

PHY 251/252, Fall 2022

	Monday	Tuesday	Thursday	Recitation (Mon. and Wed.)	Lab
1	22-Aug	23-Aug Ch1 19th century physics	25-Aug Ch2 Relativity	Error propagation	No lab
2	29-Aug No HW due Start working on HW1	30-Aug Ch2, practice quiz Relativity	1-Sep Ch2 Relativity	HW1 Ch2	Michelson interferometer
3	5-Sep HW1 due on Tuesday Labor day	6-Sep Ch3, quiz1 Quantum physics	8-Sep Ch3 Quantum physics	see note below HW2 Ch3	No lab
4	12-Sep HW2 due	13-Sep Ch4, quiz2 Structure of atom	15-Sep Ch5 Quantum mech. 1	HW3 Ch4	Photoelectric effect
5	19-Sep HW3 due	20-Sep Ch5, quiz3 Quantum mech. 1	22-Sep Ch6 Quantum mech. 2	HW4 Ch5	Electron charge
6	26-Sep HW4 due	27-Sep Midterm 1 prep. Ch2,3,4	29-Sep Midterm 1 Ch2,3,4	Midterm 1 prep. Ch2,3,4,5	No lab
7	3-Oct No HW due	4-Oct Ch6, quiz4 Quantum mech. 2	6-Oct Ch6 Quantum mech. 2	HW5 Ch6	Bragg scattering
8	10-Oct Fall break	11-Oct Fall break	13-Oct Ch7 H atom	No recitation	No lab
9	17-Oct HW5 due	18-Oct Ch7, quiz5 H atom	20-Oct Ch8 Atoms	HW6 Ch7	e/m of electron
10	24-Oct HW6 due	25-Oct Ch8, quiz6 Atoms	27-Oct Ch9 Statistical physics	HW7 Ch8	Hydrogen spectrum
11	31-Oct HW7 due	1-Nov Ch9, quiz7 Statistical physics	3-Nov Ch10 Molecules, solids	HW8 Ch9	Scattering angles
12	7-Nov HW8 due	8-Nov Midterm 2 prep. Ch6,7,8,9	10-Nov Midterm 2 Ch5,6,7,8	Midterm 2 prep. Ch6,7,8,9	No lab
13	14-Nov No HW due	15-Nov Ch10, quiz8 Molecules, solids	17-Nov Ch11 Semiconductors	HW9 Ch10	Make up labs
14	21-Nov HW8 due	22-Nov Ch12, quiz9 Nuclear physics	24-Nov Thanksgiving	see note below No recitation	No lab
15	28-Nov HW9 due	29-Nov Ch13, quiz10 Nuclear power	1-Dec Final exam prep. Ch 10,11,12	HW10 Ch11,12	Nuclear decay
16	5-Dec HW10 due		13-Dec Final exam 2:15 - 5:00pm	see note below Final exam prep.	Make up labs

Note: There will be no recitation on September 5 (Labor Day) and November 21. (Thanksgiving week)
 This is necessary for us to keep the two recitation sections in synchronization with the lectures.
 In September, students in the Monday section should watch the recitation recorded on Wednesday.
 In November, the Wednesday recitation falls into the Thanksgiving break.

Syllabus for Modern Physics

Physics 251, Spring 2022

Lecture and Recitation Instructors

Laszlo Mihaly, Laszlo.mihaly@stonybrook.edu (Lecture)

Office hours: in B-145, Tue 3:00 - 4:00, Thu 3:00 - 4:00, and by appointment,
<https://stonybrook.zoom.us/j/7316638666>

Laboratory (PHY 252): Bent Nielsen, Bent.nielsen@stonybrook.edu

Texts (required)

1. *WebAssign for Thornton's Modern Physics 5e* **OR** *Cengage Unlimited*.

Students get free temporary access to WebAssign and ebook from course start date so no one falls behind. Enroll via the "PHY 251.01 (R01-R02) Modern Physics - Fall 2022" link on Blackboard by clicking on *Access WebAssign*. The class key is **sunysb 3901 9843**. [Click here for 3-minute registration directions video](#). Options to purchase are available through your Cengage dashboard or campus store. 24/7 Cengage Support: Live Chat Support and Online Self-Help at Cengage.com/support, social media @CengageHelp or call 800-354-9706.

