

Physics 1116

Mechanics & Special Relativity : Fall 2020

Instructors

Professor :	Professor Kyle Shen	email : kmshe@cornell.edu
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Texts & Required Materials

- *An Introduction to Mechanics*, by Kleppner & Kolenkow (K&K), 2nd edition

Optional Text

- *University Physics*, by Young & Freedman (**any old edition** – for reference only)

Class Times

<u>Lecture</u> :	M W F	10:20 – 11:10 AM	Zoom : 95334899116
<u>Section 201</u> :	T R	10:20 – 11:10 AM	Clark 294D
<u>Section 202</u> :	T R	11:30 AM – 12:20 PM	Clark 294D
<u>Section 203</u> :	T R	8:00 – 8:50 AM	Zoom : 92429986905
<u>Section 204</u> :	T R	10:20 – 11:10 AM	Zoom : 96852568652
<u>Section 205</u> :	T R	11:30 – 12:20 PM	Zoom : 96852568652
<u>Lab 401</u> :	T	3:00 – 4:55 PM	Zoom : 94488647338
<u>Lab 402</u> :	R	3:00 – 4:55 PM	Zoom : 97429555274
<u>Lab 403</u> :	T	4:15 – 6:10 PM	Zoom : 97429555274
<u>Lab 404</u> :	F	4:15 – 6:10 PM	Zoom : 97429555274
<u>Lab 405</u> :	M	7:30 – 9:25 PM	Zoom : 97429555274

All registration issues (add/drop, section assignments) are handled by Danyel Wierson (dww442@cornell.edu). Do not contact the course staff about registration issues, as we have no control over the section assignments.

Information about Teaching Modalities

PHYS 1116 will be offered in an entirely online, “real-time” (i.e. “synchronous”) format, with the exception of some discussion sections (which have both a fully online, as well as an in-person option), and prelims & exams (which will be taken in-person by students living on campus, but also remotely). **The course is structured so that students living off-campus / quarantined will be able to complete the course remotely, without any difficulty.**

Lectures : Will be offered in “real-time” online-only via Zoom, but will also be recorded for later viewing, and lecture notes made available as PDFs. Participation in lecture* (multiple choice questions) will be counted towards your final grade.

Discussion Sections : Will be offered both in “real-time” online via Zoom, as well as an in-person option. The content covered in the online versus in-person discussion sections will be

identical. Participation in section (group problem solving) will be counted towards your final grade*, as will in-section quizzes.

Labs : Will be offered online-only in “real-time” via Zoom

Office Hours & Study Hall

Office hours for the course staff (held via Zoom) will be announced some time during the first week of class and posted on Canvas. A “drop-in” study hall will also be available Tuesdays-Thursday afternoons and evenings on Zoom (hours & Zoom ID TBD). There will be members of the course staff available during the study hall. Attendance is entirely voluntary but you **must have worked on the problems on your own beforehand**.

Online Course Information

All information, assignments, solutions, lecture notes, videos, and handouts will be available through the Physics 1116 Canvas site : <https://canvas.cornell.edu/courses/17583> . Please make sure that are able to access the Canvas page - class emails will go out via Canvas, so make sure that you are enrolled.

Piazza is an online forum / message board, similar to Facebook, but designed for classes. Piazza allows you to ask the professor, TAs, and one another, questions about the course material and to receive quick responses. Do not post your solutions to problems on Piazza. Our Piazza forum will be accessible through Canvas, but you will need to register first (free). The URL is : <https://piazza.com/class/kdezmg7i4c5dn>

Problem Sets

There will be one problem set assigned each week, posted on Canvas on Friday evening and **due the following Friday at 5 PM**. They can should be turned in digitally via Canvas. If you are uploading pictures of a hard copy problem set, we ask that you use the Adobe Scan app (free, iOS & Android) to convert scanned PDFs of your problem set for uploading onto Canvas. **Late problem sets will not be accepted**, although the grades for your lowest 3 problem sets will be dropped. Solutions will be posted on Canvas on Friday evening after the problem sets are collected. A portion of your problem set grade will be based on the presentation (i.e. neatness) and completeness of your working.

Discussion and collaboration on the problem sets is encouraged, but **you must first attempt to solve as much as you can by yourself**. We have set up a “study hall” for students to gather to work on problems on which they have gotten stuck or could not solve themselves. However, you must have worked on the problems on your own before coming to the study hall. The ability to solve the problem sets **on your own** is the “gold standard” against which to assess your true understanding of the material. If you do discuss your work with other students, please write the names of the other group members on your problem set. Simply copying your classmates’ problem sets will be self-defeating, as you will not have learned the material well enough to perform well on the quizzes and exams.

