

PHYSICS I FOR SCIENCE AND ENGINEERING

Physics 880:130

Tuesday Lab – Section 01

Thursday Lab – Section 02

Fall 2003

INSTRUCTOR: Dr. Michael W. Roth

OFFICE: Physics 305

OFFICE HOURS: M,W,F 1:00 P.M.-3:00 P.M. and by appointment

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MEETING SPACETIME INFORMATION: M,W,F 11:00-11:50 A.M. in Physics 201 (Lecture); T 3:30-5:20 P.M. in Physics 101 (Lab-sect. 01) and R 3:30-5:20 P.M. in Physics 101 (Lab– sect. 02).

COURSE DESCRIPTION: Physics I for Science and Engineering is a calculus-based introductory course covering Newtonian mechanics, oscillations and waves.

OBJECTIVES: The mission of Physics I for Science and Engineering is to spark interest in the eyes of students, to have students question and analyze the world around them, to have students think, and for the class to be an experience far deeper than just a series of meetings and deadlines. At a more pragmatic level, Physics I for Science and Engineering will help the student prepare for a career in any field(s) where science is an essential component. The successful student will be able to envision how the course topics apply to situations in the everyday world as well as in technical settings-not only in conceptualization but also in proficient problem solving using calculus.

REQUIRED READING MATERIALS:

i. **Textbook:** Paul A. Tipler, *Physics for Scientists and Engineers*, W.H. Freeman and Co., 1999 (4th edition).

ii. **Course Packet:** *880:130 Physics I for Science and Engineering activity Packet*, available at Copyworks – 2227 College St. (319-266-2306).

PREREQUISITE(S)/COREQUISITES: Calculus I (800:160).

SPECIAL NEEDS: The Americans with Disabilities Act of 1999 (ADA) provides protection from illegal discrimination for qualified individuals with disabilities. If you have any condition such as a physical or learning disability, which will prevent the fullest expression of your abilities or will require academic accommodations and would like to request instructional accommodation due to disabilities, you must arrange for such accommodation through the Office of Disability Services, 213 Student Services Center, Tel. 273-2676.

GRADING: I have tried to make every major effort for you in this class worth a “test score”, or 100 points. Your grade will be calculated based on 12 lab/activity reports, 9 homework sets, 3 exams and one in-class final examination with the following weights:

- 12 lab activity reports of equal weight (100 points possible total; lowest one dropped)
- 9 homework sets of equal weight (100 pts. possible total; lowest one dropped)
- 3 exams of equal weight (300 pts. possible for all exams; none dropped)
- 1 final exam (100 pts. possible; not dropped)

Although any appropriate curve(s) will be announced in class, *it is assumed that the following standard scale will be utilized.* The grade cutoffs are as follows:

93% and above A,	77% C+,	60% D-,
90% A-,	73% C,	below 60% F
87% B+,	70% C-,	
83% B,	67% D+,	
80% B-,	63% D,	

ATTENDANCE: Although roll is not formally taken in class, it is expected that all participants with body temperatures above 80F will attend regularly. (If you are not in this category please see me.) If there is a reason that you must miss class please talk with me to make arrangements to cover the material.

LATE POLICY: Homework sets and lab/activity reports are due on the dates indicated on the class calendar. Your work is due on time, with the exception of reasonable documented excuses. *Late work will be docked 10% of face value for each day of tardiness and 50% per day after solutions have been posted.* If you are going to miss a test, you **must** notify me in advance (preferably one week) so alternative arrangements can be made. If you miss a test or quiz, which is not excused, a grade of zero points will have to be assessed for that particular piece of work. You must take all three-hour exams as well as the final exam in order to pass the course.

ACADEMIC DISHONESTY/PLAGIARISM: Collaboration on homework and certainly labs/activities is welcome, but please keep in mind that your final, turned-in work should be your own and not copied. Although collegiality is encouraged and supported, no form of cheating/plagiarism will be tolerated in this class. If anyone is suspected of academic dishonesty, I will privately speak with them in an attempt to reach a solution to whatever problem is manifesting itself. If anyone is without doubt determined to be cheating on a given

assignment/test and no resolution can be offered, *negative credit will be given*. In extreme cases, the Department and/or College administration will become involved.

