

Physics 121, Winter 2009

Brigham Young University

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January 14, 2009

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1 Introduction

Welcome to Physics 121! This is one of the best classes on campus. We will study how mechanical things move in response to forces. Probably many of you have studied some of this already in high school or other courses, so many of the concepts will be familiar – at least at first. We’ll go rather quickly through an amazing list of topics. After a short ride through Newton’s laws, vector algebra, and motion in one and two dimensions, we’ll take on energy, momentum, and rotational motion. Just for kicks, we’ll toss in some gravity and harmonic motion at the end of the semester. So buckle your seatbelt and hang on!

1.1 Textbook

Physics for Scientists and Engineers by Serway and Jewett, 7th edition, Volume 1. Previous editions will also probably work, but you might have to do a little work to make sure you read the right sections.

1.2 Website

Go to <http://volta.byu.edu/moodle> and follow the link to “Physics 121 Bergeson.” Check here often for policies, homework schedules, the updated syllabus, and more. Because you are enrolled in the class, you should be able to log in. Your user name is your route-Y ID. Your password is your BYU ID number. When you first log in, you will be required to change your password. **The password encryption is not bullet-proof, so DO NOT use a secure password (like the one you use for your bank account, etc.).**

1.3 Mathematical Preparation

A solid background in algebra, trigonometry, and calculus will help enormously in this class. Concurrent enrollment is usually okay, but if you are mathematically weak it could mean pain. If you need a quick brush up on calculus, you might try *Quick Calculus* by Kleppner and Ramsey. You can get it on Amazon for a couple of dollars. Similar books are also available in the library and from other sources. If there is too much pain and suffering, we may have to schedule a calculus tutorial and review.

1.4 Instructor

I have been teaching physics at BYU for 10 years. Way back in the last century I graduated from BYU and majored in physics with minors in math and music. Shortly after most of you were born I earned a Ph.D. in atomic physics from the University of Wisconsin – Madison. For three years I carried out post-doctoral research at the National Institute of Standards and Technology in Gaithersburg, MD, and then I moved here. A few years ago I took a break and worked for a year at the Max Planck Institute for Quantum Optics in Munich, Germany. Twice I have worked for Nobel Prize winners, but I’m not so famous myself. I occasionally consult with local companies on different projects. I do laser stuff and most of the time it is a blast.

I’ve been married for about a zillion years and have nine children. In my home ward I am in the bishopric, and you can imagine that most Sundays the bishop asks himself, “Now why exactly did I think it was a good idea to call Brother Bergeson into the bishopric?” At any rate, my goal in life is to have a good time doing all of the things have to be done. For fun I like to cycle, run, read, do the dishes, and think about physics experiments. I’ve never watched a complete episode of the Simpsons, the Office, or probably any other TV show you can imagine. It is a little strange because as a kid I was a complete TV addict. I watched TV all the time. But something snapped and I quit cold turkey.

1.5 Course Objectives

Because we have all these business people in the administration building, the faculty have to dream up things called “course objectives.” Somehow it makes the bean counters feel good about their jobs when we do this. Since we’re such nice guys and since we *like* to help people feel good about themselves (although you may question this before the semester is over), here are the things that all of you will be able to do by the time we’re through this semester.

- Convert quantities from one set of units to another.
- Express numerical answers using a reasonable number of significant digits.

- Compute a particle's classical translational motion in one or two dimensions, including circular motion.
- Use the ideas of energy, work, and power to arrive at conclusions about the motion of a system.
- Use linear momentum to describe the motion of systems of particles.
- Compute the rotation of a rigid body about a fixed axis.
- Relate the forces on objects in static equilibrium.
- Compute the motion of objects and planets moving in response to the gravitational force.
- Compute the motion of objects in simple harmonic motion.

It will be great, and we'll learn a lot as we go along.

Even though this class is awesome, it is going to be hard. Get to know your neighbors in the class and try to find a way to study and work on homework together. Think big thoughts and ask questions.

Learning takes time and it takes work. You will have to read a lot in your textbook and spend some intimate moments with your calculator. But in the end it will be worth it. My own feeling is that science is beautiful. In a way it is like art. It is a way to experience the world around us and then to convey that experience to others. It is a way of making sense of what happens to us in life.

2 Your Grade

Most of your grade will come from the three mid-term exams and the final. But homework and other things will also count. Here is approximately how we will calculate things – at least for now.

