishing, with Mastering Physics. Make sure you also buy and make use of the workbook that accompanies this book. We will regularly use the workbook in class. The text, the workbooks and Mastering Physics will also be used in PH203. Optional: Student Study Guide, there even is a student solutions manual, unfortunately most students (mis)using it hurt their final grades...

**PH 202 Lab Manual** available in the LBCC bookstore, and a Lab notebook (Computation Notebook).

**Mastering Physics subscriptions:** New purchases of the text come with an option for an access code to subscribe to the *masteringphysics.com* website, which is required. Subscriptions last for 2 years from the date of activation so if you already have a current subscription you do not need to purchase the text with the access code. If you buy a used text you can purchase an access code through the M.P. website. Make sure you select the text *Knight/Jones/Field, College Physics, 3edition* when registering with M.P. The course name is **LBCCSPRING2017PH202**.

**Course Information Online:** You will find course materials for our class my personal website at <http://www.fliphysics.com/ph202-w17/> . Check the Calendar page regularly.

**Supplemental resource:** <https://boxsand.physics.oregonstate.edu/> (please register "username\_LBCC")

**Contacting me:** The best way to contact me is in person during office hours or via email. Also, usually whenever you see me, I am happy to talk to you. I would recommend you to see me at least 3 times this term, one in the first three week, once in the middle of the term, and once towards the end of the term.

## Course Activities

**Group Work:** Physics education research has shown that group discussions with peers support physics learning, and that particularly a person explaining a topic to a second person has often significant learning gains. Would you think it is fair that in a college physics class the physics professor should be the person learning the most physics? We therefore create opportunities for every student to listen to the instructor and to other students and to explain the course materials to other students and the instructor. Yes, we will work in groups a lot!

**Reading:** You are responsible for familiarizing yourself with the physics principles involved in the class activities by reading the relevant sections in the textbook. The course schedule includes the required weekly readings – you are asked to study ahead, the reading schedule ensures that you are prepared for activities in class. My goal is to set up the Monday HW at Mastering Physics in such a way that you will be able to answer the question without further instruction. Please let me know how well I am doing!

**Class time** will be spent on a variety of activities, including group work, discussions, problem-solving sessions, and demonstrations. I constantly work on making our classroom an interactive classroom for all of us to learn together. Education and learning research shows that pretty much nothing has ever been learned by means of listening to somebody else. How did you learn walking, reading, cooking, fishing, writing a letter, and calculating an angle? You will DO physics instead of watching me doing it. I rely on you to create the desired learning environment. It will benefit you to participate enthusiastically, which will also make it more fun for all of us. Unless you make special arrangements with me, I expect your **cell phone or PDA will be off during class**. I will be helpful if you struggle with this.

**Labs:** Much of the learning that goes on in physics happens in the lab. Laboratory work is consequently a large part of the grade. A part of each Readiness Assurance Assessment (RAA) and of the Final will consist of topics covered in the lab. Prelab and Postlab exercises support your learning in the laboratory environment. Each lab report includes a short summary you write that summarizes shortly what you did in the lab, and what you learned.

**Homework (HW):** This class includes two kinds of homework:

Assignments from the end of the chapters in our text book are to be completed online at [www.masteringphysics.com](http://www.masteringphysics.com). Website access comes with your textbook, enter

**LBCCSPRING2017PH202** as the Course ID. HW solutions and other useful materials are available at <http://elearning.linnbenton.edu>. Make sure that your current e-mail is listed at both sites so that you can receive e-mailed course information. Each assignment must be completed by the due date listed in your schedule and in Mastering Physics respectively. Over the years students have asked to split the HW up into small sections. I have followed that wish and now post homework on Mastering Physics usually three times each week. I will post each assignment approximately one week before the HW is due. Late work will not receive credit.

**Hand-In Problem (HIP) and Enhancement (ENH):** Additionally to Mastering physics you will hand in one HW assignment every week (HIP) that will often wrap up the learning of the week and allows you to reflect on the connection between the physics material we studied in class and in your homework and the rest of your life (ENH). I hope you will enjoy this part. It is always fun for me to learn how students make use of the physics they learn, and I am curious to read what you will dig into. See further guidelines on HW and portfolio on Moodle.

**Journal:** Each week you will write a paragraph summarizing your learning and struggles and hand it in on Fridays for review. To make sure you will focus on physics you will include and explain A) one key picture, B) one key diagram or graph and C) one key equation. Ideally all these are related.

