



PHY 122/124: Physics for Life Sciences
Course Syllabus
Spring 2017

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| Instructors: | Laszlo Mihaly | Laszlo.mihaly@stonybrook.edu |
| Class Hours: | Mondays, Wednesdays 8:00-9:20am Friday 8:00-9:50am | |
| Classroom: | Physics P-118 | |
| Office Hours: | Wednesdays 1:00-3:00pm in Physics B-145 | |
| Graduate TAs: | Anthony Bassante Niv Ramasubramanian | |

I. Course Description

Second part of an introduction to physics with applications to biology, primarily for students majoring in biological sciences or pre-clinical programs. Topics include electromagnetism, optics, acoustics, and radiation phenomena. Strong algebra skills and knowledge of the ideas of calculus are required. Three lecture hours per week. The Laboratory component, PHY 124, must be taken concurrently; a common grade for both courses will be assigned. PHY 122 may not be taken for credit in addition to PHY 127, 132, or 142. This course has been designated as a High Demand/ Controlled Access (HD/CA) course. Students registering for HD/CA courses for the first time will have priority to do so.

Prerequisite: C or higher in PHY 121/123

Corequisite: PHY 124; CHE 132

DEC: E

SBC: SNW

3 credits

II. Course Learning Objectives

1. Students will demonstrate mastery of physics concepts related to electrostatics, electric circuit theory, magnetostatics, electromagnetism, reflection, refraction, geometric optics, diffraction and interference. Students will be familiar with basic concepts in quantum physics, materials science and nuclear physics.
2. Students will be able to think critically and apply appropriate physics concepts in analyzing qualitative problems.
3. Students will demonstrate the ability to apply algebraic mathematical reasoning in solving quantitative physics problems.
4. Students will demonstrate proficiency in science process skills by designing and performing experiments to measure physical phenomena and minimize experimental error.
5. Students will demonstrate scientific communication skills through thoughtful discussion, collaborative problem solving, and dissemination of experimental results.



III. Blackboard

Stony Brook's Blackboard website is the location where course files are shared and stored. The course is listed under PHY 122.90. Files will be posted for laboratory procedures, lecture notes, clicker questions, etc. The gradebook will be updated regularly with clicker, lab and exam grades.

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.

IV. Required Materials

1. Textbook: Knight, Jones and Field: College Physics, a Strategic Approach, 3rd edition. Pearson, ISBN-10: 0-321-87972-1, ISBN-13: 978-0-321-87972-1. You may also purchase the e-book version. It is important to have access to the textbook; by the structure of this course, there may not be time to cover all required material in class time. There are hard copy and electronic versions of the book, with options to buy or rent, so pick your best option. Keep in mind that you **MUST** have a Mastering Physics subscription either purchased with the book or purchased separately.
2. Use the student access code that comes with the Mastering Physics subscription to register at <http://www.pearsonmylabandmastering.com/northamerica/masteringphysics/students/>. The course ID associated with this course is **PHY12290S17**. All homework will be assigned and graded electronically.
3. Scientific calculator with trig functions.
4. Turning Point Technologies clicker, registered on Blackboard.
5. Laboratory notebook (may be the same as your notebook for the lectures).

V. Materials to Read

1. Instructions for writing lab reports and a sample lab report.
2. Guide to uncertainty and error in measurements.

These documents are posted on Blackboard

VI. Homework

Homework problems will be posted on Sundays and they are due 10 days later, on Wednesday evenings at 11:59pm. The problems for the entire semester are posted on the Mastering Physics website under course **PHY12290S17**. When accessing the homework, please register using your student ID number so your grade may be linked to Blackboard. Students will not be penalized for multiple attempts at problems, but there is a maximum of ten submissions for each part of each problem. Late work is not accepted.

The function of homework is to reinforce and apply concepts that you are learning; it is not to write down the correct answer. If you get homework solutions from Google, Chegg, TransTutors, other university web sites with solutions, etc. without working out the solution yourself, you will not get much educational benefit, and you will not be prepared for the exams that carry much more weight towards your final grade.



VII. Laboratory: PHY 124

Laboratory experiments will be conducted during regular class time on Fridays. Brief instructions for each lab will be posted on Blackboard. The laboratory grade will be based upon participation and successful completion of experiments. For each experiment, students will record 1) the purpose of the experiment, 2) *brief* procedural outline, 3) materials, 4) data and calculations, 5) graphs (where appropriate), 6) error analysis, and 7) conclusions. **The first three sections must be completed before you come to the laboratory:** On the weeks when there is a lab, you must look at the lab instructions **before the class**, and record in your lab book 1) the purpose of the experiment, 2) a procedural outline, and 3) the materials used in the lab. The final four sections will be completed in class. Teaching assistants will check laboratory notebooks at the beginning and the end of each period for completeness and assign points.

