

Physics 132: Classical Physics II, Fall 2008

This version: Aug 31, 2008

Course Information and Syllabus

A special note which we ask you to read and consider very carefully: As you may already know from the Spring Semester, 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 a considerable number of problems assigned on the Mastering Physics website 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 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 40 lectures during the Semester, plus two Midterms (held also in the lecture periods). The 2.5 hour Final exam will be given in the finals week. 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:** *Essential University Physics, 1st Edition*, Richard Wolfson, ed. Addison Wesley (2007)
- **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: **MPGurvitchFall08**. 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 will contain all the homework assignments and links to lab notes. If you used Blackboard during the Fall 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, in room B-147; 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 Physics room P-118.

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/suggestion, 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.

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 follow each other. There are 3 recitation sections and 4 lab sections as follows:

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	ESS 183	M. Gurvitch	Michael.Gurvitch@sunysb.edu or avgur2001@yahoo.com tel. x 2-7298
R02	M 3:50 – 4:45	ESS 181	M. Gurvitch	Michael.Gurvitch@sunysb.edu or avgur2001@yahoo.com tel. x 2-7298
R03	Th 3:50 – 4:45	Old Chem 134	A. Abanov	
L01	M 12:50 – 2:50	A116	Morgan Lynch	m.lynch@yahoo.com
L02	M 5:20 – 7:20	A116	Andrew Manion	andrew.manion@stonybrook.edu
L03	W 12:50 – 2:50	A116	Morgan Lynch	m.lynch@yahoo.com
L04	W 5:20 – 7:20	A116	Andrew Manion	andrew.manion@stonybrook.edu

Recitations: Attendance of recitations is **mandatory**: 25% of the recitation score is given for attendance. Homework assignments each week will consist of 15-20 for-credit problems assigned in Mastering Physics, accounting for 50% of the recitation score. Some of these problems are very simple and others are more difficult; they all illuminate various aspects of the covered material and help you build the skills necessary to pass exams. 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 additional "practice" problems assigned, which do not carry credit points. They are intended for your additional training in problem-solving. The due date for entering completed problems into MP will be Sunday at midnight. Students are expected to be familiar with the assigned problems before each recitation session, and to ask questions about them. There will be surprise quizzes given in some of the recitations based on the assigned homework. They will account for another 25 % of the recitation grade. Exams are largely based on similar problems. **You must learn to correctly solve problems on your own, in allocated amount of time during the exam, in order to pass this course.** Experience shows that student's performance in a recitation is a reliable predictor of the final grade in the 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. Altogether, the exams account for 70% of your grade in this course. 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. Missing a Final without an excuse is a basis for F in the whole course, irrespective of other grades.

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

$$G = 0.20 R + 0.20 L + 0.15 M1 + 0.15 M2 + 0.3 (F + LC)$$

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 your 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**. If you miss more than two labs, or for whatever reason provide fewer than 8 reports, we will have to give you an “F” or, if there is a valid, documented excuse, an incomplete “I” course grade, irrespective of other scores. And, as was mentioned above, according to University rules, the same grade must be assigned for both PHY132 and PHY134; in other words, these grades, while entered separately into the SOLAR System, have to be identical.

The letter grade ranges (“cuts”) are decided only at the end of the course. Here we provide the “cuts” we used in the last couple of years. They are provided for your general guidance, as they may change somewhat this time.

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.

In the Fall of 2007, in a similar off-semester PHY132, the % of the students registered at the end of the semester who got F (and I, which later turned into F) was 23%; of all who got below C: 35%. 12% received the highest grade of 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 2008 (Aug 31 version)

