

PH 203: General Physics III

Linn Benton Community College: Spring 2020, CRN 40786, 5 c.h.

Instructor: Ralph Tadday, Ph.D., taddayr@linnbenton.edu, MH-112, (541) 917-4743

Due to COVID-19 this course will be taught remotely, supported by ZOOM meetings

Student Zoom Hours: MW 11 am – 11:45 am, F 10:30am – 11:30am

When and where this course meets on ZOOM:

Class: MW 9:30am – 10:50am, F 9:30 am – 10:20 am, ZOOM
MW 3 pm – 4:50pm, ZOOM

Laboratory: Tuesday 8:00 am – 10:50 am, ZOOM

Final: Friday, June 12, 10:00 am - 11:50 am

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.

Welcome to General Physics III, the third and last course in this sequence trying to shed some light on all the miracle and wonder around you in this universe. Please read this document carefully. Your understanding of these guidelines are crucial for the success in this class.

Math requirements for this class and for physics in general:

As you have seen in PH201 and PH202 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 and PH 202 General Physics II 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. Just like last term **you are advised to review the material from MTH 111 and MTH 112 at your earliest convenience.**

Course Information Online: You will find course materials for our class on the 'Moodle' website at <http://elearning.linnbenton.edu>. The course is entitled “PH203 SPRING2020 - GENERAL PHYSICS”. Check the Moodle page regularly.

Contacting me: The best way to contact me is via email or during zoom hours. When you need any other time, please arrange via email, we will make it happen! I recommend that you check in by zoom at last 3 times this term, one in the first three weeks, once in the middle of the term, and once towards the end of the term. Even better check in regularly to discuss your work.

Me contacting you: Check your LBCC email – this is the most common path I take to support you. When you are in this class, I expect you to check your LBCC-email.

Required Materials:

Text: *College Physics: A Strategic Approach* 4E, by Randall D. Knight, Brain Jones, and Stuart Field; Pearson Publishing, with Mastering Physics. **The textbook is available for \$48 through the Mastering Physics (MP) website if you purchase a subscription online.** Make sure you also buy and regularly use the workbook that accompanies this book. The workbook questions are best to study on your own when preparing for class after you read the chapter the first time. We will at times use the workbook in class. Talk to me if you own the 3rd edition of the textbook, the workbook, or MP.

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 your current subscription from PH201/PH202 should be sufficient. You can purchase an access code through the M.P. website. Make sure you select the text ***Knight/Jones/Field, College Physics, 4edition*** when registering with M.P. Our Course ID is **PH203SPRING2020**.

Lab notebook (Computation Notebook), in LBCC bookstore (or use PH202 lab notebook).

Course Activities

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. I ask you this term to answer all reading questions in your Journal. Much of your homework at Mastering Physics I have set up in such a way that you will be able to answer the question without further instruction. Please let me know how well I was doing!

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. We will continue to work in groups during our zoom meetings

Class time will be spent on a variety of activities, including group work, discussions, problem-solving sessions, and demonstrations. I am curious how this will work out in the new remote environment. Education and learning research shows that more or less 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 a lot of physics in class instead of watching me doing it. Together we create the desired learning environment. I rely on you, you can rely on me. It will benefit you to participate enthusiastically, if you do we will all have more fun. Unless you make special arrangements with me, I expect your **cell phone or PDA will be turned off during class**, even though we meet electronically this term.

Labs: Much of the learning that goes on in physics happens in the lab. Laboratory work is consequently a significant part of the grade. A part of each exam and of the Final will consist of topics covered in the lab. Each lab report includes a short summary you write that summarizes shortly what you did in the lab, and what you learned.

Journal: Each week you will summarize your learning and struggles in your personal Journal. For details see Guidelines for your Journal on Moodle. I ask you to answer all reading questions that you find posted in the reading guide on moodle in writing in your Journal.

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

Mastering Physics assignments from the end of the chapters in our text book are to be completed online at www.masteringphysics.com. When you buy your textbook in the campus store website access comes with it: Enter **PH202SPRING2020** as the Course ID. 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.

Hand-In Problem (HIP) and Enhancement (ENH): Additionally to Mastering physics you will hand in a HW assignment every week (HIP) that will often wrap up the learning of the week. The Enhancement (ENH) 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. This part of the assessment has regularly brought to the surface conceptual understanding that might need correcting. See guidelines on HIP and ENH on Moodle. This term HIP/ENH are handed in each week on Moodle.

Exams: You will ask yourself how much you learned in class. To make sure you know where you stand, we will write regular Exams to monitor your learning progress.

