

Physics 251 - Fall 2008
Call # 05600 Syllabus

Instructor	Dr. Braslavsky	
Office	155 Clippinger	Text Physics for Scientists and Engineers
Phone	597-3011	By Randall Knight, 2 nd edition 2007
e-mail	braslavs@ohio.edu	
Office Hrs	2:10 - 3:00 p.m. Mon., Wed., Thur, Fri., and by appointment	
Classroom	M W TH F Walter 245 1:10 - 2:00 p.m.	

This syllabus, your homework, and addition information about the course can be found at <http://loncapa.phy.ohiou.edu>, use your oak id and password to login and select the course. The following list of topics/chapters will be covered in approximately the order indicated. The teaching method is primarily through the analysis of problems and the use of in-class questions to which you will be expected to respond using our electronic response system. Students are expected to read ahead material from the text book so that they are ready to learn more in class. Topics will be grouped and presented through relevant problems.

Sep 8	Introduction and Chapter 1, Concept of Motion		
10	Chapter 2, Motion in 1-D		
11	Chapter 2, Motion in 1-D		
12	Chapter 3, Vectors	Oct 20	Chapter 10, Energy
		22	Chapter 10, Energy
Sep 15	Chapter 4, Motion in 2-D	23	Chapter 11 Work
17	Chapter 4, Motion in 2-D	24	Quiz 5, Problem Set 6 due
18	Chapter 4, Motion in 2-D		
19	Quiz1, Problem Set 1 due	Oct 27	Chapter 11, Work
		29	Chapter 12, Rotation of a Rigid Body
Sep 22	Chapter 5, Force and Motion	30	Chapter 12, Rotation of a Rigid Body
24	Chapter 5, Newton's 1 st & 2 nd Laws	31	Quiz 6, Problem Set 7 due
25	Chapter 6, Motion along a line		
26	Quiz 2, Problem Set 2 due	Nov 3	Chapter 12, Torque, Static Equilibrium
		5	Chapter 12, Static Equilibrium
Sep 29	Chapter 6, Friction	6	Chapter 12, Angular momentum
Oct 1	Chapter 7, Newton's 3 rd Law	7	Quiz 7, Problem Set 8 due
2	Chapter 7, Newton's 3 rd Law		
3	Quiz 3, Problem Set 3 due	Nov 10	Chapter 13, Newton's Theory of Gravity
		12	Chapter 13, Newton's Theory of Gravity
Oct 6	Chapter 8, Motion in a Plane	13	Review
8	Chapter 8, Motion in a Plane	14	Quiz 8, Problem Set 9 due
9	Review, Problem Set 4 due		
10	Chapter 8, Motion in a Plane		
			The Midterm Exam will be 2 hours starting at 7:10 p.m. on Thursday October 9 th .
Oct 13	Chapter 9, Impulse and Momentum		
15	Chapter 9, Momentum		
16	Chapter 9, Momentum		
17	Quiz 4, Problem Set 5 due		The Final Exam will be Tuesday, November 18 th , at 7:00 p.m.

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Grading policy

General

Physics 251 is the first of a three-quarter sequence in General Physics for students of science and engineering. Students are assumed to have a working knowledge of calculus equivalent to Math 263A/B.

The General Physics sequence will try to present a unified view of physics by analyzing the basic principles, their implications and their limitations. Physics 251 deals with: **Measurement; motion in one, two and three dimensions; Newton's laws of motion; conservation of energy; systems of particles and conservation of momentum; rotational dynamics; angular momentum; gravity; static equilibrium and elasticity.** *Calculus (differentiation and integration) and vector arithmetic will be used to solve problems in these topics, the necessary mathematical techniques will be reviewed as necessary when they first arise and are also reviewed in Appendix A of the text book.*

Scientists and engineers are usually put into situations where they have to do things they, and others, have not done before. A bridge of a given type may have been built before but not in this new location; a new computer may use the same architecture as slower speed models but not at this new higher speed; a doctor may be treating a patient with a common disorder but not in this patient.

