PHY121.90/123.90 - Physics for the Life Sciences I

Fall 2022

Syllabus

Course Description

PHY121/123-122/124 Physics for the Life Sciences the 'Participatory Studio Format' (3+1 credits) is a fast-paced, two-semester long, survey of classical physics, primarily for students majoring in biological sciences or pre-clinical programs. Topics for the first semester include classical mechanics, oscillations and (sound) waves, fluids, and thermodynamics. The second semester discusses electricity, DC and AC currents, magnetism and electromagnetic waves, light, optics, and a few topics in modern physics. The course has two 80-minute lectures per week with clicker quizzes and assigned homework. Homework (online) will be graded and counts towards the final grade.

The **concurrent** Laboratory component **PHY123** or **PHY124** consists of ten **mandatory** 2-hour lab sessions. **All labs must be done to pass PHY121 or PHY122**, and a **common grade** will be given to the Lecture and Lab components. **Missing a Lab session** and not making it up **will yield a certain F** for both PHY123 and its parent course PHY121 (or PHY124 and its parent course PHY122)!

Two midterm exams and a **final** exam are given, with a **common final grade** for lecture (75%) and laboratory (25%) components.
Co-requisite for PHY121 is PHY123, co-requisite for PHY122 is PHY124.
Pre-requisites for PHY121/123: *one of* MAT 125, MAT131, MAT141, or AMS 151. Note that these are *PRE*-requisites: most students who fail simply have insufficient math skills! Pre-requisite for PHY122/124 is "**C**" or higher in PHY121/123.

Because the course covers all of classical physics in only two semesters, students should expect a **heavy workload**. To succeed this course, students should be well-prepared and should devote about **8-12 hr/week** to homework and laboratory preparation.

Course Learning Objectives

1. PHY121: Students will demonstrate mastery of physics concepts related to motion in one and two dimensions, Newton's laws of motion and gravitation, energy, momentum, angular momentum, rigid body motion, wave motion, fluids, heat, kinetic theory, and thermodynamics.
2. PHY122: Students will demonstrate mastery of physics concepts related to static electricity and magnetic forces; fields; current flow through and potential steps across passive elements like resistors, capacitors, and inductors; light and optics: interference and linear optics; and some elements of modern physics.
3. Students will be able to think critically and apply appropriate physics concepts in analyzing qualitative problems in classical physics.
4. Students will demonstrate the ability to apply algebraic and calculus-based mathematical reasoning in solving quantitative physics problems. Basic skills in differentiation and integration will be part of the learning goals.
5. Students will demonstrate proficiency in science process by designing and performing experiments to measure physical phenomena and minimize experimental error.
6. Students will demonstrate scientific communication skills through thoughtful and critical discussion, collaborative problem solving, and dissemination of experimental results.

Blackboard

Stony Brook's Blackboard (BB) Website is the location where course information and files are available. The course is listed under PHY 122.90 Physics for Life Sciences II - Spring 2018. Files for laboratory procedures, lecture notes, etc. are posted in the BB "Course Documents". Lecture notes (in pdf format) will be posted a few days in advance of the lecture, beginning January 15, without the embedded clicker questions. After the lecture, the updated lecture notes (including the clicker questions&answers) will be posted.

Laboratory preparation by a student for each lab consists of reading the laboratory assignment and preparing for the lab exercise, see below.

All course information is found in these pages, also reachable via Blackboard. All **grades**, including the Laboratory grades, will be accessible on the Blackboard site for PHY121.90 or PHY122.90.

To take **PHY121/122 for P/NC**, see below.

Required Materials

- **Suggested Text Book:** "College Physics - A Strategic Approach" by R.D.Knight, B.Jones, and S.Field, **3rd edition**, Pearson Publishers. ISBN10: 0321879724/ ISBN-13: 9780321879721. The text is available in multiple formats: **hard/soft cover, separate volumes (Vol I needed for PHY121, Vol II for PHY122), and eText.** The eText is the most convenient because it is accessible directly from the homework site MasteringPhysics. Some Introductory Physics texts are free at www.openstax.org
- **Online Homework:** Make sure that you also acquire the *access code* to the "Mastering Physics" tutorial and on-line homework; the on-line access code can be purchased separately and is valid for three semesters. Register for MasteringPhysics **via Blackboard**.
  (e)Text and "Mastering Physics" access are available directly from the publisher, from (online) resellers, or in the Campus bookstore.
- **CPS RF Response Pad ("RF Clicker")** from Turning Technologies, which must be registered on its cloud-based system via the BB course page, see "Tools" in the main menu. Available in the Campus bookstore.
- **Scientific Calculator** (with trigonometric functions, etc.) to be used in lecture, lab, and exams.
- **Laboratory notebook**, preferably with graph paper on one side of each page; available in the Campus bookstore or elsewhere. Pencils, ruler.

