PHYSISCS 180	***Physics for Scientists and Engineers I***	**Fall 2010**

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Class Lecture: **MT RF 1:10 p.m. - 2:00 p.m. Upham 141**

Class Laboratory: **Section 1:** T 8:00 a.m. – 11:00 a.m. **or** 9:50 a.m. – 12:50 p.m.
Section 2: T 2:15 p.m. – 5:15 p.m.

Office Hours: M R F: 10:00 - 11:30 a.m. or by appointment.

Exams: Midterms: Unit C: Oct. 14; Unit N: Nov. 11; Unit R: Dec. 13.
Final: Mon. Dec. 20, 1:00 – 3:00 p.m.

Required Texts: *Six Ideas that Shaped Physics: Unit C, N, and R, 2nd ed.* by Tom Moore [Purchase at bookstore.]

An Introduction to Error Analysis by John R. Taylor [Text Rental]

Co-requisite: Math 253

Course WWW: http://academics.uww.edu/physics/courses/physcs180 contains the syllabus, schedule, and links.

Desire2Learn: For other course related materials we will be using the course D2L PHYSCS 180 site. **The D2L site is linked from class and UWW home Web pages.**

Note 1: ***Physics 494 Seminar*** is a 1 u course on Problem Solving techniques designed to assist Physics 180 students. This course meets **W 1:10 – 2:00 p.m.** and many students have found it very helpful!

Note 2: If you are a Physics major, you should also be enrolled in ***Physics 190***. This 1 u seminar meets **Fridays 12:05 – 12:55 p.m.**

Note 3: The last day to drop classes is Sept. 16 (no 'W'); Oct. 14 ('W' grade.)

Course Pre/Co-requisite: Math 253 is a co-requisite. Potential physics majors should also be enrolled for Physics 190, *Frontiers of Engineering and Physics*, a one-credit seminar course on careers in engineering and physics.

Required text (available at bookstore): *Six Ideas that Shaped Physics: Unit C, N, and R* by Tom Moore. Note that you are required to purchase this text. Physics majors will need to keep these books for the rest of their lives; non-physics majors should hold onto these books until they finish the Physics 180/181 sequence. Chemistry students are encouraged to keep these books at least until they finish Physical Chemistry (PChem). The Bookstore has the textbook "bundle" available; discounted books might be found from other vendors. If you buy from another vendor, make sure you get the 2nd edition of these textbooks.

Other required materials: Clickers (available at Textbook Rental), scientific calculator (graphing capability is **not** necessary), and a ruler. For lab, you should also get *An Introduction to Error Analysis* by John R. Taylor (available at Textbook Rental).

Scientific calculator: You might wish to buy a Texas Instruments TI-30X IIS calculator (or a similar non-programmable calculator) to get used to using the same calculator as will be provided during the exams. These calculators cost about $20 at the bookstore.

Supplemental materials: *Mathematical Methods for Introductory Physics with Calculus,* by Davidson & Marion (ISBN 0-7216-2919-9). Multiple copies are available for long-term loan.

DEPARTMENT POLICY ON PERSONAL ELECTRONIC DEVICES

All personal electronic devices not required for note taking or calculation (e.g., cell phones, pager, iPods, etc.) must be turned off while in class. Texting or using a cell phone during class is NOT PERMITTED.

I will provide a TI 30X IIS or similar calculator for use during exams. If you have a similar calculator that you would like to use as an alternate, it must first be checked and approved by the me prior to the exam. No other electronic devices are allowed during exams. NO CELL PHONES ARE ALLOWED DURING EXAMS. You will not be allowed to use a cell phone as a calculator during the exams or have your cell phone available.

COURSE OBJECTIVES

Physics for Scientists and Engineers I is a calculus-based physics course designed for science majors. The principle objectives are:

- Understand the fundamental concepts of conservation of momentum, energy, and angular momentum (Unit C), application of the Newtonian laws of dynamics to predicting motion (Unit N), and the invariance of laws of physics in inertial reference frames (Unit R).
- Use algebra and calculus to explain measurements and make predictions.
- Understand the usefulness and limitations of applying problem-solving methods to realistic examples.