The Final: One aspect of physics is that every week builds upon what was learned in the previous weeks. The final exam is comprehensive. Physics is about learning concepts, so it is not enough to memorize the problems we have discussed in class or in the exams, but to understand the concepts discussed and be ready to solve new problems.

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, family, peers, 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*.

For all work you hand in for PH203 you will agree to the following statement:

All work handed in for PH 203 is legitimately my own.

I have not used any information that came from another person or a web resource, unless specifically stated in my work.

I understand that acts of academic dishonesty will result in a score of zero for my work.

I recognize that I am responsible for understanding the provisions of the Linn-Benton Community College Student Conduct Code as they relate to my academic exercises.

Calculator Policy: Students will be required to use a non-graphing/non-programmable scientific calculator for quizzes, and/or exams. Department approved calculators are: TI 30xa, TI 30X IIs, Casio fx-260, or HP 10s.

Resources:

We are working on options for a remote **Science Help Desk** and a remote TASS session. Also, you can sign up for individual 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, bug me (-:

Students in need of accommodations: Students who may need accommodations due to documented disabilities, who have medical information that the instructor should know, or who need special arrangements in an emergency should speak with their instructor during the first week of class. If you believe you may need accommodations but are not yet registered with CFAR, please visit the CFAR website at www.linnbenton.edu/cfar for steps on how to apply for services or call 541-917-4789.

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.

HELP: Any student who has difficulty affording groceries or food, or who lacks a safe and stable place to live, is urged to contact a Student Resource Navigator in the Single Stop Office (T-112): Amanda Stanley, stanlea@linnbenton.edu, 541-917-4877. The navigator can connect students to resources. Furthermore, please talk with your instructor (me) if you are comfortable doing so. This will enable me to provide any resources we might have.

The Add/Drop date and date for payment is the 2nd Monday of the term.

Suggestions for success from former students taken from Journals and Portfolios:

- I have a hard time to wake up in the morning and drag myself to school. So I was late a lot. One day my lab partner [...] said she would look for another group and stop helping me with the homework if I would not come prepared and in time. I started coming to class in time or even early to discuss some reading questions and somehow the stuff started to make sense.
- Thanks for putting all this support up on Moodle. I am glad I found it.
- I did not do my homework last week and that made this week much more difficult.
- I started reading the textbook before every class and answer the reading questions. Class is actually fun now.
- After I realized how much I forget during the week, I even started writing into my Journal after every class instead of just Thursdays or Friday morning.
- I was used from high school that important stuff is always repeated in class. At the end of the term I started repeating exercises from past weeks – wow I forget a lot!
- When we meet with the study group we now answer a few of the conceptual problems [in the textbook at the end of each chapter] before doing the Homework.
- Since I do the workbook questions I feel more comfortable answering questions in class. I am also more involved on my table and friends ask me questions.
- [Last weekend] I was home for the long weekend and opened the mastering physics Homework of the week. I could actually answer a few of the questions and recognized others when we discussed a few problems in class. That was cool!
- Initially I googled the solutions for much of the Homework until about 6 weeks into the class, but after we talked in office hours at I started actually doing homework myself or with the help of my friends, the tutor at TASS or with Ralph. I am glad I did, finally the exams were much easier and I think I will write a good final.

And some suggestions from your instructor:

- Do additional practice homework problems in any areas where you are not satisfied with your understanding.
- Seek help whenever you realize you are struggling... after you struggled enough (-:
- ...and if you read something that you do not agree with or that your prior experience tells you, you are probably in the middle of learning!
- If you do not ask I might assume you know!

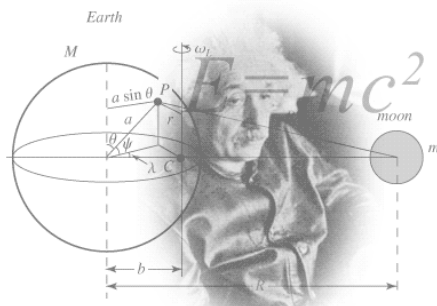
Objectives:

Physics is the study of nature and therefore search 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 third term of the sequence concludes our journey by closely looking at charges and how charges interact with each other. We will look at electricity, magnetism and conclude the journey with a look into modern physics, particularly special relativity, quantum physics and nuclear physics with a taste of applications in the medical world.

PH203 rounds up the physics we investigated in PH201 and PH202. Charge charge interactions are at the center of chemistry and biology. It might seem stunning to you, that you had to wait for 6 month to finally discuss the material that allows to fundamentally understand what you already feel familiar with from other classes. I hope you will enjoy looking at the material through the glasses of a physicist.