**Readiness Assurance Assessments (RAA):** You will ask yourself how much you learned in class. To make sure you know where you stand, we will write short assessments to monitor your learning progress.

**The Final:** One aspect of physics is that every week builds upon what was learned in the weeks previously. As a consequence, by nature, the final exam is comprehensive. The Final will contain conceptual questions similar to the workbook questions and the problems we discuss in class and the problems that are in the textbook or on Moodle.

**Ethical Conduct (Cheating):** I expect everybody in the class to adhere to the highest ethical standards. For every action/decision you take, consider the “headline test”: if your action was printed as the front page headline in the newspaper, and all those you care about – your friends, your family, your peers, your teaching staff – would read it, how would you feel? In extreme cases, e.g. copying work of others without citing the source (plagiarism), interfering with the performance of others, communicating during individual parts of assessments, you show academic dishonesty. In the case of academic dishonesty your grade will drop by at least one grade, and I will report incidents to the college administration. If you are making use of the work of others, cite the source. If you have questions about what does and does not constitute cheating, talk to me *before you turn the questionable work in*. Bear in mind that a misconduct in a team exercise affects the score for the entire team, as every team member is responsible for the entire content of the assignment, even if you decided to divide the work among team members.

**Calculator Policy:** Students will be required to use a non-graphing/non-programmable scientific calculator for quizzes, RAA’s and/or exams. Department approved calculators are: TI 30xa, TI 30X IIs, Casio fx-260, or HP 10s. If a student does not wish to purchase one of these calculators the department will provide either a Casio fx-260, or HP 10s for use on RAA’s, exams and/or quizzes.

**Resources:** The **Science Help Desk** in the atrium of Madrone Hall is open for several hours each week, where you can drop in for homework help. Also, you can sign up for Math and Physics tutoring in the **Learning Resource Center**. One of the best resources I found are your fellow students in your class. Study together, ask each other questions, answer questions, dig in, have fun with it, be persistent, and find me before you develop the desire to throw your physics book out of the window.

**Students in need of accommodations:** Students who may need accommodations due to documented disabilities, who have medical information which the instructor should know, or who need special arrangements in an emergency, should speak with the instructor during the first week of class. If you have not accessed services and think you may need them, please contact Disability Services, 917-4789.

**LBCC Nondiscrimination Statement:** LBCC prohibits unlawful discrimination based on race, color, religion, ethnicity, use of native language, national origin, sex, sexual orientation, marital status, disability, veteran status, age, or any other status protected under applicable federal, state, or local laws.

**Other important information:** The Add/Drop date and date for payment is the 2<sup>nd</sup> Monday of the term. This allows for financial aid to be disbursed a week earlier than in the not too distant past.

### **Suggestions for success:**

Physics can be both challenging and rewarding. In order to succeed, plan to:

- Arrive at class on time, prepared to participate, contribute to discussions, and treat your classmates with respect.
- Check our Moodle page regularly, and stay aware of current assignments.
- Complete readings before class, and review your class notes later the same day.
- Work through the conceptual problems at the end of each chapter and the accompanying workbook before you start doing the Mastering Physics HW.
- Start homework the day it is assigned, and break the work into small pieces. Your understanding will be much greater if you complete homework on a daily basis.
- Find help when you have not successfully answered a question in the first or second try. Do not fall into try and error.
- Do additional practice homework problems in any areas where you are not satisfied with your understanding.
- Work responsibly with other students in and out of class.
- Seek help whenever you realize you are struggling.

*I am constantly striving to become a better teacher, and find ways to support you better in your learning. Therefore this document is subject to change.*

## Objectives:

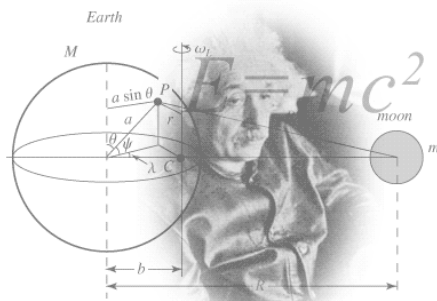
Physics is the study of nature and therefore searches to explain pretty much everything that you see around you. It is the study of how rainbows are formed. It is the study of why the sky is blue, why the stars twinkle, and how the planets move through the heavens.

Applications of physics have given us eye glasses, levers, pulleys, the combustion engine, transatlantic steamers and communication, television, lasers, computers, satellites, space flight, and new insights into the universe that startle the imagination and can only make one hungry to learn more. This second term of the sequence we will focus on the use of energy, properties of matter (solids, fluids, and gases), the physics of oscillations and waves, and finally optics partially an application of waves.

