Physics 240 – University Physics I – Spring 2018

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| **Office Hours:** B207 SCI  Monday 1:00 **to** 2:50 p.m.  Tuesday 10:00 **to** 10:50 am & 2:00 **to** 2:50 pm,  Thursday 1:00 **to** 1:50 pm  (or by appointment) |

**Course Overview:** Physics 240 is an introduction to physics aimed primarily at physics, chemistry, and engineering majors. To varying degrees, we will study *motion, Newton’s laws, energy, momentum, oscillations, waves, and fluids.* The topics will not significantly vary from those included in a typical high-school physics class, **BUT** the intensity will be significantly greater. Additionally, since introductory calculus is a prerequisite, be prepared to use calculus in certain problems. Physics is a way of thinking as much as it is a body of knowledge. We won’t simply strive to memorize the “facts.” We will also strive to become proficient at thinking like a physicist. Rather than just regurgitating information, you will continually apply your knowledge to new situations in order to solve unique problems.

One of the challenges of studying physics is to understand the language. Many of the terms and phrases, such as force and power, are used in everyday conversation, often interchangeably and incompatibly with the strict physics usage. In physics, such words have specific and unambiguous meanings, and it is a task in and of itself to learn to use the words correctly. We will strive to become proficient in the use of physics vocabulary. In addition, it is often said that mathematics is the language of physics. We will continually use mathematics as a tool for describing physical situations. Therefore, in order to succeed in this class, it will be necessary to become skilled in communicating physical ideas through both prose and mathematical expressions.

This course satisfies the learning outcomes for the Natural Science component of the General Education Program. Upon completing this course you should be able to:

* Explain major concepts, methods, or theories in the natural sciences to investigate the physical world.
* Interpret information, solve problems, and make decisions by applying natural science concepts, methods, and quantitative techniques.
* Describe the relevance of aspects of the natural sciences to their lives and society. justification.

This course is also contributes to satisfying the program learning outcomes for the physics major. Upon completing a physics major, students should be able to:

* Integrate reasoning, critical thinking, mathematical skills, and principles of theoretical and applied physics to explain, and solve problems related to physical processes, particularly those that are important for the admission to graduate programs in physics, astronomy, or a closely related field.
* Investigate a physical process by conducting an appropriate experiment, collecting reliable data, analyzing results, determining uncertainties, and drawing justifiable conclusions.
* Communicate effectively within the profession by writing clearly and concisely and by articulating clearly.

**Tentative Course Outline (subject to change):** The material of this course will mostly follow that of the text, covering a little more than one chapter per week. We will do some jumping between chapters as shown below.

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| Week | Mon Date | Lecture Subjects | **Chapters** | **HW Number** | Lab Number |
| 1 | 1/22/18 | Syllabus, motion in 1-D | 2 | No HW assigned | 1 |
| 2 | 1/29/18 | Motion in 1-D, Vectors | 2, 1 | 1 | 2 |
| 3 | 2/5/18 | Vectors, Motion in 2-D | 1, 3 | 2 | 3 |
| 4 | 2/12/18 | Motion in 2-D, Forces | 3, 4 | 3 (Not due) | No Lab (Exam on Wed 2/14 during lab) |
| 5 | 2/19/18 | Newton’s 2nd and 3rd Laws | 4, Section 5.1 | No HW assigned | 4 |
| 6 | 2/26/18 | Work and Energy | 6,7 | 4 | 5 |
| 7 | 3/5/18 | Energy and Momentum | 7, 8 | 5 | 6 |
| 8 | 3/12/18 | Momentum, Fluids | 8, 15 | 6 (Not due) | No Lab (Exam on Wed 3/14 during lab) |
| 9 | 3/19/18 | Fluids, Oscillations | 15, 12 | No HW assigned | 7 |
| N/A | 3/26/18 | **SPRING BREAK** | N/A | N/A | N/A |
| 10 | 4/2/18 | Oscillations, Waves | 12, 13 | 7 | 8 |
| 11 | 4/9/18 | Waves, Circular Motion | 13,14 Section 5.2 | 8 | 9 |
| 12 | 4/16/18 | Rotation and Rotational Dynamics | 10 | 9 (Not due) | No Lab (Exam on Wed 4/18 during lab) |
| 13 | 4/23/18 | Rotation and Rotational Dynamics | 10 | 10 | 10 |
| 14 | 4/30/18 | Rotational Dynamics, Newton’s Law of Gravity | 10, 11 | 11 | 11 |
| 15 | 5/7/18 | Newton’s Law of Gravity | 11 | 12 (Not due) | 12 |

**Text:** Principles of Physics: A Calculus-Based Text, 5th Edition by Serway and Jewett.

**Lab Manual:** Lab materials will be provided in class.

**Calculator:** You need a basic scientific calculator that is portable for use in labs, discussion, and lecture. The calculator need not be a fancy graphing calculator, but it must be capable of calculating basic trig, exponential, and logarithmic functions.

