

Syllabus for Physics 122-II

Physics for Life Sciences – Spring 2019

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General: PHY122 part II is an introductory level Physics course covering Electricity and Magnetism, Optics and topics in Modern Physics. Some examples and problems will be taken from Life Sciences, but as a whole, it is a Physics course. It assumes basic knowledge of, at a minimum, introductory level classical mechanics, oscillations and mechanical waves. In other words, we assume that you took PHY122-I or a similar course before taking this one. We also assume that you are reasonably proficient in basic high-school math: algebra, simplification and solution of simple algebraic equations, basic geometry and trigonometry.

Let me put it in specific terms, as a little test. If you do not know right now, as you are reading these words, answers to the following questions:

- a) What is the Second Law of Newton, and how to use it to solve problems,
- b) What is the formula giving solutions of a quadratic equation $Ax^2 + Bx + C = 0$, and
- c) What are the formulas expressing an area of a circle of radius R , an area of a sphere of radius R , and a volume of a sphere of radius R
- d). How to present a number 472,000,000,000 in a scientific notation (with powers of ten),
 - so, if you do not know the answers to any of these questions, please do not take this course or, if you have chosen it already, drop it! If you will take it without a necessary background, you will run a high risk of failing the course, or of getting a low grade in it, and this will not be pleasant for you and for us.

It is impossible to teach physics without using math. Having said that, we will largely stay away from higher mathematics, such as *calculus* (derivatives and integrals); however, some elements of that branch of mathematics will be introduced during the course. Due to the nature of this fast-paced course, the demands on students will be great. Please do not take this course unless you are confident in the basics of the sort mentioned above, and, also, very importantly, unless you plan to allocate a good deal of time for your studies.

LECTURES:

Will be given by Professor Michael Gurvitch, Michael.gurvitch@stonybrook.edu

There will be two ‘long’ (longer than an hour) lectures each week, Tu, Th, 11:30 – 12:50 pm, in Javits Hall room 100. I am planning to deliver them mostly in an “old-fashioned” way, writing with chalk on a blackboard, making simple drawings, solving sample problems in front of the class. Sometimes I will show slides using my laptop connected to a projector, but the essential Physics will be worked out on the board. I

believe that this is the best way to teach Physics; experience shows that “glossy” computerized lectures do not reach the audience in the same way.

The lectures will be Echo-recorded, so that you will be able to review them later. However, Echo recording (unfortunately) isn’t capturing (at least not clearly) everything that has been written on a blackboard, and so they may be of little use to those who will miss the actual lectures. So, I recommend taking good notes during the lecture, and then listening to the Echo recording your notes in hand. Then a combination of spoken word and of at least a partial view of what has been written on the board on the one hand, and of your own notes on the other, will allow you to reproduce what was done and discussed in class. This is a great way to study; I highly recommend it.

And then of course there is a textbook (see below), which can be read and re-read as many times as necessary. I found that often students do not read the textbook, or read it very little, finding that it contains too much material. If you will listen to my lectures, they will help you to identify the important subjects in the book; another good reason to attend the lectures. Please do not ignore the book; it is a good text, expertly written by Prof. Knight (see below). In addition to general Physics theory and explanations, it contains many *worked-out problems* and examples, which are most useful. Last but not least, you paid good money for it, so you may as well read it.

Five percent (5%) of your grade is designated for lecture attendance; additionally, there will be in-lecture quizzes (you will respond via clickers) which will give you some **extra credit**. In Physics, one part is always connected to the other, and missing even a single lecture may make a pretty big ‘hole’ in your learning process. Close to 100% attendance plus your diligent work on the on-line homework (see below) is the best way to succeed in this course.

TEXTBOOK AND REQUIRED MATERIALS: The text is **College Physics - A Strategic Approach**, by Randall D. Knight, 3rd edition, 2014 by Pearson Publishing. The book can be purchased together with the Student Access Code for logging on to **MasteringPhysics.com** where students will complete homework assignments (see below). If you choose not to purchase the text, you will still be responsible for purchasing the Student Access Code for access to MasteringPhysics.com. You should also be able to choose between a hardcover book, loose-leaf version of the text, or softcover.

You will also need a *scientific calculator* (the one that has functions such as sin, cos and tan, exponent, logarithm and some others, and the one that can present numbers in a *scientific notation*, i.e. in the form such as 3.00×10^8 , and a *clicker* (see next section).

