Physics 275 Syllabus – Fall 2021

Professor Wendell Hill

All sections meet in Room 3104 in the John Toll Physics Building

Official Course Description: PHYS275 - Experimental Physics I: Mechanics and Heat (2 credits) *(PermReq)* Grade Method: REG/P-F/AUD. *Prerequisite: PHYS161 or PHYS171. Additional information: CORE Physical Science Lab (PL) Course only when taken concurrently with PHYS272. Methods and rationale of experimental physics. Intended for physics majors and science and engineering students who desire a more rigorous approach. Experiments chosen from the areas of mechanics (from PHYS171), gas laws, and heats. Theory and applications of error analysis.*

What the course is about: Physics 275 is the first course in the new lab sequence PHYS 275-276-375-405. The course is intended for physics majors and also for science and engineering students who desire a more rigorous introduction to experimental science. Experiments are mainly chosen in the general area of **mechanics**. A major component of the course concerns understanding error analysis, both learning how to do it and appreciating what a useful tool it is. The Lab meets for four hours each week in **Room 3104** of the John Toll Physics Building. You should expect that roughly three hours of this time will be spent working on the lab and one hour in discussion with your instructors and other students during the lab. To get the latest information on Physics 275, check ELMS (Canvas) at:

https://umdphysics.umd.edu/academics/courses/962-physics-275-experimental-physics-i.html

*** Prerequisites:** The prerequisite for the course is Physics 171 (or Physics161).
*** Co-requisites:** The co-requisite is Physics 272.

Lab sections: All sections meet in Room 3104 in the John Toll Physics Building

Section	Day	Time	Instructors	Teaching Assistants
0101	**Monday**	**2-5:50 PM**	**Wendell Hill**	**Yan Li**
0301	**Tuesday**	**2-5:50 PM**	**Wendell Hill**	**Yan Li**
0201	Wednesday	2-5:50 PM	Kara Hoffman	Nate Fried
0401	Thursday	2-5:50 PM	Kara Hoffman	Lida Xu
0501	Thursday	2-5:50 PM	Anwar Bhatti	Nate Fried

***Contact Information:**

Prof. Wendell Hill	**Prof. Kara Hoffman**	**Prof. Bhatti**
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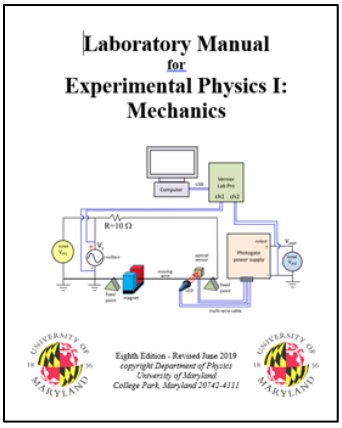
*** Teaching Assistants**	**e-mail**	**office**	**campus phone**
Nate Fried	friednr@umd.edu	1102 IPST Bldg.	x9 8599
Yan Li	yanli@umd.edu	1309 John S. Toll Bldg.	x5 6182
Lida Xu	lidaxu66@umd.edu	1309 John S. Toll Bldg.	x3 5421

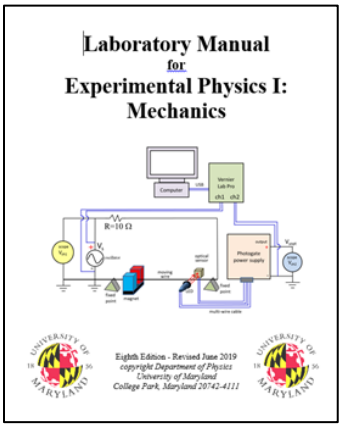
*** Office Hours:** You can try stopping by our offices at any time we are not in class, but it is best to contact us by e-mail and make an appointment.

*** Don't arrive late to class:** Classes at Maryland begin right on the hour. It is important that you arrive on time so that you can get instructions for the lab and have time to finish. If you arrive too late, you may not be allowed into the lab and will have to make it up during another section.

