

Physics 132: Classical Physics II, Fall 2009

This version: August 29, 2009

Course Information and Syllabus

A special note which we ask you to read and consider very carefully: The PHY131-132 Classical Physics course places a **very heavy** workload on students. The course is intense; what is more, by the very nature of the material covered (electricity and magnetism and optics), PHY132 is considerably more difficult than PHY131. You will need a **serious background** in Math (including differential and integral calculus and vectors) and in Physics (classical mechanics, waves, energy, gravity at the level of PHY131) in order to be able to follow this course. Even those students who have this required background **should devote at least 10 hr/week to reading of the textbook and to doing homework** in order to understand and absorb this course. Solving problems on your own is the key to understanding Physics and passing exams. There will be 10-20 problems assigned as HW every week; it will take a long time to learn how to do them correctly. Do yourself and us a favor, and **do not take this course if you a) are unprepared for it, and/or b) can not devote this amount of time to it.** If either of these two conditions can not be met at this time, you are better off dropping this course (you can do that on or before **Sept. 14** without getting a “W”) and, perhaps, re-taking it later when you are ready for it and can allocate the required time to it. If you decide to take PHY132, start working on the course from the very beginning! Postponing hard study in this fast-moving course proves fatal. This Professor (M.G.) is **not** going to grade “on the curve”, which means assigning C to the class average even if it falls below the accepted C level; letter grades will be assigned according to the actual scores received. See below the final score makeup formula and, as an example, the Fall 2006 semester’s numerical score -- letter grades correspondence (the “cuts”). It should be noted, on a positive side, that these “cuts” already reflect a somewhat liberal, soft policy on letter grades, which can be said to amount to a kind of “curving”.

Despite these easy “cuts”, as an example, in the Fall of 2006, the F grade was received by 26.6% of registered students at the end of the semester, and 56.3% of all registered students received grades lower than C (i.e. F, D, and C-).

In PHY131 you studied mainly Newtonian mechanics, Newtonian gravity, fluids, molecular theory of heat, and the elements of thermodynamics. Most of these topics were developed in the 17th and 18th centuries (except for the theory of heat and thermodynamics, which were mainly developed in the 19th century). Topics in PHY132 include Electromagnetism and Geometrical and Physical Optics. This is the part of Physics developed mainly (although not exclusively) in the 19th century. It is generally more complex than the material covered in PHY131. On a bright side, the Physics covered in this course is very interesting, and it constitutes a good part of a scientific foundation of our technological civilization.

The course has three lectures per week, accompanied by a weekly recitation section with assigned homework (HW). There will be a total of **42** lecture periods during the Semester. Two 1 hour Midterms and a 2.5 hour Final exam will be given at the assigned times outside of lectures. The mandatory Laboratory component, PHY134, consists of ten two-hour laboratory sessions, with written reports required. **There is a common grade for PHY132/134.** You can not fail one of these and still get credit for the other.

Required Materials

- **Text Book:** Giancoli, “Physics for Scientists and Engineers” volume II, ISBN-13: 978-0-13-227359-6.
- **WEB-ACCESS:** The above mentioned book comes with the access code to the tutorial and online homework site: www.masteringphysics.com. Online access code for this can also be purchased separately. Available at Campus Store or elsewhere.
 - You will need to register for this online course once you get access to the above website. The following information will be needed:
 - Course ID: **MPGurvitchFALL09**. Course title: Classical Physics II.
- **Laboratory notebook**, with graph paper on one side of each page; available in the Campus Bookstore or elsewhere.
- **Scientific Calculator** (with trigonometric functions, etc.) You will need to bring your calculator to all exams and recitations.