COURSE COMPONENTS

The grade you earn in this class will be based 50% on your exam performance and 50% on labs, in-class work, and homework. The exam performance is a measure of how well you understood the material; the remainder is a measure of how hard and consistently you worked in this course.

$$Score = 50\% \times \left(\frac{\text{Exam Scores}}{\text{Total Exam}}\right) + 12.5\% \times \left(\frac{\text{Lab Scores}}{\text{Total Lab}}\right) + 2.5\% \times \left(\frac{\text{Week 1 Score}}{\text{Week 1 Points}}\right) + \ldots + 2.5\% \times \left(\frac{\text{Week 15 Score}}{\text{Week 15 Points}}\right)$$

The course grade scale will be: A (100-93%), A- (92-90%), B+ (89-87%), B (86-83%), B- (82-79%), C+ (78-75%), C (74-71%), C- (70-66%), D+ (65 - 61%), D (60 - 56%), D- (55 - 50%), < 50% - you don't want to know.

The *weekly work* expected includes: (1) *preflights*—reading the assigned chapter and submitting the preflight problems by noon before class; (2) *participation*—coming to class prepared and working on clicker and other problems; (3) *on-line daily homework*—on-line problems for each chapter due by the next lecture; and (4) *written homework*—approximately two to three written problems per reading due on each Friday.

Each weekly activity has been assigned a point value. An acceptable week's work for activities is roughly 100 points, which translates to 2.5% of your total grade. *I consider this level of work to be the bare minimum amount of work necessary to do well on the exams.* There will be more than 100 points available each week, so you can earn extra credit. **However the amount of extra credit you earn in a week is capped at 125 per week, and the extra credit for the entire semester is capped at 2.5% of your total grade.** Please be aware that this is one respect in which the D2L gradebook might be misleading: suppose you average 125 points out of 100 for the first eight weeks. At this rate, it might appear as if you've banked an addition 5.0% towards your total grade. But extra credit will be capped at 2.5%.

It is vital that you try to maintain a 100% average in the weekly work sections of this course, <u>there is no surer way to slip below a C in this course than to blow off attending class, preflights, and turning in your homework problems</u> (See Figure 1). *The class average on college physics exams typically is about 60%; this is because physics is difficult.* The weekly workload (37.5% of course grade) is described below. Other components of the course are **labs (**15 labs for a total 12.5% of your grade**), midterm exams (**3 exams on Unit C, N, and R @ 10% each of course grade**),** and the **final exam (**comprehensive @ 20% of course grade**).**

EXAMS

There will be three mid-term exams and one final. Each mid-term exam covers one of the Units (C, N, R) and will be graded on a 50 point scale; each midterm exam contributes to 10% of the course grade and the three together contribute to 30% of the course. The final is cumulative and will be graded on a 75 point scale but will contribute to 20% of the course grade. The exams are closed-book, closed-notes exams. You are allowed to use a calculator (either one provided for the exam or one approved prior to the exam), a ruler, and half of an 8.5-inch by 11-inch "cheat sheet" filled out in your own handwriting (that can be covered on both sides with whatever information you want), but no other aids. A generally good strategy is to work *first* on problems that you are sure about (no matter what order you end up doing them in), and quickly abandon any problem where you get stuck.

Unless otherwise stated, *you should explain your physical reasoning and show your mathematical work in full*: getting the "right answer" in itself will only earn you a small fraction of the possible credit on a problem. On the other hand, generous partial credit will be given for all aspects of your work on a problem, so do whatever you *can* for every problem on the test. Be sure to include correct *units* for all numerical quantities.

LABORATORY ACTIVITIES

Since labs are integral part of this course, **you are expected to attend every lab**. Since there are two laboratory sections (8:00 – 11:00 a.m. and 2:15 – 5:15) you may be able to attend an earlier or later lab if you have a unique, important time conflict. Check with me *in advance* before missing a lab. Each lab will be graded on a 50-point scale and the cumulative lab total accounts for 12.5% of the course grade. The labs are designed so that you can complete the laboratory activity during the allotted laboratory time, and you are expected to turn in your lab write-up at the end of the lab period. [You have enough class items to work on independently; do you really want another?] Under exceptional circumstances, you may be given an extension to turn in the laboratory write-up.