One reason why scientists and engineers take physics is because your departments know that we test your ability to cope with unfamiliar situations and recognize that the questions we present to you are readily answered (i) with a knowledge of basic science, (ii) the capacity to interpret illustrations, graphs and tables, (iii) the ability to read carefully and process unfamiliar scientific information. The questions will often feature illustrations or wording that may at first sight make you think you cannot solve the problem but this is not so. Solving physics problems is not just about what you know but also about how you think. You need to know the basics and apply that knowledge in new and unfamiliar problems.

Memorization of facts that are quickly forgotten is a useful asset in physics, as in many other subjects, but is not sufficient. You will not be able to pass on memory alone. You will need to learn the basic principles and know how to apply them.

While a numerical score will be used to determine your grade, I think it useful to share with you what I expect student in particular grade letter bands to be capable of when they complete this course.

An A student will be able to solve correctly problems involving the motion of particles subject to Newton's laws of motion, in straight lines and in circular paths. They will provide all the steps necessary for the solution and they will explain them citing the relevant physical principles. They will be able to solve problems involving vectors in two and three dimensions, including the three dimensional properties of vectors such as torque and angular momentum. They will be able to solve problems involving the use of the principle of conservation of energy in mechanical systems. They will also be able to solve problems involving both conservation of linear momentum, in one or two dimensions, and conservation of angular momentum. They will be able to apply the principles of particle dynamics to systems of particles and in particular rigid bodies. They will probably complete nearly all the homework (>95%). They will have learnt how to write lab reports in a lab notebook and written a very good technical report of one experiment.

A B student will be able to apply correctly the principles of conservation of energy and momentum to mechanical systems. They will be able to solve most problems correctly involving the motion of particles in straight lines but probably have difficulties with rotational motion problems. They will give well structured solutions to problems but may not complete them. They will be able to solve problems involving vectors in two and three dimensions including linear momentum. They will have learnt how to

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write lab reports in a lab notebook and written a very good technical report of one experiment.

A C student will be able to apply the principles of conservation of energy and momentum to mechanical systems but will make mistakes in their solutions. They will be able to solve some problems correctly involving the motion of particles in straight lines. They will give some structure to solutions of problems but will often not complete all steps. They will be able to solve most problems involving vectors in two dimensions. They will probably complete most of the homework (>90%). They will have learnt how to write lab reports in a lab notebook and written an acceptable or good lab technical report of one experiment.

A D student will be get some parts to many problems correct but find it difficult to complete correctly any of the problems on exams. Parts of problems that are correct will probably be not explained, diagrams will be missing as will statements regarding the physical principles used. They will usually get more than 50% of the multiple choice questions on exams correct. They will probably complete more then 70 % of the homework with difficulty. They will have learnt how to write lab reports in a lab notebook and written an acceptable technical report of one experiment.

To get an F in this course a student will either have failed the laboratory, see notes regarding passing the laboratory, or have had severe difficulties with the material of the course such as: failing to grasp the concepts of vectors; unable to handle the mathematical knowledge required to solve the problems given; not explaining their solutions to problems, even when incorrect etc.

Statement regarding the mathematical knowledge assumed and taught

Students entering Physics 251 are expected to have some knowledge of calculus as covered in a high school math class, and all of the high school math leading up to calculus. Students are required to have passed MATH 263A or 263B with a C grade or better, or the equivalent course elsewhere. This means that you are likely to have the skills necessary to handle the math required by Physics 251. However, by no means is all the math for Physics 251 is covered in MATH263A.

For Physics 251, you are expected to be fluent in the following topics:

Basic arithmetic and logical operations

Algebra of single and multiple variable equations

Graphical representation of equations

Linear Equations

Solution of simultaneous equations with 2 or 3 variables

Trigonometric functions, their definitions, properties and associated identities

Logarithmic and exponential function properties

Differentiation of simple functions, e.g. x , x^2 , $x^{-1/2}$, $\log x$, $\sin x$

Integration of simple functions, e.g. x , x^2 , $x^{-1/2}$, x^{-1} , $\sin x$, including definite integrals

In addition you will be taught during this course the properties of vectors including, vector addition and subtraction, vector multiplication, both dot (scalar) and cross (vector) products. You will also be shown how to perform simple line integrals.