GENERAL PHILOSOPHY: In a nutshell, I believe in having fun while teaching and learning physics. I want you to do your best in a subject that is not easy. If you get behind and the class feels like a diesel tractor pulling you through mud, feel free to use me as a resource to help you. Although I love to do research, your learning and class performance is more important! Asking questions in class is strongly encouraged. If you don't wish to ask questions in class please come by my office, give me a call, make an appointment or even send me anonymous e-mail! Also, I like to talk a little about related contemporary issues in class, so if you've found an interesting newspaper clipping or watched a good documentary you'd like to share with us, please mention that. The most entertaining to me are tabloid articles that beg to be de-bunked using physics. I hope you find that physics is everywhere around you and not just in a class you had to take.

EXTRA CREDIT POLICY: Extra credit that adds to your score or substitutes for missed work is not offered in this class. However, I want to encourage you to feel like a part of the Department and I want to expose you to other scientists. Pursuant to that philosophy, I encourage you to go to our seminars, usually at 4:00 P.M. on various Wednesdays and listed on our website at <http://www.physics.uni.edu/calendar.shtml>. If you turn in one-page handwritten reports to me over the talks, I will keep track of quantity you have turned in. Although not a guarantee, these reports can often be helpful for persons in a borderline grade situation (being within about 1% of a particular grade).

ABOUT THE HOMEWORK: Homework sets need not be typed but should be neat and readable. Answers to conceptual questions should include all reasoning. Answers to quantitative problems should show all steps taken to get the answer. Since you will be provided with numerical answers to all the problems, answers to homework problems that are only a number with no supporting reasoning will not be given credit.

ABOUT LABORATORY REPORTS: I will be asking you for a lab report for each lab activity we do. They need not be typed but should be neatly handwritten. Each report should have a title page bearing relevant information followed by answers to questions posed in the lab activity as well as to analysis questions at the end of each lab activity. The best answers are complete, well-constructed sentences. Feel free to take time and elaborate on your ideas! I thoroughly enjoy my job and will gladly take the time to read what you have to say. In fact, the criterion I use for complete answers to questions is the following: *your answer is complete when someone not having seen the lab activity guide is able to reconstruct the question you were responding to just from your answer.*

INSTRUCTOR'S STATEMENT: The instructor reserves the right to modify this syllabus in a reasonable fashion and in the best interest of the class.

PHYSICS I FOR SCIENCE & ENGINEERING – FALL 2003

Week	Day	Date	Topic(s)	Text Chapter	Item(s)
1	M	Aug. 25	Intro/Systems of Measurement	1	
	W	27	Motion in One Dimension	2	
	F	29	Motion in One Dimension	2	
<i>Laboratory topic this week: Lab 1: Mathematical Modeling</i>					
2	M	Sept. 1	No Class - University holiday		
	W	3	Motion in One Dimension	2	
	F	5	Motion in One Dimension	2	
<i>Laboratory topic this week: Lab 2: Position and Velocity</i>					Lab 1 Report
3	M	8	Motion in Two and Three Dimensions	3	Homework 1 (Text Chapters 1,2)
	W	10	Motion in Two and Three Dimensions	3	
	F	12	Motion in Two and Three Dimensions	3	Lab 2 Report
<i>Laboratory topic this week: Lab 3: Velocity and Acceleration</i>					
4	M	15	Motion in Two and Three Dimensions	3	
	W	17	Newton's Laws	4	
	F	19	Newton's Laws	4	Homework 2 (Text Chapter 3)
<i>Laboratory topic this week: Test I Review (Tuesday)</i>					
FIRST EXAMINATION THURSDAY 9/18 (Text chapters 1-3)					
5	M	22	Newton's Laws	4	
	W	24	Newton's Laws	4	
	F	26	Newton's Laws	4	
<i>Laboratory topic this week: Lab 4: Projectile Motion</i>					Lab 3 Report