The University of Wisconsin-Whitewater is dedicated to a safe, supportive and non-discriminatory learning environment. It is the responsibility of all undergraduate and graduate students to familiarize themselves with University policies regarding Special Accommodations, Misconduct, Religious Beliefs Accommodation, Discrimination and Absence for University Sponsored Events. (For details please refer to the Undergraduate and Graduate Timetables; the "Rights and Responsibilities" section of the Undergraduate Bulletin; the Academic Requirements and Policies and the Facilities and Services sections of the Graduate Bulletin; and the Student Academic Disciplinary Procedures" [UWS Chapter 14]; and the "Student Nonacademic Disciplinary Procedures " [UWS Chapter 17]).

WEEKLY WORKLOAD

The most important skill you need to develop for this course is reading and understanding technical information. There is no way I will be able to cover all the material in your textbook during lecture. You should make sure to set aside sufficient time each week to go through your reading, and realize that you are responsible for understanding the reading. Make sure to have a notebook and pencil handy while you are reading to take notes and work out intermediate steps. To help encourage you to do this, you will have a set of "preflights" questions to work on before the lecture, and then homework questions to work on after the lecture.

Each week you need to score 100 points of work to get full credit for the week. You get 5 point for the preflight problem for a total up to 30 points; 3 points per class period participation (clickers) and 5 points for the tutorials for a total of 14 points; 5 points per correct homework problem for totals of 30 points for on-line homework and 30 points for written homework. There will sometimes be opportunities for additional credit and additional on-line homework problems for up to 120 points per week.

Item	Points Assigned	Total
Preflight Questions	10 pts. x 3 per week	30 pts.
On-line homework problems	Two 5 pt. problems x 3 per week	30 pts.
Written homework (usually due Fridays)	6 problems x 5 pts each.	30 pts.
Class Participation	3 pts. (Clicker Q's) x 3 per week + 5 pts. (Tutorial) x 1 per week	14 pts.
	Weekly Grand Total:	**104 pts.**

Each week counts as 2.5% of your total grade. This is the difference between B+ and A-.

SPECIFIC COMMENTS ON THE WEEKLY ITEMS:

Preflight questions [30 points]: Due by NOON right before class via D2L; may be submitted multiple times; graded automatically on correctness. Listed as "P…" in the D2L grade.

• Before each lecture, you will have a few questions to answer based on the assigned reading. You can submit the preflight as many times as you want, up until noon on the day of the lecture. **They will be graded (automatically) on correctness.** *Since many will be based on the "Self-Tests" scattered throughout each chapter, you'll have an opportunity to look at a worked out solution to help you solve the problem.*

On-line HW problems [45 points]: Due by 8 pm the first "business" day after the lecture via D2L; may be submitted multiple time; graded automatically on correctness. Listed as "H.." in the D2L grade.

• After each lecture, there are three "basic"-level problems (as your textbook calls them) to be done on-line, these will be due at 8 pm the next "business" day *after* the lecture (Monday lecture →Tuesday at 8 pm, Tues lecture → Wed at 8 pm, Fri lecture →Mon at 8 pm). You can submit the on-line HW as many times as you want until this deadline. Although I will not ask you to turn in your work for these problems, I may ask to see your work from time to time. **Please keep this work with the rest of your course notes.** The first person contacting me to report any type of error in an on-line problem (missing figure, typographic error, incorrectly coded numerical answer) will get full credit for the problem.

Written HW problems [30 points]: Due by 5pm each Thursday (unless noted otherwise); each problem graded on a 5 point scale; all corrected problems should be turned in as a weekly HW assignment; corrections can give you back up to 2 points per problem. You will also be able to turn in the in-class problems done on Thursday for credit.

• After each lecture, there are two "synthetic" level problems (as your textbook calls them) for you to attempt by the next class period. **These must be completed on the pages provided and turned in by the beginning of the next lecture.** If a problem goes longer than the one page provided, you can finish the problem on notebook paper, preferably graph paper. When you turn in your homework problems, the solutions will be provided for you to study. The problem pages have a specific format that allows for clear problem solution and thinking. There is also a grade box on the problem page to assist you in your understanding of your score. The grade you will receive will be according to the following rubric:

Score	Description of work
5	Good effort with correct results and reasoning.
4	A good effort with minor error or a fair effort with no conceptual or math errors.
3	A good effort with modest conceptual errors and/or math errors or a fair effort with minor errors.
2	A fair effort involving modest conceptual errors or a good effort involving serious conceptual errors.
1	A very poor effort
0	No initial effort