Course Blackboard web site information

The updated Syllabus, Schedules of Lectures and Labs, links to Lab Notes, weekly homework assignments and other relevant, up-to-date course information can be found on the **Blackboard (BB) website**: <http://blackboard.sunysb.edu> Click on the "Course Documents" to access Syllabus. The table at the end of this document contains web links to lab notes. If you used Blackboard during the Spring semester, your login information (Username and Password) has not changed. If you have never used Stony Brook's Blackboard system, your initial password is your SOLAR ID# and your username is the same as your Stony Brook ("sparky") username, which is generally your first initial and the first 7 letters of your last name. For help or more information see: <http://www.sinc.sunysb.edu/Help/bbstudent.html> If you still have problems logging in, go to the helpdesk in the Main Library SINC Site or the Union SINC Site, you can also call: 631-632-9602 or e-mail: helpme@ic.sunysb.edu

Lectures given by Prof. M. Gurvitch Office hours: to be announced; Phone: 2-7298 (office); 631 - 689-5639 (home); Michael.Gurvitch@sunysb.edu or avgur2001@yahoo.com.
MWF, 10:40 a.m. – 11:35 a.m., in Javits 109.

The lectures are intended to provide clear explanation of the relevant Physics. Experience shows that students understand the material covered in lectures better than when reading the book alone. Our aim is to deliver the essential material in the simplest possible way. **There will be additional credit (called Lecture Credit, or LC) accessible only to those attending the lectures: 2 points for each good/intelligent question, 2 points for each corrected lecturer's mistake, 2 points for an occasional in-lecture Quiz (see below how LC is incorporated in the Final Grade formula).**

The pace of the course is **extremely rapid**; some material may be omitted in lectures, but present in the book, and visa versa. While we strongly recommend attending the lectures, careful, repeated reading of the text is as important.

Recitation/Lab: In addition to three lectures, each week there will be one-hour recitation and two-hour laboratory session. Note that Recitations and Labs with the same section number do not necessarily follow each other.

Recitation (R) and Lab (L) Schedule; Instructor information

Sec	Time	Room	Instructor	Instructor's Office Hours and contact information
R01	W 3:50 – 4:45	Light Eng. 154	TBA	
R02	M 3:50 – 4:45	Light Eng. 154	TBA	
R03	Th 3:50 – 4:45	Light Eng. 154	TBA	
L01	M 12:50 – 2: 50	A116	TBA	
L02	M 5:20 – 7:20	A116	TBA	
L03	W 12:50 – 2: 50	A116	TBA	
L04	W 5:20 – 7:20	A116	TBA	

Homework assignments each week consist of 15-20 for-credit problems assigned in Mastering Physics. The due date for the submission of MP problems will be Friday at midnight. Some of these problems are very simple and others are more difficult; they all illuminate various aspects of the covered material and build the necessary skills. You are expected to spend several hours each week working on these problems and reading the textbook, in addition to attending lectures, recitations and labs. There will be also practice problems assigned, which not carry credit points. They are intended for your additional training in problem-solving. It is of primary importance that you work on a given HW assignment **before** the recitation session for which the set is assigned, using a classroom session to ask and clarify your remaining questions. Coming to a session without first working on assigned problems is counterproductive, especially considering that we will give you a quiz every week to test your understanding of the current material, these quizzes being based on MP assignment for the given week. Recitation grade will consist of 40% MP scores and 60% quiz scores; expect 10 minute quizzes in recitations based on MP assignments for a given week to be given every week. Exams are largely based on

similar problems. **You must learn to correctly solve problems on your own, in allocated amount of time (about 20 minutes per problem) during the exam, in order to pass this course.**

Labs: Physics is an experimental science, and nothing helps to understand its concepts better than doing the actual experiments. Students are required to print out, read and understand the Lab instructions from the *Lab Notes* (the links to which can be found in “Course Documents” on the BB site) before each Lab. There will be a 48 hour period to submit the lab report after each lab. Late reports will get a penalty of one point (out of 10 possible) for each day of being late. The minimum number of labs required to get a grade at the end of this course is 8 (out of 10 labs). If you will complete less than 8 labs and lab reports by the end of the semester, we will not be able to give you a grade other than “F” or, if there are documented reasons why you could not complete the 8 labs, “I” (an incomplete). There will be two make-up lab periods in which you can makeup labs missed for a certified reason. Only the missed labs listed in a given makeup period can be done; do not pile up missed labs: you will not be allowed to do them except as posted in the schedule below. The reason is the difficulty of arranging set up for too many labs for a makeup session.