CLICKERS: We will be using Turning Technologies clickers; if you do not have one already, you will need to purchase it at the campus bookstore. See <https://it.stonybrook.edu/help/kb/buying-clickers>. You must obtain a “Turning Account License” and should use it to register your clicker device. You can register it here <https://account.turningtechnologies.com/account/> . If you do not already have an account, please use your stonybrook.edu email when registering. Once you are logged in, you can see that Student Store is the last link on the left side of the page. Usually you will want to buy the clicker bundle, which is the first choice on the page. The bundle comes with a clicker and a 4-year license. If you already have a clicker, but no license, then you may wish to just buy a license, which is the second option.

The “school code” 4SBU is the one you need to enter (<https://it.stonybrook.edu/help/kb/purchasing-a-license-code-for-clickers>). Active links to these web pages should be available in the upper-left “gray” area of the Blackboard PHY 122 home page.

NOTE: You can also use the virtual clicker app called ``ResponseWare``.

Set your clicker to Channel 41 and bring it every day to class, as we will pose questions in class for which you can obtain additional credit. Usually attendance (any answer to a question posed in class) will count for 1, and answering correctly a multiple-choice question will account for 1.2 – 1.5 (depending on question's difficulty); of course if you are absent, you will receive zero for that lecture.

BLACKBOARD: We are planning to use *blackboard.stonybrook.edu* (BB) for writing and delivering to you *Announcements*, which may concern all kinds of aspects of the course, from the time and room for the next exam to solutions of the passed midterm and to recommendations on how to approach Mastering Physics HW. Usually an Announcement is sent via e-mail to all course participants. The Blackboard will be tied together with *Turning Technologies*, which is the software regulating your clickers, so that the results concerning your attendance and your answers to in-class quizzes will be uploaded to the Grade Center on the Blackboard. You must list the correct e-mail address on the BB for all of this to work properly. You are expected to read your University e-mail daily.

LABORATORY: The laboratory (PHY124) is mandatory. Lab rooms are labeled "PHY124". Descriptions of labs should be available beforehand on Blackboard, for you to print out. You are expected to come to the laboratory having read and understood what you are supposed to do. Data can be taken using MS Excel, which will help you to organize it and plot it. The labs are taught by graduate student TAs, devilishly clever young physicists from whom you can learn a lot. As of the writing of this document, the TA list has not been finalized. The lab, PHY124, is part of your 4-credit course; it will amount to 20% of your grade.

HOMEWORK (HW): Nobody yet have figured a way of teaching Physics without solving physics problems. To *understand* Physics essentially *means* to be able to solve problems. Normally, a Physics course involves *recitations* where an Instructor meets with 30 or 40 students in class and explains problems, gives quizzes, etc. In our course, however, there are no such recitations; they are replaced with online homework assigned on the *MasteringPhysics.com* website (MP) run by a publishing house of Pearson. Every student should purchase Access Code for MP. The course name is **MPGurvitchPHY122-II**, and course ID is **MPGurvitch46926**. Assignments will be added after the start of the semester. We will assign several (usually, 10-15) problems every week, and you will solve them (normally, using paper and pen) and at the end, enter your solutions (numerical results, or final formulas) into the MP website, where your work will be automatically graded. This HW will amount to 15% of your grade. Try to divorce the use of computer for entering the results and the actual process of solving a problem. Keep good records of your solutions (make them all in a dedicated notebook): write them clearly, stating the problem, making necessary diagrams, showing all the numbers used in your calculations, edit and correct them as you improve your skills; and then consult with them when preparing for the exams.

Sometimes students find "shortcuts", for example copying problems done by your friends, etc., thinking that their goal is to maximize that MP score. By doing so you will surely "shoot yourself in the foot", as the saying goes. It would be a big mistake to avoid doing problems on your own. You should make your best effort to solve all of them (and perhaps even more problems taken from the textbook), and to understand how a given type of a problem should be solved. Exam problems will be similar to those problems assigned on MP. It is much better to receive less than the maximum number of points on MP site but to learn how to solve problems, than to receive the maximum score on MP without true learning. Think about it this way: MP score constitutes 15% of your grade, while exams constitute 60% of your grade. You will lose a lot more points in the exams if you obtain those 15% for HW without doing actual work yourself. Solving problems in the exams correctly and in the allocated amount of time is the

single most important skill you should master in this course, and spending a good deal of time doing on-line HW will help you to achieve this result.