Exams

<u>Prelim 1</u> :	Thursday, October 15, 7:30-9:00 PM
<u>“Semi-Final” Exam</u> :	TBD (during semi-final period of Nov. 17-24)

* The participation grade will be waived for those unable to participate due to extenuating circumstances; contact Prof. Shen

Online “Final” :

TBD (during exam period of Dec. 18-21)

There will be an in-person prelim (midterm) exam during the week of October 12-16, as well as an in-person “semi-final” exam during the semi-final exam period of November 17-24. Students who are not able to take the prelim or semi-final exam in person (remote or quarantined) will take the exam simultaneously but online. There will also be a last prelim held during the final exam period (Dec. 18-21) which will be held in “real-time” online. Additional details about these exams will be provided as soon as possible.

Labs

There are 10 two-hour labs that will be conducted remotely via Zoom in real-time. In addition to the two hour lab session, there will be a short (< 30 min) homework assignment to be completed after the lab. You should make prior arrangements with the lab TA if you need to switch sections within a given week. There will be no makeups for missed labs - a missed lab will result in a zero, but your 2 lowest lab scores will be dropped from your grade.

Extra Credit

An extra credit problem will be given at the end of some of the problem sets. These problems are meant to be very challenging brain teasers. Bonus points will be awarded only for correct answers and *you must work on these problems by yourself*. Bonus points will also be awarded for your activity & participation on Piazza.

Reading Assignments & Handouts

Reading assignments (from the textbook, K&K) for the next lecture can be found on Canvas and the syllabus. You will greatly benefit by reading the assigned sections **before** lecture.

Grading

Prelims (20% each x 2) : 40 %

Semi-Final Exam : 25 % + 5% weight added to your highest exam/prelim score

Everything Else : 30 % (problem sets, labs, quizzes, participation)

Extra Credit : Extra Credit Problems, Piazza

To foster a collaborative atmosphere, Physics 1116 will not be graded on a curve, and you will not be in competition against your classmates. The highest score among all of your exams will be given an additional 5% weight towards your final grade (i.e. if your second prelim score was your highest raw score amongst the three exams, it will be weighted as 25% rather than 20% of your final grade). Participation in lecture (multiple choice questions) and discussion sections (during group problem solving) will also be counted towards your final grade.

There will be **no make-ups** allowed for missed quizzes, but your lowest 3 quiz scores will be dropped. **Late problem sets will not be accepted**, although your lowest 3 problem sets will be dropped. Any missed lab will be counted as a zero, but your 2 lowest lab scores will be dropped.

Extenuating Circumstances

We realize that this fall is an unprecedented situation, and many of you may encounter trying circumstances throughout the semester. If you find yourself dealing with a particularly challenging situation, or your health or circumstances change (e.g. having to quarantine),

please inform Prof. Shen as soon as possible via email. We will do our best to accommodate everyone's needs and challenges, but knowing about changes in your situation as soon as possible will be important.

Academic Integrity

Each student in this course is expected to abide by the Cornell Code of Academic Integrity. *"Any work submitted by a student in this course for academic credit will be the student's own work."* This includes exams, problem sets, reading exercises, etc... We realize that it may be possible to find solutions to some problems online; any students found copying from these solution sets, or from other students, will be punished severely. Any use, either buying or selling of course materials from internet sites (e.g. Chegg, CourseHero, etc...) will be considered cheating (note that Cornell faculty are able to trace posts from such sites). We will impose the highest penalties permitted for violation of this policy. For further details see: <http://cuinfo.cornell.edu/Academic/AIC.html>

Physics 1116 vs. Physics 1112

Physics 1116 and 1112 are both calculus-based introductory mechanics courses suitable for majors in physics, astronomy, applied physics, engineering, and other related fields. It should be straightforward to switch from one to the other in the first couple weeks of the semester (but the earlier, the better). Danyel Wierson will handle all switches and please inform your instructors. We would suggest that you try the first couple problem sets and quizzes before making a decision. Some differences between the two classes are :

- Physics 1116 is more abstract and requires greater mathematical sophistication than Physics 1112. Familiarity with calculus is essential for Physics 1116
- Physics 1116 covers Einstein's Theory of Special Relativity (1112 does not)
- Physics 1116 emphasizes more in-depth problem solving, somewhat similar to working on puzzles or logic problems, while Physics 1112 emphasizes more concrete and straightforward examples
- Physics 1116 moves along much faster than Physics 1112, assumes some familiarity with Newtonian mechanics, and covers more topics

A strong background in physics (such as AP Physics) and calculus is encouraged for Physics 1116. This class is intended to be challenging for students that have already received AP credit. We will introduce more sophisticated problems than you have previously encountered, and will develop your intuition and problem solving abilities. If you want to be a physics or engineering physics major, but have less preparation in physics and/or calculus than is needed for Physics 1116, you can still take Physics 1112 and continue on as a physics major.

Physics 1116 is significantly more challenging and will require more effort than Physics 1112, but hopefully you will find it correspondingly rewarding as well. We do our best to try to adjust the grades in Physics 1116 so that they should reflect what we think you may have gotten if you had put in a similar effort to Physics 1112. We do not want to penalize you for taking a more challenging course.