Upon successful completion of this course with a “C” or better, students will be able to:

- Describe and explain charged physical objects moving in electric fields.
- Determine the electric field and potential of multiple charges.
- Solve problems in serial and parallel circuits.
- Relate the induced current in a circuits to the motion of magnets.
- Relate simple harmonic motion to the frequency of AC current.



Of course, to me, still 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” – experiments that previous generations couldn’t even imagine.

We will continue building our understanding of the universe on everyday observations. During this term we will focus on electric charges and fields, the origins of magnetism, and the fundamental origins of the formation of light. How come that diamond is so hard, but wax can be cut with a knife? How are thoughts transported and how does your brain know to make your hand pull back, when you hold it on a hot or cold body? We have already talked about electromagnetic waves, but how can we make these waves in the first place? And while we walk this last part of our journey together, you will be able to connect all this to your personal goals ... at least that is my goal.

And while you study these last topics of the series of general physics I hope you are regularly reminded that everything around you are applications of the more fundamental principles that we study in this class.

Grading for this course:

Carefully read how your grade will be determined. In this class you will not count up points. I believe that a point based grading system fails in giving you good feedback on your outcome achievement, and that detailed feedback is an important part of our 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. To achieve a higher grade you will have to do more work, which usually goes along with more learning. 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 learn a lot, and achieve the grade you plan for in your physics course!

I will have the following regular activities prepared for you:

- Mastering Physics Homework (MP)
- Hand-in-homework (HIP) including Enhancements (ENH)
- Journals
- Reading activities
- Labs (**you need to participate in at least 8 labs and the lab exam**)
- Exams 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 4 HIP/ENH ALL developing or better.
- c) Have an average of at least 30% in the Exams 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 6 HIP/ENH, 2 ALL accomplished or better, 4 more ALL developing or better.
- c) Have 50% of the time all reading questions answered in your Journal.
- d) Have 2 labs ALL accomplished and another 2 labs ALL developing.
- e) Pass the lab exam with at least 50%
- f) Have an average of at least 50% in the Exams 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, 4 ALL accomplished or better, 2 more ALL developing or better.
- c) Have 60% if the time all reading questions answered in your Journal.
- d) Have 3 labs ALL accomplished and another 2 labs ALL developing.
- e) Pass the lab exam with at least 60%
- f) Have an average of at least 60% in the Exams and Final Exam.
- g) You can also reach a B in the course by fulfilling d) and e), and have an average of at least 80% in the Exams 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, 6 ALL accomplished or better, 2 more ALL developing or better.
- c) Have 75% if the time all reading questions answered in your Journal.
- d) Have 4 labs ALL accomplished and another 2 labs ALL developing.
- e) Pass the lab exam with at least 75%
- f) Have an average of at least 75% in the Exams and Final Exam.

You can also reach an A in the course by fulfilling d) and e), and have an average of at least 90% in the Exams and the Final Exam.

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

HIP/ENH and Lab activities have a rubric with several measures (emergent, developing, accomplished and exemplary). You, the successful student will always strive for accomplished work, if you fall short complete work will be developing. While “Emergent” basically means that you decided not to complete your work, “Exemplary” means that you did the activity better than we were imagining, something that might be time consuming (-:

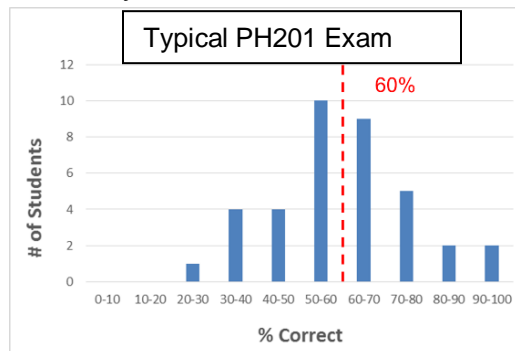
Calculation of the average of Exams and Final Exam:

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

As an example assume you have the following 4 exam results:

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?

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

If you check above you see that this qualifies you for a B in the class. Don't be fooled. Exams in physics courses have shown to be tricky. They are not based on memorization and have shown to be challenging. They will not test if you memorized equations and if you can plug in numbers, but assess if you understand and be able to derive, analyze and even evaluate your solutions. 65% is a good result in an exam as shown in the figure.

Benefits:

So what are the benefits we hope to bring to you the student in this model? It's really pretty simple – we have evidence that you will learn more and better under this model. Here are some reasons why we 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 we 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 us in the following? You want to do your jobs well, and you want to have choices about your life in general, and what jobs you do in particular. We 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 done well in time allotted. During the learning process here in the physics course we want you to learn to get the job done. We will allow you to take some extra time as outlined below.