PH202 starts of where PH201 ended, with the concept of energy, and how we use this concept in various settings. Particularly we will add an understanding of heat to the concept of energy. We will then study properties of matter, oscillation and waves and optics.

Upon successful completion of this course, students will be able to:

- Describe and explain physical objects in simple harmonic motion.
- Design and conduct experiments to determine critical motion parameters of simple harmonic motion (period, frequency).
- Solve quantitative simple harmonic motion problems using algebra and graphical methods.
- Solve physics problems involving superposition of waves.
- Select ray optics or wave optics methods to solve real world optics problems.



Of course, to me, the most important reason to study physics is because it is simply fun. Physics is about understanding everything around you. Physicists have the neatest toys—many of which I hope to share with you—and we get to do “Gedanken Experiments” – thought experiments that previous generations couldn’t even imagine.

We will continue building our understanding of the universe on everyday observations by the end the term we will end up having learned some pretty neat things about where the heat in our house or our body comes from, and how heat interacts with matter, what properties matter has and what we can conclude from these properties. We will be able to explain to people what waves are and where these waves result from, and we will understand what and how we see with our eyes. In short we continue to building a model towards understanding the universe in which we live – and all through this term we will be glad that we have had PH201 when we continue to use the fundamental physics from that term to explain and understand more advanced phenomena.

As you continue on in Physics, in physics 203 focuses on electric charges and fields, the origins of magnetism, and the fundamental origins of the formation of light and you will be able to connect all this to your personal goals.

## **Grading for this course:**

You need to read this page carefully. This is how your grade will be determined. In this class you will not count up points. I and many other instructors do believe that a point based grading system fails in giving you good feedback on your outcome achievement, and I believe that my detailed feedback is an important part of my job. I will give you detailed feedback through comments and through the use of detailed rubrics. For most of the work in this class you can determine your grade before handing in your work. If you want to achieve a higher grade you will have to do more work, which usually goes along with higher achievements in the Final and in the RAAs. In this classroom model learning is about active participation in the many activities of the class. This is how learning happens. I hope you will participate enthusiastically and therefore learn a lot, and achieve the grade you plan to have in your physics course!

We will have the following regular activities prepared for you:

- Mastering Physics Homework
- Hand-in-homework (HIP) including Enhancements (ENH)
- Journals
- Reading quizzes
- In class activities
- Labs, including Prelab and Postlab (you need to participate in at least 8 labs)
- Readiness Assurance Assessments and Final Exam

To reach a D in this course you must meet all of the following criteria:

- a) Reach 50% of Mastering Physics score.
- b) Hand in at least 3 HIP/ENH ALL developing or better.
- c) Hand in 3 Journals.
- d) Have an average of at least 30% in the RAA and Final Exam.

To reach a C in this course you must meet all of the following criteria:

- a) Reach 60% of Mastering Physics score.
- b) Hand in 8 HIP/ENH, 3 ALL accomplished or better.
- c) Hand in at least 3 ALL accomplished Journals.
- d) Have 1 lab ALL accomplished and another 5 labs ALL developing.
- e) Have an average of at least 50% in the RAA and Final Exam.

To reach a B in this course you must meet all of the following criteria:

- a) Reach 70% of Mastering Physics score.
- b) Hand in 8 HIP/ENH, 5 ALL accomplished or better.
- c) Hand in at least 5 ALL accomplished Journals.
- d) Have an average of 50% in Reading quizzes.
- e) Complete 60% of in class activities at accomplished level .
- f) Have 3 labs ALL accomplished and another 3 labs ALL developing.
- g) Have an average of at least 60% in the RAA and Final Exam.
- h) You can also reach a B in the course by fulfilling e) and f), and have an average of at least 80% in the RAAs and the Final Exam.

To reach an A in this course you must meet all of the following criteria:

- a) Reach 80% of Mastering Physics score.
- b) Hand in 8 HIP/ENH, 7 ALL accomplished or better.
- c) Hand in at least 7 ALL accomplished Journals.
- d) Have an average of 75% in Reading quizzes.
- e) Complete 80% of in class activities at accomplished level.
- f) Have 5 labs ALL accomplished and another 3 labs ALL developing.
- g) Have an average of at least 75% in the RAA and Final Exam.
- h) You can also reach an A in the course by fulfilling e) and f), and have an average of at least 90% in the RAAs and the Final Exam.