Forbidden: During Exams and lectures cell phones MUST be switched off and out of sight; iPhone, PDA, Tablets, Pocket PC, and other "smart" devices are NOT allowed!

Lectures & Quizzes

- **Venue:** Lectures and Labs meet MoWe 08:00AM-09:20AM, and Friday 08:00AM-09:50AM in Physics P-118.
- **Lecturer:** see "Contacts" in the main menu.

Quizzes in Lecture count towards the course grade and are given to check students' understanding and to encourage discussions and class attendance. Each quiz question is worth 3 points when answered correctly, and 1 point if answered incorrectly. Unanswered questions count for zero. This *includes* questions missed due to absence or faulty app operation: it is your responsibility to ensure your app is operational

Posted lecture material should be read before class, and class starts with a quiz early in the lecture. You cannot be excused from attendance unless absent for a valid medical reason!

Homework

This course has *NO* recitation sections; instead, the Physics Help Room (Physics A-131) is staffed all week during business hours. There is a Homework Forum in the main menu that serves both the lecture, homework, and laboratory parts of the course: consult it first in case of problems.

Web Homework and Web Access

Included with the text book comes access to www.Mastering Physics.com. All homework (HW) problems will be assigned using this web-based system, which provides smart feedback and context-sensitive help and optional hints. If you do not purchase the textbook, then you **must** purchase the access codes separately (valid for three semesters). With your Access Code go to Blackboard. When asked for the text book, click on the book for this course (see above). If you have a valid access (MasteringPhysics access remains valid for 3 semesters), just use your existing password and register for the class.

Homework Forum or the Physics Help Room (room A-131 Physics Building) for HW and Lab and discuss HW problems with your colleagues or blog your professor for help.

However, *you only hurt yourself* if you simply copy answers. It is to your own benefit that we assign carefully chosen HW problems so you can exercise your knowledge and gain better understanding: true understanding only comes via solving real-world problems (as I hope you know by now), and HW problems reflect (pieces of) real-world problems. Exam problems will be *based on Clicker Quizzes, Lecture examples, and HW problems*, so fully understanding the solutions is key to passing this course. Therefore, it is crucial (even if HW only counts for a small fraction of the course grade), that you do all problems *on your own* (even after having discussed them at length with colleagues or TAs). Beware: in the past, we have seen excellent correlation between success in HW and success in the exams. There are, however, a few outliers - poor course results with almost perfect HW scores - and we strongly suspect (reviewing the other course components in these cases) that these are instances of blindly copied HW solutions.

Laboratories PHY123 and PHY124

Laboratory experiments are an essential component of learning physics. The laboratory grade will be based on participation and the successful completion of experiments. For each of the ten lab experiments, students will record:

1. the purpose of the experiment (Title, Introduction),
2. brief procedural outline including the materials and equipment used (Procedure and Apparatus),
3. data, calculations, graphs (where appropriate), and error analysis (Data Analysis),
4. conclusions (Results and Conclusions).

A short introduction to the lab is given beforehand and the lab work is supervised by the teacher assisted by Lab TAs. The **first two sections must be completed before you come to class**; the **last two sections must be completed in class**. Teaching Assistants will check laboratory notebooks for completeness and assign points (maximum 10 points/lab).

In addition, students are required to complete **three formal laboratory reports** during the semester. Each formal lab report is 3-5 pages long and must include the sections listed above, typed with 1" margins, 12-point font, and single-spacing. Include the names of your two lab partners. Please be accurate and concise with your written work. You should complete one formal report from labs 2-4, one from labs 6-7, and one from labs 8 or 10. Each formal lab report will be graded on a 30-point scale.

The laboratory grade for PHY 123 will be based upon the completion of **all experiments** and the three formal laboratory reports, for a maximum of 190 points. Late work will be penalized. **All lab experiments must be done to pass PHY121 or PHY122.** If you have a valid and documented excuse, **contact your teacher immediately**. Make-up labs will be scheduled at the convenience of the TAs or instructors.

Homework Forum

A "Homework Forum" on the main course menu on Blackboard is available for discussions/questions on Lecture, Homework, and Laboratories. Please consult it first in case of problems. Your instructor will monitor the site regularly and pitch in with (hopefully) helpful hints.