If you do it right, you will be completely done with the lab during class time. However, we still require three formal laboratory reports during the semester. Each formal lab report will include the 7 sections listed above, typed with 1" margins, 12-point font, and single-spaced. The first page of the lab report should have your name, the names of your lab partners, the date of the experiment, the lab number and the title of the lab as it appears in the lab instructions. Submit formal reports in .doc, .docx, or pdf files with your name and lab number in the file name (e.g., KIM JONES_LAB 4). Please be accurate and concise with your written work. You will complete one formal report from labs 1-3 (due **Wednesday, February 22, 8:00am**), one from labs 4-6 (due **Wednesday, April 5, 8:00am**), and one from labs 7-9 (due **Wednesday, May 3, 8:00am**). Each formal laboratory report will be graded on a 20-point scale. Late work will be penalized by subtracting 5 points for each day started. In order to pass the lab course, you must submit a report even if it is so late that it will receive zero points. The laboratory grade for PHY 124 will be based upon the completion of *all* experiments and the three formal laboratory reports.

Lab make-ups: Students *must* complete all nine labs to receive a passing lab grade. Make-up labs will be scheduled at the convenience of the TAs or instructors *only with a valid medical or university excuse*.

Working with lab partners: Although you will have the same data and graphs as your lab partners, the remaining portions of the lab report must be completed individually. Copying the work of another student violates Stony Brook's Academic Integrity Policy (see below in Section "University and Academic Integrity Statement"). If the instructors find that you have violated this policy, you will receive a zero for the assignment and you will be referred to the Academic Judiciary for disciplinary action.

VIII. Exams

There will be two midterm exams - **Friday, February 24** (Chapters 20-23), and **Friday, March 24** (Chapters 24-27). They will be given during the regularly scheduled class time in Physics P-118. Students must remain in the classroom for the entire exam period. The final exam is **Thursday, May 11 at 2:15pm – 5:00pm**; the location will be announced. It will be based upon Chapters 17-30.



IX. Grading Structure

Final grades in PHY 132 will be determined as follows:

1. Midterm exams: 15% each
2. Final exam: 25%
3. Homework: 10%
4. Laboratory: 25%
5. Clicker participation: 10% (No penalty for wrong answers)

X. Extra Help

We encourage you to seek help as soon as you are having difficulty, since the cumulative nature of the material makes it difficult to catch up if you fall behind. In addition to the office hours of the instructor, Teaching Assistants will be available for 2 hours each every week in the Help Room in Physics A-131.

XI. Disability Instructions

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, 128 ECC Building (631) 632-6748. They will determine with you what accommodations are necessary and appropriate. All information and documentation 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 following web site: <http://www.ehs.sunysb.edu> and search Fire Safety and Evacuation and Disabilities.

XII. University and 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. Any suspected instance of academic dishonesty will be reported 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/>. One person using the clicker of another to simulate participation in class meetings is academic dishonesty, and will be treated as such.

XIII. 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. Faculty are required to follow school-specific procedures: http://www.stonybrook.edu/commcms/emergency/critical_incident.shtml.



XIV. Schedule of Topics and Experiments

Homeworks are due Wednesday midnight. Lab reports are due Wednesday morning in class. On the weeks when there is a lab, prepare your lab notebook with the required material before coming to class Friday morning.

| Week starting with | Topic | Homework, Lab report | Book Chapter | Monday | Wednesday | Friday |
|--------------------|---------------------------------------|-----------------------------|--------------|--------------|-------------|-------------------------------|
| 23-Jan | Electric fields and forces | | Ch. 20, 21 | L01 | L02 | L03 |
| 30-Jan | Electric Potential | HW #1 due | Ch. 22, 23 | L04 | L05 | Lab 1: Current and resistance |
| 6-Feb | Circuits | HW #2 due | Ch. 23 | L05 | L06 | Lab 2: Circuits |
| 13-Feb | Magnetic field | HW #3 due | Ch. 24 | L07 | L08 | Lab 3: Magnetic force |
| 20-Feb | Review | Report #1 due | | L09: Review | L10: Review | Midterm: Ch. 20-23 |
| 27-Feb | Induction | HW #4 due | Ch. 24, 25 | L11 | L12 | Lab 4: Faraday's law |
| 6-Mar | AC electricity | HW #5 due | Ch. 26 | L13 | L14 | Lab 5: RCL circuits |
| 13-Mar | | | | Spring Break | | |
| 20-Mar | Review | HW #6 due | | L15: Review | L16: Review | Midterm: Ch. 24-26 |
| 27-Mar | Wave optics | | Ch. 17 | L17 | L18 | Lab 6: Diffraction |
| 3-Apr | Ray optics | Report #2 due HW #7 due | Ch. 18 | L19 | L20 | Lab 7: Lenses |
| 10-Apr | Optical Instruments | HW #8 due | Ch. 19 | L21 | L22 | Lab 8: Electric motor |
| 17-Apr | Quantum Physics / Nuclear Physics | HW #9 due | Ch. 28, 30 | L23 | L24 | L25 |
| 24-Apr | Atoms and molecules / Nuclear Physics | HW #10 due | Ch. 30, 29 | L26 | L27 | Lab 9: Nuclear decay |
| 1-May | Atoms and molecules | Report #3 due HW #11 due | Ch. 29 | L28 | L29: Review | L30: Review |

Final Exam: May 11, 2:15 - 5:00pm, NOT IN CLASSROOM, place tbd