HELPROOM: The Physics Helproom, room A-131 in the Physics Building, is usually stuffed with Instructors and TAs providing help to students. In PHY122, there will be several dedicated TAs who are assigned to help students from our course. Their schedule will be posted in the beginning of the semester. Professor Gurvitch will also be in the Helproom for a couple of hours each week, the time slot for that to be announced.

Other Resources:

A helpful resource is the "*For Students*" section linked from the Stony Brook homepage: <http://www.stonybrook.edu/for-students> as well as the Division of Undergraduate Education website: <http://www.stonybrook.edu/commcms/duel/index.html>.

Academic Success and Tutoring Center:

This important program opened in September 2013. Information can be found at: http://www.stonybrook.edu/commcms/academic_success/.

EXAMS:

There will be two Midterms (15% of your grade each) and a Final (30% of your grade). Some of them may be multiple-choice exams, and some may contain full physics problems requiring a detailed solution; this will depend on the availability of graders.

The dates and times of these exams have been already decided:

Midterm 1: Feb. 26 from 8:45 pm to 10:15 pm

Midterm 2: April 4 from 8:45 pm to 10:15 pm

Final: May 21 from 11:15 am to 1:45 pm.

The rooms will be assigned later.

If you miss an exam without a valid medical excuse (**which must be documented in writing, with official doctor's note, including Doctor's phone number**), you will NOT be allowed to make up that missed exam, and your grade on it will be zero. Moreover, missing the Final automatically produces a grade of F for the course, independent of other scores. If there is a verifiable medical reason for missing the Final, you may receive an incomplete (I) for the course, and that "I" will be dealt with in the next semester.

GRADES:

Final grades will be calculated based upon contributions weighted by the following percentages:

Clickers: 5% for attendance, and extra credit for correct answers to in-lecture quizzes.

Online Homework (MP site): 15%

Midterms 1 and 2: 15% each (30% for two)

Final Exam: 30%

Lab: 20%

The 'cuts' corresponding to letter grades will be as follows: (Note that this system may change; it is provided here as an example of what this Professor used in the past):

85 < A < 100 (maximum possible score)

80 < A- < 85

75 < B+ < 80

70 < B < 75

65 < B- < 70

60 < C+ < 65

55 < C < 60

50 < C- < 55

45 < D < 50

0 < F < 45

There will be no 'curving' in this course; the scores and corresponding grades are absolute. If the score falls onto a borderline between two letter grades, we tend to assign a higher grade; for example, if you will receive 79.9, we will probably call it A-. I am also looking for significant improvement shown in the second Midterm and the Final.

Academic Integrity

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 integrity website at

http://www.stonybrook.edu/commcms/academic_integrity/index.html .

Academic dishonesty will not be tolerated. In this course, the standards are as follows: in lecture, whenever a clicker question is posed, you may discuss it with your neighbors. **However, one person operating two or more clickers is considered cheating**, and catching of such a practice will result in an Academic Dishonesty complaint being filed by the instructor with the Academic Judiciary against the owners of all involved clickers.

We are especially strict when it comes to **cheating in exams**. A student should look only at his/her work; attempts to copy solutions or answers from others will result in zero for the exam and possibly an Academic Dishonesty complaint.

Americans with Disabilities Act

If you have a physical, psychiatric/emotional, medical or learning disability that may impact on your ability to carry out assigned course work, you should contact the staff in the Disability Support Services office [DSS], ECC (Educational Communications Center) Building, Room 128, (631)632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All

information and documentation is confidential.

<https://web.stonybrook.edu/newfaculty/StudentResources/Pages/DisabilitySupportServices.aspx>

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the website

<http://www.sunysb.edu/ehs/fire/disabilities.shtml> .

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 University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn.

Posting and Updating of This Syllabus and the Schedule Calendar

This Syllabus will be posted on Blackboard. When, from time to time, it may be updated, all students will be notified by an Announcement posted in Blackboard and sent via email to your official University email address. Please make sure you're looking at the most recent version: check the first page of each one to see the date of the version you're looking at.