

## *Physics 240, 2022 Fall*

*Palash Banerjee, Dept. of Physics, UW-Stevens Point*

### *1 Basic information*

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Course title	University Physics I
Instructor	Palash Banerjee
Contact	SCI B201, palash.banerjee@uwsp.edu
Student hours	TW 4 — 5 p.m. in my office SCI B201
Pre-requisite	Math 120 (Calculus I)
Textbook	“ <i>Physics for Scientists and Engineers</i> ” by Serway and Jewett.
Required	Scientific calculator and a one-inch three-ring binder

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### *2 Course description*

Physics 240 covers foundational topics in mechanics and introduces you to thinking about the natural world in mathematical terms. I will spend class time discussing the following topics — (a) frames of reference, vectors, and the theoretical description of motion, (b) Newton’s laws and the theory of interactions, (c) conservation laws that constrain the outcome of these interactions, (d) the theoretical description of a spinning object, and (e) selected topics in the theory of gravitation and space mechanics. I hope that by studying these fundamental physics topics, you will develop a deeper and keener understanding of *how and why* the world around you works the way it does.

### *3 Teaching style*

I will present fewer topics but discuss them in substantial depth. I believe this is better for your training as scientists and engineers.

### *4 Learning outcomes*

The assignments in this course support the following learning outcomes:

1. You should be able to explain the major scientific ideas in physics and apply them to solve problems. And you should be able to design and perform an experiment and be able to explain the results you obtain from that experiment.
2. You should be able to improve your writing skills and learn to present your work clearly. If you write clearly, you will think clearly and this will improve your analytical skills.

### *5 Course assignments*

1. **Homeworks:** Homework assignments are an essential part of this course. Homework will be assigned every Friday in class and will be due in one week. You may discuss concepts and ideas with each other

but you *may not* copy each others' work. Your homework assignments count for 20% of your grade. You may expect approximately 13 homeworks during the course and I will *not* drop any homework score.

2. **Discussion quiz:** Each discussion will be spent reviewing past material, doing some group work and taking a quiz. Your discussion assignment will count for 10% of your grade and I will drop your lowest discussion score.
3. **Laboratory:** Physics is an experimental science and the laboratory is a place for you to learn measurement techniques and the methods of data analysis. The written technical reports are due the beginning of class on Monday. Your laboratory performance will count for 20% of your course grade and I will drop your lowest score.
4. **Exams:** There will be *two* midterm exams during the semester. These exams will be held in place of the regular laboratory session and each exam will count for 15% of your grade. The semester concludes with a final exam which counts for 20% of your grade. *All* the exams count and no score will be dropped. If you miss any exam, you will receive a zero for that exam.

## 6 Grading and evaluation

I will calculate your grade based on a weighted percentage of your scores as shown in the table to the left below. Your final letter grades will be determined as shown in the table to the right below.

Assignment	Value
Homeworks	20%
Discussion	10%
Laboratory work	20%
1st exam	15%
2nd exam	15%
Final examination	20%

  

Total score	Grade
93% and above	A
90–92%	A-
87–89%	B+
83–86%	B
80–82%	B-
77–79%	C+
73–76%	C
70–72%	C-
67–69%	D+
60–66%	D
below 60%	F

I do *not* grade on a curve. Scores will be rounded up according to the following example: 86.6 – 86.9% will be rounded up to 87% and become a B+, but 86.0 – 86.5% will remain at 86% and will earn a B.

## 7 Other course policies

1. Food and drinks are **not** permitted in the laboratory. No make-up labs will be offered; no make-up exams will be offered. I will accept **only one** late homework per student during the course.
2. 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, or 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.

3. Please *do not* copy each others homeworks, class assignments, laboratory reports, and examinations and pass them off as your own. Any such incidents will be treated in accordance with University policy.
4. The schedule for the finals is set by the University. I will not schedule an early final exam for whatever reason. Please don't ask.
5. I *do not* assign work for extra credit. There are *no* bonus points that you can earn. Once you hand in your final exam, there is nothing more you can do to change your grade.

## 8 Course schedule

Week	Chapter: Topic	Laboratory
(1) Sept 4	Ch 2: We meet velocity and acceleration and find a use for <u>differential calculus</u> .	Elastic properties of a steel wire.
(2) Sept 11	Ch 3: We become best friends with <u>vectors</u> .	Gravimeter.
(3) Sept 18	Ch 4: We learn about frames of reference and discover all motion is relative.	Optical lever.
(4) Sept 25	Ch 5: We meet Newton's laws and realize they are independent of the frame of reference.	Vector table.
(5) Oct 2	Ch 5: We study circular motion and are shocked to discover a frame of reference with peculiar consequences.	Introduction to computational analysis I
(6) Oct 9	Ch 9: We meet linear momentum and learn to analyze atomic collisions.	Mid term exam 1
(7) Oct 16	Ch 7: We encounter the work done by a force and find a use for <u>integral calculus</u> .	Circular motion
(8) Oct 23	Ch 8: We meet the mysterious potential energy function.	Machines and work
(9) Oct 30	Chs 8 & 9: We discover the two great conservation laws in all of physics.	Introduction to computational analysis II
(10) Nov 5	Ch 10: We encounter a rotating object and the mathematics necessary to describe it.	Center of mass
(11) Nov 13	Ch 11: We meet angular momentum and discover the first great application of <u>vector calculus</u> .	Mid term exam 2
(12) Nov 20	Ch 13: We encounter the theory of Gravitation.	Equilibrium of an extended object.
(13) Nov 27	Ch 14: We apply the theory of gravitation to satellite orbits and planetary maneuvers.	Moment of inertia.
(14) Dec 4	Ch 14: We encounter oscillating systems and learn the mathematics necessary to describe them.	Forced oscillations and resonance.
(15) Dec 11	We catch up and review and realize we <u>love</u> Physics.	Review
(16) Dec 18	Final exam Mon Dec 19 10:15 am	