Quizzes and Exams

No books, notes or formulae stored in electronic or written form may be consulted during the quizzes or exams. Students are expected to remember basic formulae and definitions. A formula

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sheet will be provided with the exams by the instructor and is also available at the class web site, <http://loncapa.phy.ohiou.edu>. Students will need a simple and cheap (less than \$20) "scientific" calculator such as the TI 30 X. The particular functions you will require are: the trig. functions sine, cosine and tangent (sin, cos and tan) and their inverse, e.g. arcsin, \sin^{-1} or inv sin, etc.; logarithms (log); square root; scientific notation; exponential. Students who have not used a scientific calculator before should make sure they are familiar with how to perform long calculations as well as use the above functions. I strongly recommend you do not buy an elaborate programmable calculator just for this course. You will not need its power, and its complexity may confuse you. However, any calculator from the TI 80 series family will be allowed, but, if you do use any advanced features of your calculator you must record that in your solution e.g. solution of quadratic equation, solution of sets of linear equations, numerical integration, regression analysis. Also, remember, consulting formulae or notes stored in a calculator is considered cheating for the purposes of the exams and quizzes, just like using written notes or a book. During exams and quizzes we will do random checks of calculators to ensure that no formulas, notes or equations are stored that are relevant to the quiz or exam being taken and could give an unfair advantage. Penalties for storing such information may range from the student being required to delete the information immediately, to being given zero for the quiz or exam, or to failure for the entire course depending on the perceived importance of the information to the quiz or exam. A report may also be made to the Judiciaries. Calculators, from other manufacturers, similar to the TI 80 series will be allowed but no calculator or electronic device may be used that has a high capacity storage device e.g. a hard drive, CD or ZIP drive, or has the ability for wireless communication.

Midterm exam

There will be one, combined midterm exam that will count 20% toward the final grade. It will last two hours. It will be similar in structure but not contain as many questions as the final exam.

Final Exam

The final exam is a two hour exam and will be comprehensive.

The final exam will count 25% toward the final grade.

Quizzes

Quizzes will usually be given during the classes on Fridays. There will be two types of quizzes given, group quizzes and individual quizzes, each quiz will take 15 - 20 minutes. For group quizzes you will be put in groups of 4-6 students. Each group will appoint a person as the "writer" for that group. That person will be given paper to record the names of the students in the group and the group response to the question. The second type of quiz, the individual quiz, will be given to each student. They will complete this quiz by themselves and turn it in after the allotted time. The grade for the class will be split equally between the two types of quizzes. The lowest score from the individual and the group quiz will be dropped.

Textbooks, notes or other materials may not be consulted during work on either quiz. For the group quiz quiet discussion of the solution is expected between members of the group. The group may ask questions of the instructor who can respond only with suggestions on how to complete the solution. The instructor will not give direct answers to the solution.

Anyone who misses a quiz will be given a makeup if they have a valid university excuse.

The total quiz grade will count 19% toward the final grade.

The in-class questions will be posed throughout the lectures, and responses will be collected. Questions will be graded 3 pts for a correct response and 2 pts for an incorrect response. The percentage

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will be scaled at the end such that a score of 75% or higher will represent full credit. Other in-class exercises may also be included in this portion of the grade.

The in-class questions grade will count 1% toward the final grade, for a total of 20% toward the final grade for the quizzes and in-class questions.

Homework Assignments

Personalized sets of homework will be provided to each student throughout the quarter. These are to be completed and graded through our Learning On-Line Computer Assisted Personalized Assignment (LON-CAPA) system. Students can enter their answers in a computer terminal and get them graded immediately on the screen. A student can try each problem up to 10 times. **Each set has a due date and time assigned and shown on the computer screen.** You will access your assignments via the World Wide Web (WWW). The address is <http://loncapa.phy.ohiou.edu>. You need to enter your Oak login id and your password to log onto this computer system. Please report any problems with access to the instructor ASAP, braslavs@ohio.edu.

To access your assignment after you have logged in select the 'Student ' role in your particular course. You will be presented with the course home page. Click on **Navigate Contents**. Scroll to the current assignment and click on the problem. Problems are color-coded, and if the assignment is open, the due date is listed on the same line. Green indicates the problem has been completed. Light green indicates the problem has multiple parts (see parts of for solved status). Yellow means the problem is open. Bright yellow indicates it is due in the next 24 hours, and pink indicates the problem is closed (answers may be available).