2.1 Tests – 65%

We will have three midterm exams and a comprehensive final. Each midterm exam will be 13% of your grade, and the final will be 26%. Part of the score you get on each problem will be for the right answer and part will be for the right reasoning that leads to the answer. Don't get cranky if we count you off for incorrect reasoning. It is our job and you're paying us to do it. *Be sure to do your homework because that is where you practice for these tests.* We do not re-grade any test questions unless the exam has an error.

All tests will be closed book and closed notes. They will be given in the testing center, which is located in the Grant Building. You can read more about their policies and procedures on the Testing Center Web Site at <http://testing.byu.edu/> . They are open Monday through Saturday, and have different hours depending on the day. They stop handing out tests one hour before closing time.

2.2 Everything Else – 35%

The other areas that contribute to your grade are homework, pre-class quizzes, in-class iclicker quizzes, walk-in labs, and memorization tests. To help with managing all of this information, we have given each of you a CID number (Course **I**dentification number). You can find out what yours when you log onto the course website and follow the link to “Display CID Number.” Some of you got an email earlier in the year telling you your CID number. We are not using those. Instead, we are using the CID numbers generated by our course web page.

2.2.1 Homework – 15%

Just about every class day, you will have some homework to hand in. The problems are posted online, and you can print them out if you wish. You hand them in to boxes just outside our classroom, in the hall outside of 445 MARB. Assignments are due by 7pm. No late assignments will be accepted. You hand them in according to the first digit of your CID number. **We will not use homework questions from the text. All homework problems are taken from the problem set posted on our course website.**

More than just getting the right answer, we really want you learn how to reason through a problem correctly. So the right answer only counts for half of the grade. The other half comes from your correct (and clear) description of the reasoning you used to arrive at the right answer – just like on the tests.

2.2.2 Pre-class Quizzes – 5%

Before each class period, you will be required to take a pre-class quiz. These are due one hour before class begins and are posted on the class website. You will need to read the course materials *before* you take the quiz because the first problem will always be “I completed the assigned reading for today’s class,” and you can answer yes or no. Your grade on these quizzes is completely dominated by your answer to this question. The remaining questions will be used as part of our classroom discussion.

2.2.3 iClicker – 6%

In each class period you will have to answer questions. You will each need to buy an iclicker and bring it to class every day. These questions will be over the material listed in the class

schedule. Some will be group response, some will be individual. Some will require simple calculations, some will be conceptual.

2.2.4 Walk-in Labs – 6%

Roughly once each week you will get to complete a laboratory exercise. These will be posted online pretty soon and can be fun. They won't take a huge amount of time, but they will reinforce some ideas we are talking about in our class. Each lab will require a write-up and will be graded. To avoid too much congestion in the lab, you all have assigned days. If the first digit of your CID is 0-1, you have to complete the lab on Monday, 2-3 on Tuesday, 4-5 on Wednesday, 6-7 on Thursday, 8-9 on Friday.

The labs are in S415 ESC, and they are available any time that the building is open. You can complete the lab exercises in groups or individually. If you work in a group, you each need to turn in your own lab report.

2.2.5 Memorization Quizzes – 3%

Before each exam I will post a memorization quiz. This will be a list of things you should know in the course. You can retake the quiz as many times as you wish and I will record only the score on your last attempt. Because the tests are closed notes and closed book, all of the formulas you will need on the exam will be on the memorization quiz.

2.3 Comparison with the other section of Physics 121

There is another section of Physics 121 that meets earlier in the day. We are using the same book, the same homework, and the same tests. In my section, I am emphasizing the tests a little more heavily (65% instead of 50% in the other section). But we will probably arrange things so that the average grade in the two sections is approximately the same.

2.4 Dropped grades

We have 24 homework assignments, 13 walk-in labs, 28 clicker quizzes, 28 warm up quizzes, and four memorization tests. To make our lives a little easier, we will drop two homework assignments, one lab, 3 clicker quizzes, and 3 warm-up quizzes. This information is summarized in Table 1.

2.5 The grading scale

I can guarantee the traditional grading scale: $A = 90$ to 100 , $B = 80$ to 90 , etc. So it is possible for all of you to earn an A in the class. Historically, we have always used a curve to help you get better grades. When I do the curve, the average grade in the class will be in the mid- to low-B range. Remember, the curve will only help you.

