

Syllabus for Modern Physics Physics 251 and 252, Spring 2020

Lecture Lab and Recitation Instructor

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Office: Physics Building, B-145. Office hours: Thu 3:00pm-4:00pm

Lab TAs

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Physics Building, A-131. Office hours: Mon 1:00-3:00pm

Texts (required)

1. Thornton/Rex - Modern Physics for Scientists and Engineers + WebAssign
2. "A practical Guide to Data Analysis for Physical Science Students", L. Lyons

Home works (required): Thornton/Rex - WebAssign Access

Where to buy course material?

You have to get the textbook and purchase the access for the WEB-based home works. The prices may be quite different, depending on what do you get and the place you buy them from. Here we present two choices.

From the Bookstore

Textbook, printed ISBN: 9781133103721 **OR** electronic ISBN: 9781133712237

AND for home works, WebAssign access: ISBN: 9781337773102

AND for the lab: ISBN: 9780521424639

From the Publisher, Cengage

Open this link, <https://www.cengage.com/c/modern-physics-for-scientists-and-engineers-4e-thornton>, and click on the "Cengage unlimited" tab. If you purchase that you will have access to all Cengage products, including possibly books that are used in other courses on campus.

The Data Analysis book (ISBN: 9780521424639) is not carried by Cengage, but it can be purchased from Amazon or other booksellers.

Course URL, Blackboard

The lab, homework and clicker grades will be accessible on Blackboard. The relevant link is "**-PHY 251.01 Modern Physics - Spring 2020**". E-mail messages from the instructors will be distributed via Blackboard, so it is important that you register an email address that you check regularly for important course information.

Most of the other information about the course will be posted at <http://solidstate.physics.sunysb.edu/teaching/2020/phy251>. This includes lab and lecture notes, and solutions to the midterm and final exams. There is also a section with links to computer simulations, books and TV shows.

Course format

This course follows a participatory studio format. Students are expected to attend all classes for which they do not have a reasonable excuse and participate in group activities during the classes. There will be short quizzes (using clickers) during the lecture about the basic concepts.

It is recommended that you prepare for every class by reading the relevant chapter in the textbook before coming to class. Two versions of the lectures will be published on the course WEB site. Version one is before the actual lecture. Some students print this out and bring it to class for note-taking. Version two is available after the class and it contains all the hand-written notes that were made during lecture.

Three lectures are dedicated to problem-solving. You can best use this opportunity if you try to solve the problems before they are solved in lecture.

We will strictly adhere to the schedule outlined in the course schedule, see below. If a material is not covered in lecture, students are expected to study it from the book.

Learning objectives

Students will demonstrate mastery of physics concepts related to modern physics, including the theory of relativity, quantum mechanics, statistical physics, nuclear-, solid state- and particle-physics.

1. Students will be able to think critically and apply appropriate physics concepts in analyzing qualitative problems.
2. Students will demonstrate the ability to apply mathematical reasoning, including calculus, in solving quantitative physics problems.
3. Students will demonstrate proficiency in science process skills by designing and performing experiments to measure physical phenomena and minimize experimental error.
4. Students will demonstrate scientific communication skills through thoughtful discussion, collaborative problem solving, and dissemination of experimental results.

Homework

To access the home works, follow the link “-PHY 251.01 (R01-R02) Modern Physics - Fall 2020” on Blackboard and click on the “Access WebAssign” tab on the left hand side. Students will not be penalized for multiple attempts at problems, but there is a maximum of ten submissions for each part of each problem.

There will be 10 homework sets. The deadline to submit solutions is on Fridays at 11:59pm. Try to do your homework before coming to recitation, and finish submitting it right after the recitation. The WEB site will not accept late home works.

Any excuses (medical or otherwise) are to be documented and discussed with the instructor in a timely manner.

Exams

There will be 2 midterms and 1 final exam. The material covered in the midterms is indicated in the course schedule. The final exam covers the whole course material.

Midterm exams will be given during the regular lecture hours. The location of the midterms and the final are announced later (most likely different from the lecture room).

A printed formula sheet will be provided to you before the exam. You are not allowed to make your own notes. You should bring a calculator. Answer each questions legibly, showing all formulas, substitutions and work to receive full credit. Partial credit is given if you write down the correct formula but you cannot complete the numerical calculation. There will be no partial credit if, in addition to the correct one, you also write one or more other equations that have nothing to do with the solution (even if those formulas are correct). To get full credit you have to use the correct unit for each answer. There is no partial credit for the multiple-choice questions.

Lab component

PHY 252 (the lab) is a separate course from PHY 251 (the lecture and the recitation), but students will get a common grade in PHY 251 and PHY 252. PHY 252 is required and must be taken concurrently with PHY 251. There will be 8 labs during the semester, as shown in the course schedule. All labs are in room A133.

The lab grades will be posted on Blackboard; follow the link to your lab section. Some documents related to the labs will be also posted there.