**Homework:** Roughly ten homework problems will be assigned on a weekly basis and will be collected for grading (there may also be some suggested conceptual questions for you to consider that won’t be collected). The total score on your homework assignments will count toward 12% of your final grade in the class. **Only three of the assigned problems will be graded. The graded problems will be chosen at random *after* the due date.** Solutions to the homework assignments will be provided after the due date. While I encourage you to discuss homework problems with your classmates, your final write-up should be **your own** work, should be written in **your own** words, should represent **your own** understanding of the material, and should **not** be shared directly with other students. If you have any questions as to what constitutes acceptable collaboration, please see me. Copying the solution from the internet is also not acceptable. **In order to earn full credit for a homework problem, you must show your work and include explanations of your approach. Being able to effectively communicate the solution to a problem is an important course objective.**  On the weeks with an exam, you will not turn in your homework. I will provide solutions for you to use in preparing for the exam. **Problems will not be accepted late, but your assignment with the lowest score will not count toward your semester grade. The drop-grade is intended to allow for unforeseen circumstances such as an illness. It is highly recommended that you reserve your drop-grade for such a purpose.**

**Laboratory:** There will be twelve graded laboratory sessions during the semester. Each session will be of equal weight, and labs will contribute to 12% of your semester grade. *One lab score is dropped*. This drop-grade is intended to allow for unforeseen circumstances such as an illness. It is highly recommended that you reserve your drop-grade for such a purpose. **Be warned:** Since this course satisfies a lab requirement, it is necessary to pass the lab portion alone in order to pass the course. In other words, if your lab average is below 60% you fail the course regardless of your homework and exam averages.

**Examinations:** There will be three midterm examinations of two hours each and a non-cumulative final of two hours. Each will be worth 19% of your final grade (*see “Grade Calculation” below*). More information on exams will be provided during the semester

**Exam Schedule:**

Exam 1 ………………………………… Wed. Feb. 14, during lab

Exam 2 ………………………………… Wed. March 14, during lab

Exam 3 ………………………………… Wed. April 18, during lab

Exam 4 (final) ………………………. Mon. May 14, 8:00-10:00 am

**Semester Grade Calculation**:

Homework 12 %

Labs 12 %

Exams (4 @ 19% each) 76 %

Photo Assignment 1 %

Total 101 % (how crazy is that?)

Your grades on individual assignments will be posted periodically on D2L (updated every 2-3 weeks). If you have any questions on the grades posted, please contact me immediately so any errors can be corrected. The scale for the final semester grade is shown to the right.

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| --- | --- |
| **A** | 93-101% |
| **A-** | 90-92.99% |
| **B+** | 87-89.99% |
| **B** | 83-86.99% |
| **B-** | 80-82.99% |
| **C+** | 77-79.99% |
| **C** | 73-76.99% |
| **C-** | 70-72.99% |
| **D+** | 67-69.99% |
| **D** | 60-66.99% |
| **F** | <60% |

**Attendance:** Attendance will not be kept for discussion sessions or lectures. *Attendance to labs and exams is mandatory and students are responsible for all material discussed and announcements made during any scheduled class meeting*. Make-up work will only be accepted in the case of excused absences. Excused absences include death in the immediate family, illness with a note from the appropriate health care professional, religious observance, an event in which you officially represent the University of Wisconsin – Stevens Point and the event directly conflicts with an exam or lab. **Excused absences must be approved with documenting materials prior to the date of absence**. Unexcused absences from a lab or exam will result in a grade of zero.

In the case of a potential conflict between class and religious observances, University of Wisconsin policy requires the student to notify the instructor within the first two weeks of class in order to expect that accommodations be made. If there is any possibility that you will miss a lab or exam due to religious observances, please notify me of the specific dates that will be missed within the first two weeks of class.

**E-mail:** I will use email to send out the weekly homework assignments. Occasionally it will be necessary to make class-related announcements outside of class. This will be done primarily through e-mail. If you’re not already in the habit of frequently checking your e-mail, it will be useful to develop that habit.

**Extra Credit:** It is possible for you to earn up to 1% of extra credit applied toward your semester grade. To do so, find an article in the news that is related to the material in class. Write a one-page summary of the article and turn it in to me with a copy of the article **within 7 days of when the article was published**. Each article will be worth a total of 10 points. If for some reason you don’t receive full credit for your summary, you can keep submitting new articles until you have a total of 10 points of extra credit. I will be rigidly adhering to the grading scale shown above, so I strongly encourage you to take advantage of this opportunity. 1% is enough to raise a person’s semester grade if she or he is at the border. All extra credit assignments must be received no later than the last day of classes.

**Photo Assignment:** As part of your first homework assignment, you will also complete a survey to help me learn names and get to know students in the class. See final sheet that is attached to the syllabus.