## What does “ALL accomplished”, and "ALL developing mean:

HIP, Journals, and Lab activities have a rubric with several measures (emergent, developing, accomplished and exemplary). You should always strive for accomplished work, if you fall short it will be developing. While “emergent” basically means that you missed taking on the work, “exemplary” means that you did the activity better than I was imagining – trying to reach that, will mean that you need to invest a significant amount of time, possibly just too much time.

## Calculation of the average of RAA and Final Exam:

RAAs are preparing you for the final. Therefore the RAAs together will be worth as much as the final. I have planned four RAAs for the class, so they are each worth 12.5%, the final is worth 50%.

Here is an example.

Assume you have the following 4 results of RAAs:

1. 15/20 (15points out of 20 points)
2. 12/20
3. 16/30
4. 5/25 (everybody can have a bad day (-: )

In the Final you have 78 out of 100 points.

Based on these assumptions, how would you calculate the grade?

$$\% \text{ RAA and Final} = 12.5*(15/20) + 12.5*(12/20) + 12.5*(16/30) + 12.5*(5/25) + 50*(78/100) = 65\%$$

If you check above you see that this qualifies you for a B in the class. Don't be fooled. This does not mean that you are handed a B or an A. Exams and RAAs in the course are challenging. They will not only test if you memorized a few equations and can plug in numbers, but assess if you understand and be able to analyze and even evaluate your solutions. 65% is a good result in an RAA as shown in the figure.

## Benefits:

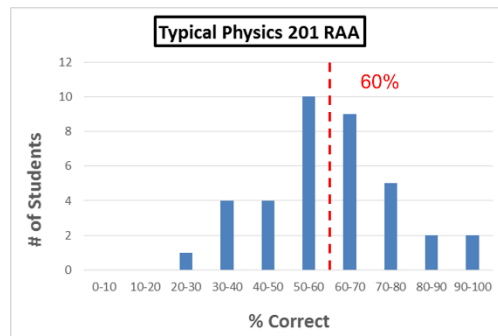
So what are the benefits I hope to bring to you the student in this model? It's really pretty simple – I have evidence that you will learn more and better under this model. Here are some reasons why I think this happens some of which are supported by research about student learning and others are based on student feedback and observations. Most of what I do is about your engagement with your learning. You always have been responsible for your learning and this grading scheme makes these connection more direct.

Do you agree with me in the following? You want to get jobs you do done well, and you want to have choices about your life in general, and what jobs you do in particular. I have created opportunities for you to rise up to a high standard of 100% accomplished work. Think about your past experiences or your future in a professional environment. You will probably not be judged on a job 60% nicely done, but simply if you did get the job well done in time. During the learning process here in the physics course I want you to learn to get the job done. I will allow you to take some extra time as outlined below.

In particular I will always accept late work, if you schedule 20min during office hours for each late activity. In that case you come to my office and explain what you did and learned when you hand in the assignment. You can only defend one single assignment per office hour, and I will not extend official office hours for your late work. If you cannot schedule time during office hours, please see me to adjust office hours or find other times to meet with me. You cannot be late for an RAA of the final exam.

Because the grade penalty in this class is less abrupt in most activities I hope you will spend more time thinking and observing HOW you learn instead of merely stuffing facts. This process is called metacognition and is a tremendous tool for improving your long term learning. See where your thoughts take you. Enjoy asking ever more complex questions and try to figure out what it would take to answer them. If you follow the rubrics provided you know the grade you will have in every activity of this class.

I hope you enjoy having choices about your work. Keep in mind that because it is easier to meet particular grade expectations I can ask more of you and push you harder in various directions without feeling guilty. I want to take each of you as far as you can go with the material we are studying. How far that is will be different for each of you, and I hope you will let me know.



**PH201 (Ryan): Syllabus Reading Comprehension**

Name: \_\_\_\_\_

Class time: \_\_\_\_\_ Lab time \_\_\_\_\_

1. Can you hand in late work for this course? What is the procedure?
  
2. At what times/assessments are you not allowed to use a graphing calculator?
  
3. What are two of the outcomes of PH202 listed in the syllabus?
  - a.
  - b.
  
4. Of the following, what would be considered cheating? Please circle
  - a. Copying solutions into Mastering physics from some internet resource
  - b. Copying solutions into Mastering physics from a friend
  - c. Handing in a HIP you solved together with a fellow student without clearly acknowledging your fellow student.
  - d. Copying solutions to a Prelab exercise from a fellow student.
  