*** Required Texts:**

Laboratory Manual for Experimental Physics I: Mechanics – 9th Edition - June 2021. This Lab Manual and access to the Homework Questions for PHYS275 are only available electronically from the online service Expert TA. In order to purchase the lab manual from Expert TA, follow the steps listed below in the section on Expert TA. If the University bookstore incorrectly lists "*no textbook required*" for the course, don't be fooled - you need to purchase electronic access to the lab manual and homework questions by going to Expert TA. In order to buy the manual online you will need the "class code" listed below corresponding to your particular section of Phys 275.





Purchasing the Lab Manual from Expert TA and access to Homework:

1. Locate your section number in the table below and find the corresponding **Expert TA link for the class code** for your specific section. Note that the numbering of the sections is not in order; in particular, 0101 is on Monday and 0301 is on Tuesday.
2. Double-check that the section you are enrolled in on Testudo has the same section number, and meets on the same day, as listed in the table below.
3. Copy the correct link to your section's class code, paste it into your browser, open the link and follow the instructions.

Lab sections: All sections meet in Room 3104 in the John Toll Physics Building

Section	Day	Time	Instructor	Expert TA link for registration
0101	**Monday**	**2-5:50 PM**	**Wendell Hill**	**http://goeta.link/USH22MD-3FC46D-29M**
0301	**Tuesday**	**2-5:50 PM**	**Wendell Hil**	**http://goeta.link/USH22MD-788E23-29L**
0201	Wednesday	2-5:50 PM	Kara Hoffman	(see Prof. Hoffman's syllabus)
0401	Thursday	2-5:50 PM	Kara Hoffman	(see Prof. Hoffman's syllabus)
0501	Tu-Th	9-10:50	Anwar Bhatti	(see Prof. Bhatti's syllabus)

***Recommended Texts:**

(1) *A Practical Guide to Data Analysis for Physical Science Students,* L. Lyons, Cambridge University Press (1991).

(1) *An Introduction to Error Analysis*, 2nd Edition, J. R. Taylor, University Science Books (1997).

(2) *Data Reduction and Error Analysis for the Physical Sciences*, 3rd Edition, P. R. Bevington & D. K. Robinson, McGraw Hill (1969).

***Recommended Videos**: Jordan Goodman has created a series of YouTube videos on topics such as Excel, uncertainty, significant figures, error propagation, fitting, and χ^2. The full playlist is at https://www.youtube.com/playlist?list=PLO3QjeXmsBsk14oMlVavG5DvQdbisok8Z.

*** Grading:**

10%	Pre-Lab Assignments	10%	Homework Assignments
20%	First Practical Exam	25%	Second Practical Exam
35%	Spreadsheet Lab Reports		

You must complete all experiments, including the practical exams, and turn in all spreadsheets to pass this course. *Missing one homework set will be costly, as much as one-half a letter in your final grade.* Final numerical scores will be computed based upon the above weightings and standard grading will be used to assign letter grades (A is 90-100, B is 80-90, *etc*.).

NOTE 1: Running scores will be tabulated in ELMS (Canvas). Please do not be misled by the "Total Score" column listed in ELMS. It is incomplete because it does not include Expert TA Pre-Lab and Homework scores and does not use the correct weighting listed above.

NOTE 2: With the Covid-19 pandemic still underway, the fall semester may bring some unexpected developments. This could not only cause changes in the schedule of labs, including the cancelling of labs or exams, but could also force adjustments in the grading scheme to account for any missed activities.

*** Making Up Missed Labs:** During the semester you should make every effort to attend class during your regularly scheduled lab session time. If you realize you are going to miss your regular lab section, let your instructor know as soon as possible. If you miss a lab, you should try to make up that lab during the same week, since the equipment may not be available the following week. To make up a lab during the week, you will need to check with Profs. Hill, Hoffman and Bhatti to see if there are any open seats available in other sections. If not, you will need to consult with your instructor and TA to schedule a makeup lab at some other time.

*** Pre-Lab Assignments** - In addition to Homework Assignments, each lab typically also has a Pre-Lab Assignment. The Pre-Lab Assignment for each experiment is due before your lab section meets to do the lab, while the Homework Assignment for each experiment are typically due the week after your section does the experiment. All Pre-lab assignments must be completed on Expert TA and require you to answer a few questions about the lab. The purpose of the Pre-Labs is to make sure that you have looked through the Lab Manual and understand the key concepts before you try to do an experiment.