Cengage Unlimited subscribers do not have to purchase the course materials for this class. Simply follow registration directions above. (Cengage Unlimited is a cost-saving option if you are taking multiple courses using Cengage.)

We will use the "Access Webassign" link for homeworks, quizzes, and clickers. (If you do not see the "Access Webassign" link on the course's Blackboard page, it is most likely that, instead of the lecture course, you logged into one of the lab or recitation courses.)

2. "A practical Guide to Data Analysis for Physical Science Students", L. Lyons ISBN-13: 9780521424639. This book can be purchased from Amazon or other booksellers.

Course format

The course is offered primarily in person. Lectures and recitations will be live broadcast online as well as recorded. Quizzes will be online only, using WebAssign. The two midterms and the final exam will be in-person only. The laboratory component is also in-person only.

To access an online lecture or a recitation go to the "Zoom Meeting" tab in the "PHY 251.01 (R01-R02) Modern Physics - Fall 2022" section in Blackboard, look for the date and click on. You should do this at the posted time of the lecture or recitation. Previous lectures can be found under "Cloud Recordings".

Please note that you are welcome to participate in the online version of any of the two recitation sections, independent of where are you registered. If you want to come "in person" to the recitation where you are not registered, you should ask permission from the instructor.

In addition to the live and recorded lectures, I will post two printable versions of each lecture. Version one is the pdf of the lecture slides. Version two will be available after the

lecture and it contains all the hand-written notes that were made during lecture. I will also post solutions to the homeworks as discussed in recitation.

We will strictly adhere to the schedule posted on the course WEB page. If a material is not covered in lecture, students are expected to study it from the book.

Technical requirements

For the homeworks and quizzes all students need a device with a WEB browser capable to access WebAssign. If you come “in person” to the lectures (highly recommended) you should bring your laptop.

Course URL, Blackboard

Grades will be accessible on Blackboard. All other information about the course will be posted at http://solidstate.physics.sunysb.edu/teaching/2022_fall/phy251. This includes the schedule of lectures, lab instructions, lecture and recitation notes, and solutions to exams. There is also a section with links to computer simulations, books and TV shows.

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.

Learning strategies, getting help

- Be organized. Start solving new homework problems a day or two before your recitation. This way you can ask questions about it at the next recitation. Try to submit the homework right after the recitation, where the homework has been discussed. If you still have questions, go to the office hours of any of the instructors of the course. If you want to do it by Zoom, send an email message first.
- Be there. Do not skip lectures or recitations for watching them online or looking at the video. Come to the lecture room. The more you are absent, the more likely you will have difficulties with the course.
- Be social. Organize or join a study group and discuss the homeworks with your friends. If you are one of the better students, you will learn a lot by explaining. If you are a bit behind, sometimes your peers can explain the stuff better than the instructor.

- Be active. Ask questions during the recitation. Do not be afraid of asking questions during the lectures. I really need your questions in order to stay at the proper level in the lecture. Also, if you think I made a mistake, do not hesitate to correct me.
- Be engaged. Respond to the multiple-choice questions during lectures.
- Print out the lecture notes before each lecture and use the printout for note-taking. When you prepare for the exam, print out the annotated lecture notes as well, and use them with your own notes.
- Before each exam, practice problems will be published on the course WEB page. Try to solve these problems before the lecture/recitation where the instructor solves them. Ask questions if you do not understand something.
- When solving homework or practice problems and quizzes use the formula sheet provided on the course WEB page. This way you will be familiar with it when the exam comes.
- If your first midterm happens to fall below 30% of the maximum score, immediately contact the instructor and discuss how can you improve.
- Be on time. Never submit lab reports late.

Homework

To access the homework, visit the Blackboard page of the lectures and click on the “Access WebAssign” tab on the left-hand side. Students will not be penalized for multiple attempts at problems. There is a maximum of 10 submissions for each part of problem, except for the multiple choice questions where the number of attempts is 2. The deadline to submit solutions is on Mondays 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 homework.

Any requests for deadline extension should be documented and discussed with the instructor in a timely manner.