• *I will return graded problems by the following Monday using the above scale*. To give you a sense of where the problem might lie, I have put a checkbox on the HW sheets to indicate thing that can go wrong. A good effort involves at least some words of explanation, appropriate diagrams, and enough evidence of calculations so that I can see what you are doing. *Your final answer should be indicated with a box around it.* You can still get credit for a problem if you write something about why you can't solve a problem. Explain what information is missing or where you might be stumped. Also at the top of each problem, please indicate who you worked with or got help from including classmates, friends, tutors, or me.

HW corrections [variable]: Due on the next HW deadline. All of your corrected problems should be corrected in a **colored pen (different than the pencil or pen you used initially)** and turned in with the weekly HW set for the next week. You can earn up to two points back per problem.

Score	Description of corrected work
+2	Good effort with correct results and reasoning
+1	A good effort with minor error or a fair effort with no conceptual or math errors.
+0	A good effort with modest conceptual/math errors or a fair effort with minor errors.

Participation [9 pts (clicker) and 5 pts. Tutorial]: You get 3 points/class for showing up and participating in the clicker questions! Listed as "T.." in the D2L grade.

• You get these points for participating in class activities provided that (1) you are on time, or at least before I start class, (2) you have the required materials for class (calculator, ruler, scratch paper, and textbook), and (3) you do not use any electronic devices (cellphone rings, you lose the points), and (4) I don't catch you off task (excessive talking or other disruptive behavior, studying for another class, sleeping). If you e-mail me in advance with a reasonable explanation for why you need to miss class (you wake up with the flu, for example) you will still get attendance credit. Think of it as a job: if you can't be

there, you need to call in. If you are unable to make a Friday tutorial session, you will be expected to submit a written solution to the tutorial problems handed out in class for the 5 pts. credit.

• Fridays will be Tutorial Days. You will work in groups of four students and submit a correctly completed tutorial activity for the group by the end of class. The tutorials will be rich-context type questions with multiple parts so you will need to work together to solve the tutorial problems. There will be Learning Assistants (LAs) available to help you if you have questions. While you will turn in one tutorial copy for a score, you should keep your own solution page that you worked out for the tutorial.

Note that the difficulty level increases as you go along. *Preflight questions* (which come from "self tests") should be the easiest because there are worked out examples at the end of each chapter. *On-line HW problems* come from the "basic" category in your textbook; at least one example will be worked each lecture. *Daily written HW problems*, which come from the "synthetic" category, are harder but you have a chance to submit corrections. The additional *weekly written HW problems* are "rich context" (the most realistic, but the most complex), but will be solved in groups.

Weekly work flow: Physics and mathematics are <u>not</u> the sort of subjects that one learns in a six hour "cram" session held the night before a homework deadline. Yes, you may get the job done, but will you really be able to do the same thing when exams roll around? Moreover, the topics build... If you don't understand lecture C1, you'll find that C2 becomes even more confusing.

It takes a lot of discipline and organization to keep up a daily regimen of physics and math. Personally, I like to read in blocks, but work on problems in smaller patches of time. So I would recommend doing all the reading for a week the weekend before, see if I can do the preflights for all three readings <u>immediately</u>, and <u>then</u> get started on the homework problems.

The lectures covering material are Monday, Tuesday and Thursday. Friday is a Tutorial group problem session day. The two or three online problems for each lecture are due the next lecture day at 8pm. The weekly written assignments for each set of three lectures (and corrections on the last written assignment) are due on the subsequent Friday.

MON	TUES	WED	THURS	FRIDAY
	LAB			**Tutorial Session**
NOON: Reading and preflight: Lecture **M**	**NOON:** Reading and preflight: Lecture **T**		**NOON:** Reading and preflight: Lecture **R**	**Written homework covering last three lectures due by 5pm.**
1PM: Lecture **M**	**1PM:** Lecture **T**		**1PM:** Lecture **R**	
8 PM: On-line problems from previous R lecture due.	**8 pm:** On-line problems: Lecture **M**		**8 PM:** On-line problems for Lecture **T**	**Corrections to previous week's written homework also due.**