Enter the answers in the boxes provided (or via pull- down menus). Press 'submit answer' to send the answer to the computer. Feedback will be provided. Read this carefully. If you are correct, you will be provided with a receipt number. **RECORD THIS NUMBER!!!**

If there is a technical problem, this number will provide proof that you have done your assignment. You are allowed multiple attempts at a problem. The number of attempts is displayed below the problem and in the navigation page.

To obtain a printout of your assignment, go to one of the problems in the assignment. Select PRT on the remote. To print the assignment, select "The whole primary sequence". You can then select 1 or 2 column output and portrait (use other options at your own risk!). Press 'submit'. The system will create a PDF (Adobe Portable Document Format) file which can be read, and then printed, using Adobe Acrobat. The screen version can be pretty ugly, but the print version should look much better.

WARNING! CAPA will stop accepting answers at the exact due time listed on the assignment. The time on the computer is *NOT* necessarily the time on your watch. Waiting to the last hour to do your assignment is a really bad practice. Additionally, the load on the computers can get very high at due times and delay your submissions. Do not wait until the last minute!

Tips: Here are a few tips when entering answers:

- Keep a notebook with your written solutions in.
- Keep a list of your answers! When you get to the 10th try on a problem, you can easily confuse yourself.
- Read the computer feedback carefully!
- Scientific notation is entered in the form **6.02E23** not 6.02×10^{23}

Browsers: The following browsers should work with LON-CAPA: Google Chrome, FireFox, Netscape, Internet, or Safari. Your browser will need to have "cookies", "Javascript" and "Java" enabled.

HELP !!! If you are having technical difficulties checkout <http://loncapa.phy.ohiou.edu/help>, if that does not work please e-mail Dr. Braslavsky at braslavs@ohio.edu. Include the course, browser version,

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location, a brief description of the problem and any error messages you have seen.

Credit for homework that is late will only be given after the first two assignments if you have a very good excuse.

Since the TAs for this course have no homework to grade there will be extended hours for students to consult with TAs for help. However TAs are forbidden to do the problems for the students. They are to help the students get to a position where they can do the problem for themselves. The homework help times and places will be announced in class.

If you find you get the right answer but do not know why please come and see the instructor or one of the TAs. Please bring your solution with you so we can have a concrete discussion.

The purpose of the homework is to encourage you to regularly study the material and to learn how to solve the problems correctly. If you “cheat” by trying to find answer through picking the right equation from a book or copying it from a friend you will not be able answer similar questions on exams or quizzes because then you will be required to explain, show or otherwise use the physics principles that underlie “the equation”. We expect you to collaborate with others during your solution of the homework but if you do not understand why an answer is the correct one come and ask.

The home work will count 15% toward the final grade. The average grade on the home work is ~90%. There is a small correlation between the home work grade and your overall grade for the course, but it is very small. It is there to help you learn the material in preparation for the exams. There is a big correlation between those that do their homework first and their final grade.

Laboratory

You are required to register for a laboratory for this class. **A passing grade on the laboratory of at least 70% is required in order to pass the course.** A missed lab without a valid university excuse counts as zero and cannot be made up. Only labs for which you have a valid university excuse can be made up by scheduling the make up through the curators office (042 Clippinger). Where possible labs should be made up during the week in which they were due to be taken. Students waiting until the last weeks of the quarter to make up labs missed in the first part of the quarter will be denied make up privileges even if the original excuse for the missing lab was valid.

Not only must the lab be passed to pass the entire course, but if a student misses more than 2 labs without a valid University excuse then the lab will be failed as well as the entire course.

The laboratory counts 20% towards the final grade.

Attendance

The instructor recommends that all students attend class. Students are responsible for all material covered in class whether they attend or not. A University Excuse (see O.U. Handbook) is required for any makeups on exams, quizzes, or lab work. If in doubt about a make-up please ask, I am usually more generous than the O.U. Handbook.

Additional practice problems

In addition to CAPA, the book website offer helpful resources, including the "Active Physics Online". Sign in to access the book website at:

<http://session.masteringphysics.com/myct?productID=knight2>

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Cheating

Students suspected of cheating will be warned and may be asked to change seats during exams or quizzes, take a retest or may be asked to resubmit the work in the case of laboratory reports. This is not an indication that cheating has actually occurred, but is a preventative measure to reduce the chances of cheating in suspicious circumstances. Students caught cheating may be given an F for the course. If the student does not agree with this action, the student may file a grievance through established University channels. The instructor may also initiate a review by the University Judicial Board. This action could result in suspension of the student or other punitive actions by the Judicial Board.