Timing:

Due to the remote structure of the class, I will not accept any late work. I will accept corrections to the HIPs and Labs. You can correct each of them within 3 days after the work was returned to you after the due date.

Because the grade penalty in this class is less abrupt in most activities I hope you will spend more time observing and thinking A) WHY things are the way they are and B) HOW you best learn about them.

Why asking more WHY? Physics is all about making observation and then making predictions. If we understand why things are the way they are we can build a model ourselves, and do what this class tries to support: Thinking like a scientist and making informed decisions. We also hope and try to motivate you to reflect on 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. Use your journal for the pleasure of learning and the joy of feeling lots of AHA-moments.

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.

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 PH203 listed in the syllabus?
 - a.
 - b.

4. What do you do with your cell phone during Zoom time?

5. When do you ideally use the workbook that accompanies our textbook?

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

7. This is a remotely taught class. For all work I hand in for PH203 I agree to the following statement:

All work handed in for PH 203 is legitimately my own.

I have not used any information that came from another person or a web resource, unless specifically stated in my work.

I understand that acts of academic dishonesty will result in a score of zero for my work.

I recognize that I am responsible for understanding the provisions of the Linn-Benton Community College Student Conduct Code as they relate to my academic exercises.

I have read and understood the syllabus entirely. 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 (in brackets include the grade):
4. What other classes do you take this term?
5. Have you regularly scheduled time to study for PH203 during the week? Yes No
How many hours? _____ When? _____
6. Do you plan regularly meeting other students to study for this class? Yes No
7. Do you plan regularly coming to TASS (Tutor Assisted Study Session) for this class?
(Time to be determined) Yes No
8. How often do you plan to see your instructor during office hours?
9. 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...

PH203 Spring 2020, LBCC, Schedule Ralph Tadday (subject to change):

Week	Key Topics	Monday	Tues Lab	Wednesday	Friday
1	Electric Charges, Forces and Fields	6. April Introduction Reading due* Ch. 20.1-3	Lab #1 Introduction Electrostatics and Electric Field	8. April Reading due Ch. 20.4-6 Workbook 20	10. April Ch. 20.7 Lab1 Due
2	Electric Potential, Electric Potential, Electric Potential Energy	13. April Ch. 21.1-4 Workbook 21 HIP1 Due	Lab #2 Electric Potential	15. April Ch. 21.4-8 Workbook 21	17. April Lab2 Due Exam1
3	Current and Resistance, Simple Circuits, Ohm's Law	20. April Ch. 22.1-4 Workbook 22 HIP2 Due	Lab #3 Current and Ohm's Law	22. April Ch. 22.5-6 Workbook 22	24. April Lab3 Due
4	Circuits, Kirchhoff's Laws, Parallel and Series Resistors, RC Circuits	27. April Ch. 23.1-5 HIP3 Due	Lab #4 Circuit Analysis	29. April Ch. 23.6-8 Workbook 23	1. May Lab4 Due Exam2
5	Magnetic Fields and Forces	4. May Ch. 24.1-4 Workbook 24 HIP4 Due	Lab #5 Magnetic Phenomena	6. May Ch. 24.5-8 Workbook 24	8. May Ch. 24.7-8 Lab5 Due
6	Electromagnetic Induction and Electromagnetic Waves	11. May Ch. 25.1-4 Workbook 25 HIP5 Due	Lab #6 Magnetic Field of Current	13. May Ch. 25.5-8 Workbook 25	15. May Lab6 Due Exam3
7	AC Electricity	18. May Ch. 26.1-4 Workbook 26 HIP6 Due	Lab #7 Electric Motors	20. May Ch. 26.5-7 Workbook 26	22. May Ch. 27.1-3 Workbook 27 Lab7 Due
8	Relativity:	25. May HIP7 Due Memorial Day No School	Lab #8 Energy use in your home	27. May Ch. 27.4-7 Workbook 27	29. May Lab8 Due Exam4
9	Quantum Physics	1. June Ch. 28.1-4 Workbook 28 HIP8 Due	Lab #9 Photoelectric effect	3. June Ch. 28.5,7-8 Workbook 28	3. June Ch. 30.1-4 Workbook 30 Lab9 Due
10	Nuclear Physics	8. June Ch. 30.5-6 Workbook 30 HIP9 Due	Lab #10 Radioactive Decay Lab Exam	10. June Review	12. June Final 10-11:50am

* These are the chapters discussed in the Zoom meeting that day.
Answers to all reading questions are due in your Journal by midnight the day before.

Mastering Physics due dates please see course PH203SPRING2020