Table 1: A summary of how your grade is assigned. This is described in the text in more detail.

	number assigned	number counted in grade	combined weight
homework	24	22	15%
walk-in labs	13	12	6%
iclicker quizzes	28	25	6%
warm-up quizzes	28	25	5%
memorization tests	4	4	3%
mid-term exams	3	3	39%
final exam	1	1	26%
total			100%

3 How the Course Works

So here is what you need to do:

1. Go to the bookstore and buy your book and iclicker.
2. Read chapter 1.
3. Go to <http://volta.byu.edu/moodle/> . Log in and change your password
4. While you are logged in, take the first warm-up quiz.
5. On the back of your iclicker, there is an 8-digit number. The digits range from 0-9 and A-F. Follow the link on the course web page and register your iclicker. If you cannot read your number, come see me during office hours.
6. Come to class and stay caught up. Some of you will think the first week or so is incredibly easy. But things change rapidly.
7. Do your homework.
8. Do your labs.
9. Ask questions.
10. Have a good time.

4 Where to go for help

4.1 The Book

So the other day I was working with a research student in my lab. He was using a pair of lenses to focus a laser beam at a distant point about 4 meters away. It was a little tricky and he was struggling. After a couple of hours he asked me to help and I showed him how to do it. He said, “That’s amazing! Is there someplace I can read about this? Like a good Wiki article or something?” My response was, “How about your physics textbook?”

A colleague of mine who sometimes teaches this class told me his students were asking for practice online homework and test questions to help them prepare for the final exam. He pointed out that the book was full of questions (with answers) on the exact topics that would be on the test. So don’t neglect your book. It is full of information about physics and it will be very helpful during the semester – I promise!

4.2 The Tutorial Lab

We have hired a group of teaching assistants to help you this semester. They staff the Tutorial Laboratory in N304 ESC. The room is open whenever the building is open, but TA’s are only present during certain hours which will be posted near the lab. The Tutorial Lab is not a study hall – don’t plan to camp out here to do all of your homework. It is a place you can come to get help on problems you have already worked on. It is also a place where you can meet other students who are in your class.

All of the TA’s in the Tutorial Lab have enough background to help you with your homework. But we hired some specifically for this class, so look for them. Their hours will be posted, and usually they have a specially-colored vest or name badge.

4.3 One Another

I want to encourage you to work with other students in the class. Don’t copy solutions, but you can learn a lot by discussing the problems and solutions with one another. We expect that you will be honest. All of you signed a contract saying that you would abide by the honor code. Dishonesty includes using other peoples writing or ideas without crediting them with the work, representing others’ work as your own, certifying or implying completion of an assignment when you didn’t do the work, or inappropriately obtaining exam questions or solutions to exams or problem sets.

4.4 Our Class Time

Someone once joked that teaching is the art of transferring the instructors lecture notes onto the student’s papers without having any of the concepts go through the minds of anyone.

We'll try to avoid that. In class I will ask you questions, and part of your grade will be based on your answers. If you have questions, ask them. Don't be shy because the class is so big. Someone else in the room undoubtedly has the same question you do and they will be glad you asked.

4.5 Office Hours

My office hours are MWF, 8:30 to 9:15 am in room N267 ESC. Please stop by if you have a question. That will be a lot easier than asking by email.

5 University Policies

We fully support the mission and aims of Brigham Young University. We fully support the mission and aims of its founding institution, the Church of Jesus Christ of Latter-Day Saints. We recognize that all of you have signed the honor code, and we expect you to adhere to it.

5.1 Honor Code Standards

While attending BYU, remember that you promised to uphold the principles of the honor code. This means honesty in your academic work. Cheating on an assignment or a test will result in a failing grade. A notification will be sent to the Honor Code Office.

5.2 Sexual Harassment

If you encounter sexual harassment or gender-based discrimination, please talk to me, contact the Equal Employment Office (422-5895), or contact the Honor Code Office (422-2847). BYU's policy against such harassment extends to all members of the university community.

5.3 Students with Disabilities

Please contact the University Accessibility Center (422-2767) if you have any disability that may adversely affect your success in this course. BYU provides reasonable accommodation to qualified persons with disabilities with services to be coordinated through that office.

5.4 Children in the Classroom

Small children are wonderful, but are a distraction in the classroom. You will need to make arrangements for child care and should not bring them with you to class.

6 Epilogue

OK. That's all for now. This document will be updated periodically. Have a great semester and enjoy learning all of these great thoughts!