Physic 251 - Fall 2003
Call #s 05149 – 05150 - Syllabus

Instructor Dr. Smith
Office Clippinger 165
Phone 597-2576
Email smitha2@ohio.edu

Text Physics for Scientists and Engineers
Paul A. Tipler
4th edition 2000

Office Hrs 4:30 – 5:30 p.m. Mon. and Wed. and by appointment

Call # 05149
Call # 05150
M W TH F Morton 115 9:10 - 10:00 a.m.
M W TH F Morton 115 9:10 - 10:00 a.m.

Note: meet always in 115 every day unless otherwise directed.

This syllabus, your homework, and addition information about the course can be found at
http://loncapa.phy.ohiou.edu

The following list of chapters should be covered in approximately the order indicated. The teaching
method is primarily through the analysis of problems. Topics will be grouped and presented through
relevant problems.

Sep 8 Introduction and Chapter 1
10 Chapter 2
11 Chapter 2
12 Chapter 2
Oct 20 Chapter 9
22 Chapter 9
23 Quiz 5, Assignment 5 due

Sep 15 Chapter 3
17 Chapter 3
18 Quiz1, Assignment 1 due
19 Chapter 3

Sep 22 Chapter 4
24 Chapter 4
25 Quiz 2, Assignment 2 due
26 Chapter 4

Sep 29 Chapter 5
Oct 1 Chapter 5
2 Quiz 3
3 Chapter 5

Oct 6 Chapter 6+7, Assignment 3 due
8 Review
9 Chapter 6+7
10 Chapter 6+7

Midterm exam will be at 7:10 p.m. on Wednesday

Oct 13 Chapter 8
15 Chapter 8
16 Quiz 4, Assignment 4 due
17 Chapter 8

October 8th in Bentley 240, anyone with a Physics
Lab. from 6-8 pm will start their exam at 8:10 pm in a
different room

Nov 3 Chapter 10
29 Chapter 10
30 Quiz 6, Assignment 6 due

Nov 10 Chapter 12
12 Chapter 12
13 Quiz 8, Assignment 8 due

Nov 17 Review

Final Exam: 4:40 p.m Wednesday Nov 19th
Physics 251  Dr. Smith

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 D 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 in 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 learned 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 learned how to write lab reports in a lab notebook and written a very good technical report of one experiment.
Physics 251  Dr. Smith

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 learned 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 learned 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 or homework assignments, see notes regarding passing the laboratory and homework in this syllabus, 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 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 (scaler) and cross (vector) products. You will also be shown how to perform simple line integrals.
Physics 251   Dr. Smith

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 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. 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^{	ext{-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, 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. 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 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 30% toward the final grade.

Quizzes

Quizzes will usually be given during the classes on Thursdays. The quiz will take 15 - 20 minutes. Your lowest quiz score will be dropped.

Textbooks, notes or other materials may not be consulted during the quiz. Anyone who misses a quiz will be given a makeup if they have a valid university excuse.

The total quiz grade will count 15% toward the final grade.

Homework Assignments

Personalized sets of homework will be provided to each student throughout the quarter. These problems 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 at the top of the page. 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. Homework will count
Physics 251   Dr. Smith

for 15% of your 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.
Physics 251  Dr. Smith

Attendance

The instructor recommends that all students attend class but roll will not be taken. 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.

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 determined 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 summarized as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>15%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>15%</td>
</tr>
<tr>
<td>Midterm</td>
<td>20%</td>
</tr>
<tr>
<td>Final</td>
<td>30%</td>
</tr>
<tr>
<td>Laboratory</td>
<td>20%</td>
</tr>
</tbody>
</table>

The total weighted score will be calculated. Letter grades will be awarded approximately as follows:

- A- to A: 90 – 100%
- B- to B+: 80 – 89%
- C- to C+: 70 – 79%
- D- to D+: 60 – 69%
- 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 weighting. 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 the lab, and many get a similar score on quizzes, which means that most of the spread in the grades is determined by the exams.
# Physics 251 Laboratory Schedule

## Fall 2003

<table>
<thead>
<tr>
<th>Week of:</th>
<th>Experiment</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sep. 15</td>
<td>Measurement</td>
<td>2</td>
</tr>
<tr>
<td>Sep. 22</td>
<td>Kinematics</td>
<td>3</td>
</tr>
<tr>
<td>Sep. 29</td>
<td>Vector treatment of concurrent forces</td>
<td>4</td>
</tr>
<tr>
<td>Oct. 6</td>
<td>Newton's Second Law, Technical Report, due the week of Oct. 20(^{th}) in your laboratory</td>
<td>9</td>
</tr>
<tr>
<td>Oct. 13</td>
<td>Conservation of Linear Momentum</td>
<td>7</td>
</tr>
<tr>
<td>Oct. 20</td>
<td>Ballistic Pendulum</td>
<td>10</td>
</tr>
<tr>
<td>Oct. 27</td>
<td>Measurement of Moments of Inertia</td>
<td>12</td>
</tr>
<tr>
<td>Nov. 3</td>
<td>Equilibrium for Nonconcurrent Forces</td>
<td>5</td>
</tr>
</tbody>
</table>

1. The experiments are from the Physics Laboratory book General Physics Experiments by the 250 Series Committee. This book should be purchased at the bookstore.
2. The lab reports are to be written up in the laboratory and given to your lab instructor at the end of the lab. The small green or black Composition books with Quadrule ruling should be used. They may be purchased at the bookstore, see Page 5 in the lab manual for lab reports.
3. **The technical report is described in General Physics Experiments** and will be required to be handed in two (2) weeks after the laboratory in which the data was taken. It includes an abstract, theory, experimental details, data, results (tables or graphs), conclusion, and bibliography in that order, see Page xiii in the lab manual.
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, one (1) point 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), 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.

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