The value of a degree from Ohio University is largely determine by the strength of the reputation of all of us. Academic dishonesty cannot be tolerated and reflects on the reputation of all of us and on the ability of graduating seniors to obtain jobs.

Final Grades

The individual numerical scores will be weighted as given above and added to give a total score out of 100. Letter grades will be awarded approximately as follows:

- A- to A ≥ 90 ;
- B- to B+ 80 to 89;
- C- to C+ 70 to 79;
- D- to D+ 60 to 70;
- F < 60.

The bands may be adjusted down but never up. This information is given so that you can work out what you need to do to get a particular final grade. No letter grades are applied to individual parts of the course, only the numerical scores from the parts, with the weightings shown, are used to calculate the final letter grade for the course. Each instructor values each part of the course in their own way. They use their own weights when assigning a final grade letter. Comparisons are not possible between a part of the course of one instructor with that same part for another instructor.

You should also be aware that most students score about 90% in labs, and many get a similar score on quizzes, this means that most of the spread or dispersion in the grades is determined by the exams.

Contribution to final grade summary:

	Contribution toward the final grade
Assignments	15%
Quizzes	19%
Midterm Exam	20%
PRS - questions in class	1%
Lab	20%
Final Exam	25%
Total	100%

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Physics 251 Laboratory Schedule Fall 2008

Week of:	Experiment	<u>Number</u>
Sep. 15	Measurement and Error	1
Sep. 22	Vector treatment of concurrent forces	3
Sep. 29	Determination of acceleration due to gravity and Newton's Second Law (Technical Report) draft <u>due</u> the week of Oct. 13 th in your laboratory Final version due week of Oct. 27 th in your laboratory	4
no lab week of Oct. 6		
Oct. 13	Centripetal Force	5
Oct. 20	Momentum, Impulse, & Collisions in one dimension	6&7
Oct. 27	Ballistic Pendulum	8
Nov. 3	Experimental determination of the Moments of Inertia	9
Nov. 10	no lab this week	

1. The experiments are from the Laboratory Experiments Physics 250 Series, 2008. This book should be purchased at the bookstore.
2. The lab reports are to be written up as described in the handout on writing laboratory reports, and given to your lab instructor at the end of the lab or within 48 hours of the end your lab. The small green or black Vernon Royal Composition books with Quadrule ruling are to be used. They may be purchased at the bookstore.
3. **The technical report is described in the section in the lab. manual on technical reports.** It includes an abstract, theory, experimental details, data, results (tables or graphs), conclusion, and bibliography in that order.
4. In writing the technical report, give particular attention to: English (spelling, precision of statements, proper word usage, etc.); handling of equations, tables, graphs (see your textbook here for examples); organization; neatness. Make sure that your theory is complete, relevant, and discusses the physical phenomena and equations used. In the conclusions, indicate: what you learned about the physical phenomena observed, the values obtained, the source of errors, and suggestions for improving equipment and technique so as to reduce the errors. The conclusions are important and require considerable thought.
5. Missed labs and/or lab reports shall count as zero (0). If more than two (2) labs and/or reports are missed with or without a University sanctioned excuse (and not made up in the case of a University excuse) the student shall fail the entire course. **Read the Physics Department Laboratory Makeup Policy** posted on the door of the laboratory. **You are responsible for this information.**
6. For each school day (Monday - Friday) a report is late, without excuse, two (2) points will be subtracted from the report grade. A 70% grade in lab is required to pass the lab unless otherwise stated in the lecture syllabus.
7. In the case of academic dishonesty (copying, plagiarism, etc. including material from the previous quarters, your lab partner, the lab manual), the grade on the lab report may result in a zero. If this happens on the technical report, you may fail the lab and hence the entire course since your total lab grade may now fall below 70% as the technical report is worth 30% of the total lab grade. All lab reports are to be your own work even though the data may have been taken by you and your lab partner.

**** Bring your calculator, pen, memory stick, and a ruler to lab AND READ THE LAB. BEFORE YOU COME.**