Lab reports must be submitted in electronic form (either by email to the TA or by using the “Assignment” tab in your Blackboard lab section). The deadline is the beginning of the next lab on the date specified in the course schedule. If a lab report is late by less than 24 hours the penalty is 20 points (out of 100). Beyond that, if the lab report is late by less than 48 hours, the penalty is 40 points. Lab reports will not be accepted 48 hours after your scheduled lab start time i.e. you shall receive a zero credit on that report.

All lab reports must be submitted by the last day of classes. If one or more reports are missing, the lab component of the grade is zeroed out.

These penalties are strictly enforced, unless there is a valid excuse and you notify us sufficiently in advance of the deadline and the lateness is approved.

You will have a lab partner, or two, in this course. You will have the same data but each person must hand in their own individual and original lab report.

More information about the lab reports is here:

<http://solidstate.physics.stonybrook.edu/teaching/2020/phy251/lab.pdf>

Grading

Your final PHY251/PHY252 course grade will be determined by weighting the various portions of the course as follows:

- 5% clicker participation (no penalty for wrong answers)
- 35% midterm exams (17.5% each midterm)
- 10% homework
- 30% final exam
- 20% lab

It is obvious from the weight factors that you can get a reasonably good grade even if you do not do the home works. Nevertheless, it would be a **huge mistake** to skip home works,

because you cannot get a decent score on the quizzes and the exams if you do not practice. The problems on the quizzes and the exams will be similar to homework problems.

Grades

These numbers are not final, and they may be adjusted according to the performance of the class.

- Weighted average: 90% - 100% → grade A
- Weighted average: 85% - 90% → grade A-
- Weighted average: 80% - 85% → grade B+
- Weighted average: 70% - 80% → grade B
- Weighted average: 65% - 70% → grade B-
- Weighted average: 60% - 65% → grade C+
- Weighted average: 50% - 60% → grade C
- Weighted average: 45% - 50% → grade C-
- Weighted average: 40% - 45% → grade D+
- Weighted average: 35% - 40% → grade D
- Weighted average: <35% → grade F

Religious Holidays

If the schedule of home works, exams or other assignments is in conflict with your religion's Holidays, please let me know in an email by the end of the first week of instructions and I will do my best to accommodate your needs. Please note that I cannot make changes in the course schedule after the first week of classes. No consideration will be made if someone approaches me in this matter at a time close to the due date or the exam date.

Americans With Disability Act

If you have a physical, psychological, medical or learning disability that may impact your ability to carry out assigned course work, contact the staff in the Disabled Student Services office (DSS), 128 Educational Communications Center, 632-6748/9. DSS will review your concerns and determine with you what accommodations are necessary and DSS will advise me. All information and documentation of disability is confidential.

University Academic Integrity Statement

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at: <http://www.stonybrook.edu/uaa/academicjudiciary/>

Critical Incident Management

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn.

PHY 251/252 Course Schedule

Week of	Lecture (Tue. and Thu.)	Recitation (Tue. and Thu.)	HW due (Fri)	Lab (Mon. and Thu.)
27-Jan	Physics of 21 st century Ch 2 Special Relativity	No recitation		No Lab
3-Feb	Ch 2 Special Relativity Ch 2 Special Relativity	Error propagation		Michelson Interferometer
10-Feb	Ch 3 Quantum physics Ch 3 Quantum physics	Ch 2	HW 1 (Ch 2)	Hydrogen Spectrum
17-Feb	Ch 4 Structure of atom Ch 5 QM 1	Ch 3	HW 2 (Ch 3)	Photoelectric Effect
24-Feb	Ch 5 QM 1 Ch 6 QM 2	Ch 4,5	HW 3 (Ch 4,5)	No lab
2-Mar	Midterm review Midterm 1 (Ch 2,3,4,5)	Midterm prep		No Lab- Midterm 1 Prep
9-Mar	Ch 6 QM 2 Ch 7 H atom	Ch 6	HW 4 (Ch 6)	Scattering
16-Mar	Spring break Spring break	Spring break		No Lab - Spring break
23-Mar	Ch 7 H atom Ch 8 Atomic physics	Ch 7	HW 5 (Ch 7)	Bragg Scattering of Microwaves
30-Mar	Ch 8 Atomic physics Ch 9 Stat. Phys.	Ch 8	HW 6 (Ch 8)	Measurement of Electron Charge
6-Apr	Midterm review Midterm 2 (Ch 6,7,8)	Midterm prep		No Lab- Midterm 2 Prep
13-Apr	Ch 9 Stat. Phys. Ch 10 Molecules, solids	Ch 9	HW 7 (Ch 9)	Measurement of e/m for Electrons
20-Apr	Ch 10 Molecules, solids Ch 11 Semiconductors	Ch 10	HW 8 (Ch 10)	No lab
27-Apr	Ch 12 Nuclear Physics Ch 13 Nuclear reactions	Ch 11-12	HW 9 (Ch 11-12)	Geiger Counter, Radioactive Decay
4-May	Ch 14 Particle physics Final review	Ch 13-14 Final prep	HW 10 (Ch13-14)	Reserved for Make-Up Labs

Final exam: May 12, 11:15am-1:45pm, location TBA