5. What do you do with your cell phone in class?
  
6. When do you ideally use the workbook that accompanies our textbook?

I would like to discuss the following questions/issues about the syllabus in class:

I have read and understood the syllabus for this course. I have listed above all questions I would like to clarify in class or during my first visit during office hours.

Signature: \_\_\_\_\_

## A Little Reflection

1. Why are you here? What is your program?
2. What are your personal outcomes / expectations for this class?  
Be specific! (3 minimum)
3. Help me to understand your background: The 3 highest level math classes you took are (grade):
4. Help us to plan this sequence:  
Which physics classes do you plan to take during this academic year / summer?  PH203
5. What is the highest level of Math you took?
6. What other classes do you take this term?
7. Have you regularly scheduled time to study for this class during the week?  Yes  No  
How many hours? \_\_\_\_\_ When? \_\_\_\_\_
8. Do you plan regularly meeting other students to study for this class?  Yes  No
9. Do you plan regularly coming to TASS (Tutor Assisted Study Session) for this class?  
(Wednesday 2pm – 5pm, and Saturdays 1pm – 4pm)  Yes  No
10. How often do you plan to see your instructor during office hours?
11. Describe any foreseeable events that may hinder you to be successful in this course, or any specific requirements that may be necessary/helpful for you to perform the tasks for this class successfully. This is a good place to mention a balky car, a long commute, or anything...
12. What can I do to make this class the best class you ever had?



**PH202 S2017, LBCC, Schedule (subject to change):**

Week	Key Topics	Monday	Tues Lab	Wednesday	Friday
1	Introduction, Kinetic theory of gasses, Equations of state	03. Apr	Lab #1 Conservation of energy	05. Apr	07. Apr <b>Lab 1 Due</b> <b>Journal 01 Due</b>
2	1 <sup>st</sup> and 2 <sup>nd</sup> law of thermodynamics, Specific heat, Calorimetry, Heat transfer	10. Apr	Lab #2 <b>HIP 01 Due</b> Ideal Gas Law	12. Apr	14. Apr <b>Lab 2 Due</b> <b>Journal 02 Due</b>
3	Density, Pressure, Fluid mechanics	17. Apr <b>HIP 02 Due</b>	Lab #3 Specific Heat	19. Apr <b>Journal 03 Due</b> <b>RAA 01</b>	21. Apr <i>LBCC Closed</i>
4	Equilibrium and Oscillations	24. Apr <b>Lab3 Due</b> <b>HIP 03 Due</b>	Lab #4 Archimedes Principle	26. Apr	28. Apr <b>Lab4 Due</b> <b>Journal 04 Due</b>
5	Simple harmonic motion, Energy in SHM, Damped and Driven Oscillations	01. May <b>HIP 04 Due</b>	Lab #5 Oscillations & Harmonic Motion	03. May	05. May <b>Journal 05 Due</b> <b>RAA 02</b>
6	Traveling waves, the wave model, graphical and mathematical description of waves, sound and light, Doppler effect	08. May <b>Lab5 Due</b> <b>HIP 05 Due</b>	Lab #6 Nature of Waves	10. May	12. May <b>Lab6 Due</b> <b>Journal 06 Due</b>
7	The principle of superposition, standing waves on a string and sound in tubes. Interference	15. May	Lab #7 <b>HIP 06 Due</b> Standing Waves	17. May	19. May <b>RAA 03</b> <b>Journal7 Due</b>
8	Wave optics, what is light? Interference, Diffraction, Thin films	22. May <b>Lab7 Due</b> <b>HIP 07 Due</b>	Lab #8 Optical Interference	24. May	26. May <b>Lab8 Due</b> <b>Journal8 Due</b>
9	Ray optics, Reflection, Refraction, Image formation by refraction, ray tracing (thin lenses)	29. May <i>Memorial Day</i> <i>LBCC Closed</i> <b>HIP 08 Due</b>	Lab #9 Index of Refraction	31. May	02. June <b>RAA 04</b>
10	Optical instruments, camera, human eye, magnifier, microscope, telescope	05. June <b>Lab9 Due</b> <b>HIP 09 Due</b>	Lab #10 Focal Length of a Lens	07. June	09. June Review <b>HW10 Due</b>
11	<b>Finals Week</b>	12. June		14. June <b>Final 3:00pm – 4:50pm</b>	

**For Due Dates of Mastering Physics please check the Mastering Physics Web-site**