Exams and Grading

Three exams are scheduled; see the "Exams" directory in the "Documents" menu item. The exams will be in Multiple Choice format with answers to be circled. Exams are cumulative, but relatively more problems will be from the newer material.

PHY121 and PHY123 (or PHY122 and PHY124) have a **single common grade**; the lab component is part of the common total grade. **All laboratories MUST be completed** to pass PHY121/123. The total grade for the course will be determined by weighting the various course components as indicated below. All grades, including the laboratory grades, will be accessible via the Blackboard site for this course.

Exam	Relative Weight
Midterm I	15%
Midterm II	15%
Final	25%
WebHW	10%
Lecture Quizzes	10%
Laboratory	25%

Grading will **NOT** be on a curve.
Letter grade correspondence to numerical grade: A(80%<Grade<100%), A- (75%<Grade<80%), B+ (70%<Grade<75%), B (65%<Grade<70%), B- (60%<Grade<65%), C+ (55%<Grade<60%), C (45%<Grade<55%), D+ (40%<Grade<45%), D (35%<Grade<40%), F (Grade<35%).

During Exams telephones MUST be switched off and put away; iPhone, PDA, or Pocket PC devices are NOT allowed! Only bring: scientific calculator, two No.2 pencils (for scan-tron sheets), and a ruler. Formulae sheet and scrap paper are provided by the instructor.

P/NC: If you decide to take the course for **PASS/NO CREDIT**, you must change before the University-imposed deadline. You must also thoroughly verify and certify to us that your major department will accept a P/NC grade for PHY121/122 as part of its major program. Note that the pre-requisite for PHY122 is a "C" or higher in PHY121.

Help and Other Information

Physics Help Room: The Laboratory Teaching Assistants, undergraduate TAs (all of whom earned an A- or better in PHY121 last semester), and the course Faculty will staff the PHY121/122 Help Room (Physics A-131) for business hours in the Mon-Fri period, and the Faculty and TAs will have posted office hours in their respective offices, see the "Contacts" menu.

The Society of Physics Students may be contacted for tutoring information.

Course administration and grading issues need to be discussed with the teacher. For problems with registration, contact the teacher or contact Mrs. Diane Diaferia in the Main Office, Physics Building. For mediation or for general questions regarding Physics courses, please contact the Physics and Astronomy Department Office P-110, Phone 2-8110.

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 and unfair towards other students in the class.

Academic dishonesty will not be tolerated. In this course, the standards are as follows. **Instances of copying and plagiarism will lead to an automatic F**; Faculty are required to report any suspected instance of academic dishonesty to the Academic Judiciary. In lecture, when a "clicker" question is posed, you may discuss it with your neighbors. When you are found clicking for another person in Lecture **all users/owners of the clickers involved will automatically fail this 4-credit course and will be brought before the Academic Judiciary**.

You may work with your colleagues on the homework problems, the clicker quizzes during lectures, and the laboratory preparation and execution. **However**, please note that you only hurt yourself if you submit answers that you get from somebody else and you do not understand, or provide answers to someone else who does not understand.

In lab, you and your partner are collecting the same data, and you may discuss subsequent steps of analysis with your partner and others. **However**, you may not use data that you did not participate in collecting as if it were your own. Doing so will result in a course grade of **F**. In an exam, copying answers from another person or use of materials or communication other than what is allowed by the instructors will result in an **F** in the course.

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/.

Electronic Communication

Email to your University email account is an important way of communicating with you for this course. For most students the email address is 'firstname.lastname@stonybrook.edu'. **It is your responsibility to read your email received at your University account**; if you choose to forward your University email to another account, we are not responsible for any undeliverable messages.

Religious Observances

See the policy statement regarding religious holidays at http://www.stonybrook.edu/registrar/forms/RelHolPol%20081612%20cr.pdf. Students are expected to notify the course professors by email of their intention to take time out for religious observance. This should be done as soon as possible but definitely before the end of the 'add/drop' period. At that time they can discuss with the instructor(s) how they will be able to make up the work covered.

Disability

If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact Disability Support Services [DSS], 128 ECC Building, (631) 632-6748/9. DSS will review your concerns and determine, with you, what accommodations are necessary and appropriate. All information and documentation of disability is confidential. 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.ehs.sunysb.edu and search Fire Safety and Evacuation and Disabilities.

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 affects their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty are required to follow school-specific procedures as described in http://www.stonybrook.edu/commcms/emergency/critical_incident.shtml

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Michael Rijssenbeek, 15 August 2022