Week	Day	Date	Topic(s)	Text Chapter	Item(s) Due
6	M	29	Applications of Newton's Laws	5	Homework 3 (Text Chapter 4)
	W	Oct.1	Applications of Newton's Laws	5	
	F	3	Applications of Newton's Laws	5	
<i>Laboratory topic this week: Lab 5: Force, Acceleration and Weight</i>					Lab 4 Report
7	M	6	Work and Energy	6	
	W	8	Work and Energy	6	
	F	10	Work and Energy	6	
<i>Laboratory topic this week: Lab 6: Friction and Newton's 2nd Law of Motion</i>					Lab 5 Report
8	M	13	Conservation of Energy	7	Homework 4 (Text Chapters 5,6)
	W	15	Conservation of Energy	7	
	F	17	Conservation of Energy	7	
<i>Laboratory topic for this week: Test II Review (Tuesday)</i>					
SECOND EXAMINATION THURSDAY 10/16 (Text chapters 4-6)					
9	M	20	Systems of Particles/Momentum Conservation	8	
	W	22	Systems of Particles/Momentum Conservation	8	
	F	24	Systems of Particles/Momentum Conservation	8	
<i>Laboratory topic this week: Lab 7: Work and Energy</i>					Lab 6 Report
10	M	27	Systems of Particles/Momentum Conservation	8	
	W	29	Rotation	9	
	F	31	Rotation	9	
<i>Laboratory topic this week: Lab 8: Hot Wheels Challenge and Energy Conservation</i>					Lab 7 Report

Week	Day	Date	Topic(s)	Text Chapter	Item(s) Due
11	M	Nov. 3	Rotation	9	Homework 5 (Text Chapters 7,8)
	W	5	Rotation	9	
	F	7	Conservation of Angular Momentum	10	
<i>Laboratory topic this week: Lab 9: Conservation of Momentum</i>					Lab 8 Report
12	M	10	Conservation of Angular Momentum	10	Homework 6 (Text Chapter 9)
	W	12	Conservation of Angular Momentum	10	
	F	14	Conservation of Angular Momentum	10	
<i>Laboratory topic this week: Review for Exam III (Tuesday)</i>					
THIRD EXAMINATION THURSDAY 11/13 (Text chapters 7-9)					
13	M	17	Oscillations	14	Lab 9 Report
	W	19	Oscillations	14	
	F	21	Oscillations	14	
<i>Laboratory topic this week: Lab 10: Rotational Dynamics</i>					
14	M	24	Wave Motion	15	Homework 7 (Text Chapter 10)
	W	26	No class – Thanksgiving Break		
	F	28	No class – Thanksgiving Break		
<i>No laboratory this week</i>					
15	M	Dec. 1	Wave Motion	15	Lab 10 Report
	W	3	Wave Motion	15	
	F	5	Superposition and Standing Waves	16	
<i>Laboratory topic this week: Lab 11: Angular Momentum of a System</i>					
16	M	8	Superposition and Standing Waves	16	Homework 8 (Text Chapters 14,15)
	W	10	Superposition and Standing Waves	16	
	F	12	Final Exam Review		
<i>Laboratory topic this week: Lab 12: Angular Momentum of a System</i>					Lab 11 Report
17	T	16	FINAL EXAM(10,14,15,16); 10A.M.-11:50 A.M.		Homework 9 (Text Chapter 16); Lab 12 Report

Physics I for Science and Engineering Homework List

Homework Set	Textbook Chapter	Problems
1	1	6,14,17,18,21,22,37,43,49,51,56,61
1	2	35,40,57,59,63,64,66,71,76,77,85,93,119,131
2	3	16,17,19,20,37,39,42,45,50,64,65,70,102,110
3	4	1,20,26,51,64,67,68,72,80,81,105
4	5	9,18,21,28,37,40,46,53,55,59,66,88,91,108
4	6	25,28,38,39,44,47,52,61,65,67,68,94
5	7	3,7,8,9,17,18,22,24,39,49,50,80,95
5	8	6,10,11,18,21,33,36,48,50,66,67,72,112,138
6	9	3,7,24,27,36,37,54,56,60,67,68,69,77,92
7	10	2,4,7,9,23,26,29,36,37,38,40,52
8	14	6,7,15,16,26,28,36,43,45,55,78,80,83
8	15	5,9,11,15,28,29,47,50,54,72,82,90
9	16	11,18,35,45,46,52,55,77,79,86

N.B. “Three-dot” problems are very challenging entirely optional. However if you feel as though you could benefit from such an undertaking, you may substitute any number of other assigned homework problem with any number of assigned “three-dotters” within a given chapter.