Quizzes

There will be a quiz at the beginning of most of Tuesday lectures. The format is similar to the homework, using WebAssign, except the number of attempts to enter to the answer(s) is reduced to 2. The quiz will be 10 minutes long and the problems will be similar to the homework problems from the previous week. For example, “quiz 3” questions will be similar to the “homework 3” questions. You are free to use any resources or tools, including your notes, the textbook and the internet. However, the time limit for the quiz will be set so that if you are not prepared, there will be very little time to look up things. **You may not consult with anyone, and the work should be entirely yours.**

In calculating to final quiz score the 2 lowest quiz grade will be dropped. There is no make-up for the quizzes.

Please note that you need to participate in the live lecture (either in the classroom or on the Internet) at least during the time when the quiz is scheduled. Otherwise you will not get credit for the quiz.

Multiple-choice questions (a.k.a. “clicker questions”)

There will be a several multiple-choice questions during the lecture. The purpose of these questions is to measure the progress of the class and adjust the lecturing accordingly. During each lecture you need to answer only a single question correctly in order to get full credit for the clickers. *Please note that if you elect not to participate in the live lecture (either in the classroom or on the Internet) you will not get credit for the multiple-choice questions.*

We are not going to use the regular clickers. Instead, we use WebAssign. At the beginning of the lecture log in to WebAssign and be ready to answer the clicker questions there.

Exams

There will be two midterms and a final exam. The material covered in the midterms is indicated in the course schedule. The final exam covers the whole course material. A formula sheet will be provided for each exam.

Practice problems will be distributed before the exams. On the week of the midterms the Tuesday lecture will be dedicated to problem-solving in preparation for the midterm and the midterm will be during lecture time on Thursday. Similarly, the last lecture of the course will be a preparation to the final exam.

Due to contingencies related to the Covid situation, we plan for two kinds of exams.

In person exams (default): Traditional exam with problems distributed on paper. Sufficient room will be provided for social distancing. The exams are proctored. The in-person exams are closed books and all work must be done by the student without outside help. A formula sheet will be provided.

Remote exams (Covid emergency): The format is similar to the quizzes, using WebAssign. One important difference is that students may submit their work by email to me and I may assign partial credit (WebAssign cannot do that). These exams are open book, open notes, free access to the internet. Students should log in to a Zoom session and switch on a camera for being proctored. Again, all the work must be done by the student with no outside help from anyone.

The **midterm exams** will be held during the regular lecture hours as indicated in the course schedule published on the WEB site.

There will be no make-ups for the midterms. Instead, if proper medical or other explanation is provided, the weight factor of the missed midterm will be reduced to zero and the weight factor of the other midterm will be doubled. In the absence of explanation, the midterm grade will be counted as zero with its full weight factor.

The **final exam** will be held at the time and place assigned by the Registrar. Students missing the final exam will get an “incomplete” grade, if proper medical or other explanation is provided. These students take the written exam later, followed by an oral examination. In the absence of explanation, the course grade will be F.

Cheating on the exams will be immediately reported to the Academic Judiciary and the minimum penalty will be an F in the course.

Grading

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

- 10% quizzes
- 5% multiple-choice questions during lectures (participation)
- 40% midterm exams (20% each midterm)
- 5% homework
- 40% final exam

It is obvious from the weight factors that you can get a good grade even if you do not do the homeworks. Nevertheless, it would be a **huge mistake** to skip them, 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: The course is graded “on the curve”. The average score (S) and the standard deviation of the scores (d) will be calculated (students who did not do the final exam will be excluded from the calculation). Students with scores larger than $S + 0.5d$ will get an A grade. The lower cut-offs for the rest of the grades are: $A^- : S + 0.3d$, $B^+ : S + 0.1d$, $B : S - 0.2d$, $B^- : S - 0.5d$, $C^+ : S - 0.8d$, $C : S - 1.4d$. These numbers are not final and may change depending on the actual distribution of the grades.

Laboratory

PHY 252 (the lab) is a separate course from PHY 251 (the lecture and the recitation), but several elements of PHY 251 and 252 are “synchronized”. For example, there will be no labs during the week of the midterm exams. **Most students take the lecture/recitation and the lab concurrently.** The labs are listed in the course schedule; see the course WEB page. The labs will be set up so that students can maintain social distancing as necessary. There is no online version for the labs.

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.

See the syllabus for the labs for more details.

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.