*** Your Lab Report** - Each week, before you leave the lab, you must submit to ELMS Canvas an Excel spreadsheet lab report of all the work you completed by the end of the lab period. If you need to make revisions to this report, or finish some parts, you must submit a revised report before the start of your next lab session.

*** Homework** is assigned on **Expert TA**. Typically there is a homework assignment at the end of each Lab and it is due before the start of your next lab session. To get credit for completing the homework, you must log into your own area in Expert TA and submit your answers via **Expert TA** before the deadline.

*** Homework and Pre-Lab assignments turned in after the deadline will be severely penalized unless you are seriously ill and provide a written note from your physician.**

* The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student, you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit:

http://www.studenthonorcouncil.umd.edu/whatis.html.

*** General Comments on the Lab report and Homework:**

Finishing all the lab reports and homework sets is very important. If you can't completely finish a lab and homework set, it is still important to turn in what you do have. When you are working on your report or homework, feel free to discuss with other students to try to figure out what is going on. However, do not use these discussions as an excuse to copy someone else's report or solution, or let someone else copy yours. That is cheating and is strictly forbidden. It is also very self-defeating since a large part of your grade (45%) will come from tests. The right way to proceed is first to work through the report and arrive at a definite answer on your own. With this preparation, you can then discuss intelligently with your colleagues and see if you have missed something essential. Of course, you can always ask one of your instructors.

In some of the homework assignments, you will see that there are problems labeled with an H. These are optional problems which are intended "For Hotshots Only" and do not count towards your grade. If you like thinking about physics problems, and are looking for something a bit more challenging, then go ahead and try them - we made these problems just for you.

*** University Closures, Bad Weather, and Health Emergencies**: Due to the ongoing Covid-19 pandemic, the University may close if the state, county, or local campus health authorities deem it necessary to contain an outbreak. If the University is closed due to the pandemic, the class may transition to on-line experiments, if possible, or suspend labs until further notice if suitable on-line activities are not feasible. The Washington metro area also can have severe winter weather, including ice- storms and large snowstorms that can make travel difficult or dangerous. The University will usually close when road conditions are dangerous or for other emergency situations. Closures are announced on the University's homepage and local radio and TV. If your lab section has been scheduled to meet during a time when the University is closed, then that section of the lab will be cancelled. Check with your instructor on when the experiment will be rescheduled - typically this will be the following week or during the week set aside for Lab Make-ups.

Physics 275 - Spring 2021

(Schedule - last updated August 27, 2021)

All labs are in-person unless otherwise noted

Aug. 30 (Monday)	**First Day of classes**
Aug. 30 – 31	Exp #1 – *Excel and Uncertainties*
Sept. 6 (Monday)	**Labor Day – no classes**
Sept. 7 (Tuesday)	**No Lab**
Sept. 13 – 14	Exp # 2 – *Propagation of Errors and* χ^2
Sept. 20 – 21	Exp # 3 – *Dice and Distributions*
Sept. 27 – 28	Exp # 4 – *Statistics of Radioactive Decay*
Oct. 4 – 5	Exp # 5 – *Position, Velocity and Acceleration*
Oct. 11 – 12	Exp # 6 – *First Review (Experiments 1-5)*
Oct. 18 – 19	**Exp # 7 – *First Practical Exam***
Oct. 25 – 26	Exp # 8 – *Free fall*
Nov. 1 – 2	Exp #10 – *Forced Harmonic Motion*
Nov. 8 – 9	Exp #11 – *Standing Waves*
Nov. 15 –16	Exp #12 – *Measuring g with a Pendulum*
Nov. 22 – 23	Exp #14 – *Second Review (Experiments 8-12)*
Nov. 24 – 26	**Wednesday-Friday – Thanksgiving Break**
Nov. 29 –30	**Exp #15 – *Second Practical Exam***
Dec. 6 – 7	Make-up all experiments
Dec. 13 (Monday)	**Last Day of Classes**
Dec. 14 (Tuesday)	**Reading Day**
Dec. 15-21	**Final Exams Week**

Note: Sections 0201, 0401 and 0501 of Phys 276 will follow a different schedule. Please see the syllabi of Profs. Bhatti and Hoffman.