Examinations: There will be two one-hour midterm exams during the semester, and a two-and-a-half-hour final exam. The exams are all closed-book, with a few essential constants and formulas provided. To repeat the main point again: you need to learn how to solve problems to pass these exams. The exam attendance is mandatory. Those who must miss the exam for a certified illness or emergency will have to take make-up exams.

The final course grade: Your recitation instructor will assign the final grade. The final score on which a letter grade will be based is composed as follows: recitation (R): 20%; lab (L): 20%; each midterm (M1 and M2): 15%; final exam (F): 30%; additional credit for questions/corrections/quizzes in Lectures (LC) is added to the score of the final. The maximum total is 100 points, excluding additional LC (with LC your score could in principle be over 100). So, the formula for the final score on which we base the letter grade is

$$G = 0.2 R + 0.2 L + 0.15 (M1+M2) + 0.3 (F + LC)$$

where **G, R, L, M1, M2, F** are numbers from 0 to 100, and the Lecture Credit **LC** is a number of additional credit points as described above. If, because of LC, anybody gets over 100 points, it is an "A" with our compliments. Since very few students get scores close to 100, LC should come handy in improving your grade. We do not plan to drop any of the lowest grades in recitations or in labs, to grade “on the curve”, or to otherwise adjust this formula, except for an ability of a recitation instructor to adjust the final letter grade by no more than one notch, and only if it is marginal. For example, if you got 79/100, which means, say, B+, and 80 means A-, the recitation instructor **may** decide to give A- to a deserving student. If, however, you got, for example, 40/100, nobody will be able to call this result anything but D.

As was mentioned above, the Lab score, however, is not the same as other scores in the formula in a sense that the minimum number of Lab reports is **eight**. Fewer than 8 reports will result in the failing grade (F) or, if there is a valid, documented excuse, incomplete (I) course grade, irrespective of other scores. And, as was mentioned above, there is one common grade for both PHY132 and PHY134; in other words, these grades, while entered separately into the SOLAR System, will be identical, and one can not be obtained without the other.

The letter grade ranges (“cuts”) are decided only at the end of the course. Here we provide Fall 2006 semester “cuts” for your general guidance only (they may change somewhat this time, but, most likely, not too significantly):

Fall 2006 cuts:

0-30: F; 30-45: D; 45-48: C-; 48-55 C; 55-60 C+; 60 -65 B-; 65-75 B; 75-80 B+; 80-85 A-; 85-100 A.

Other notes:

- **FEEDBACK WELCOME:** We welcome your feedback during the course. Do not hesitate to talk to your instructors about your concerns or feelings. You can also express your concerns in writing; you do not have to sign your name if you so prefer. On a Blackboard website there is a discussion forum where you can also express your opinions and give us a feedback.
- **DISABILITIES:** If you have a physical, psychiatric, medical, or learning disability that may impact on your ability to carry out assigned course work, you may want to contact the staff in the Disable Student Services office (DSS), room 133 in Humanities, phone 632-6748. DSS will review your concerns and determine, with you, what

accommodations are necessary and appropriate. All information and documentation concerning disability is kept confidential.

- **ACADEMIC HONESTY:** 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/>
- **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, and/or inhibits students' ability to learn.
- **CLASS PROTOCOL:** Cell phones and any other electronic equipment except a normal “scientific type” calculator with trigonometric functions are banned from examination rooms and when students are solving quizzes.

PHY 132 Schedule for Fall 2009 (August 29 version)

This schedule will be updated during the term

Ctrl+Click on the Lab titles to access Lab Notes sections for each Lab

All recitation homework assignments will be found on web site www.masteringphysics.com

Lecture days in a week starting on Mon.	Chapters and Sections in Giancoli and topics to be covered each week	Laboratory and HW that week	Notes
Aug. 31 MWF	Ch. 21.1-10 Introduction to the course. Electric charge; insulators and conductors; Coulomb's Law; electric field; field calculations in various geometries; field lines; motion of charged particles in an electric field.	No recitations and labs the first week. Look for the HW assignment for next week and all the following weeks on www.masteringphysics.com	HW problems from the MP website will be due in the recitation next week; start working on them right-away; expect a quiz based on similar problems in a recitation next week.
Sep. 7 WF	Ch. 22.1-3 Electric flux. Gauss's Law; applications of Gauss Law; charges on conductors; field near conductor's surface.	Recitations start this week, but there will be no labs in the second week as well.	Labor Day on Monday In preparation for the first Lab next week print out and study Oscilloscope and Error Analysis Ctrl and click to open all hyperlinks
Sep. 14 MWF	Ch. 22.3-4 Finishing applications of Gauss's law. Ch. 23.1-6 Electric potential energy, electric potential; relationship between potential and field; calculating potential; equipotential surfaces;	Lab 1: Oscilloscope	
Sep. 21 MWF	Ch. 23.7-9 Field as potential gradient; electron volt; CRT and oscilloscope. Ch. 24.1-4 Capacitance; parallel-plate and other types of capacitors; capacitors in series and in parallel; energy stored in a capacitor; energy density in E field.	Lab 2: Electric Field	

Sep. 28 TuWF	Ch. 24.5-6 Dielectrics in capacitors Ch. 25.1-9 Battery, Ohm's law, simple circuits, electric power, alternating current microscopic model of Ohm's law; superconductivity;	Lab 3: Capacitors	Note that this week Monday schedule is followed on Tuesday
Oct. 5 MWF	Ch. 26.1-3, 7 EMF and terminal voltage, resistors in series and in parallel, Kirchhoff's rules; electrical instruments	Lab 4: Ohm's Law	
Oct. 12 MWF	Ch. 26.5 RC circuits Ch. 27.1- 4 Magnetic field; magnetic force on moving charges and currents; particles in B and E fields	Make-up for labs 1-4	
Oct. 19 MWF	Ch. 27.5 – 9 Torque on a current loop in B field; applications; discovery of an electron; mass spectrometer	Lab5: Magnetic Force I	
Oct. 26 MWF	Ch. 28.1 – 5 Magnetic field due to straight wire; force between parallel wires; definitions of Ampere and Coulomb; Ampere's law; magnetic field of a solenoid	Lab 6: Magnetic Force II	
Nov. 2 MWF	Ch. 28.6 – 10 Biot-Savart law, calculations of magnetic fields, magnetic materials, ferro-, dia- and para- magnetism. Ch. 29.1 – 4 Electromagnetic induction; Faraday's law; Lenz law; motional EMF; generators	Lab 7: Induction	
Nov. 9 MWF	Ch. 29.5 – 7 Back EMF, counter-torque; eddy currents; transformers; power transmission; induced electric field; some applications	Make-up for labs 5-7	
Nov. 16 MWF	Ch. 30.1 – 9 Mutual and self- inductance; energy stored in the magnetic field; LR circuits; LC circuits; LRC circuits; driven AC circuits, phasors; resonance	Lab 8: LRC Circuits	
Nov. 23 MW	Ch. 31.1 – 8 Maxwell's correction of the Ampere's law (displacement current); Maxwell's equations; EM waves and their speed; EM spectrum; measurements of the speed of light; Poynting vector	Lab 9: Resonance	Thanksgiving
Nov. 30 MWF	Ch. 32.1, 2, 4 - 7 Geometrical optics, reflection; plane mirrors; refraction; Snell's law, index of refraction; image formation by refraction; Newton's dispersion; total internal reflection; Ch. 33.1,2 Image formation by thin lenses	Make-up for labs 8-9	Partial coverage of geometrical optics
Dec. 7 MWF	Ch. 33.3,5,6 Simple magnifier; microscope and telescope; photo-camera, the human eye Ch. 34.1 – 3 Light waves, Huygens' principle; interference and diffraction; Thomas Young double-slit experiment Ch. 35.1, 4 Diffraction on a single slit; limits of resolution	Lab 10: Optics	Partial coverage of physical optics
Dec. ...	FINAL	FINAL	FINAL