This schedule will be updated during the term

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

Lecture days in a week starting on Mon	Chapters and Sections in Wofson's book and topics to be covered for each week	Do HW problems before the recitation the following week	Laboratory that week	Notes
Sept. 1 WF	Ch. 20 Introduction to the course. Electric charge; Coulomb's Law; electric field; field calculations in various geometries.	Log on to Mastering Physics website www.masteringphysics.com to register and see assigned problems. Course ID is MPGurvitchFall08	No lab	No recitations and labs the first week, but there will be a HW assignment for the next week HW problems assigned in a given week are due at the end of next week; start working on them right-away. <u>Expect a quiz</u> based on similar problems in a recitation the following week.
Sept. 8 MWF	Ch. 20 cont. Finishing with field calculations. Field lines. Ch. 21 Electric flux. Gauss's Law; charges on conductors; applications of Gauss Law using symmetries.	www.masteringphysics.com	Lab 1: Oscilloscope	In preparation for the first Lab print out and study Oscilloscope and Error Analysis Ctrl and click to open all hyperlinks
Sept. 15 MWF	Ch. 21 cont. Finishing applications of Gauss Law. Ch. 22 Electric potential energy, electric potential; calculating potential.	www.masteringphysics.com	Lab 2: Electric Field	
Sept. 22 MWF	Ch. 22 cont. Finishing potential: Equipotential surfaces; potential gradient (relationship between potential and field). Ch. 23 Total electrostatic potential energy of several charges. Capacitance; parallel-plate and other types of capacitors; capacitors in series and in parallel. Energy stored in a capacitor; energy density in E field.	www.masteringphysics.com	Lab 3: Capacitors	
Sept. 29	Ch. 23 cont. Capacitors with dielectrics;			Tu, Wed no classes (Rosh)

M(F)	Energy in a capacitor with a dielectric (two cases: fixed Q and fixed V).	www.masteringphysics.com	No lab	Hashanah) First Midterm in-lecture on Friday Oct. 3
Oct. 6 MWF	Ch. 24 Electric current; current density, drift velocity; Ohm's Law, resistance, resistivity; emf, power in DC circuits.	www.masteringphysics.com	No lab	Wed. Oct. 8 after 5 p.m. and all day Th Oct. 9 no classes (Yom Kippur)
Oct. 13 MWF	Ch. 25 Direct Current circuits: Resistors in Series and in parallel; Kirchhoff's rules; Electrical measuring instruments. RC circuits, capacitors charging and discharging	www.masteringphysics.com	Lab 4: Ohm's Law	
Oct. 20 MWF	Ch. 26 Magnetic field, force on a moving particle, magnetic flux, Gauss Law for magnetism, motion of particles in the magnetic and electric fields. Applications in which we control the motion of particles. Force on a conductor with current. Force and torque on a current loop, potential energy of a magnetic dipole in B field, magnetic dipole in a non-uniform field.	www.masteringphysics.com	Makeup period for labs 1- 4	If you missed any of the first 4 labs, this is your only chance to make up for it. The other make-up period will be for the other labs.
Oct. 27 MWF	Ch. 26 continued: Sources of magnetic field: Magnetic field of a moving charge; Law of Bio and Savart; field of a wire with current; forces between parallel wires; Ampere's Law. Applications of Ampere's Law, ratio of magnetic and electric forces.	www.masteringphysics.com	Lab5: Magnetic Force I	
Nov. 3 MW(F)	Ch. 27: Electromagnetic Induction: Faraday's Law. Examples illustrating Faraday's law; Lenz's Law. Motional emf.	www.masteringphysics.com	Lab 6: Magnetic Force II	Second Midterm in-lecture Friday Nov. 7
Nov. 10 MWF	Cont. Ch. 27: Induced electric fields; mutual and self-inductance; magnetic field energy; RL circuits. Ch. 28: Alternating Current, definitions, rms. LC circuit and electro-mechanical analogy. R, L and C in an AC circuit, reactances, phasors, analysis of an LRC circuit driven by a sinusoidal emf, impedance, resonance.	www.masteringphysics.com	Lab 7: Induction	
Nov. 17 MWF	Cont. Ch. 28: Power in AC circuits. Transformers and power transmission. Ch. 29 Displacement current. Maxwell's equations. EM waves, speed of light, relationship between directions and magnitudes of E , B , c . Sinusoidal waves.	www.masteringphysics.com	Lab 8: LRC Circuits	
Nov. 24 MW	Ch. 29 cont. Energy in EM wave, Poynting vector; intensity; electromagnetic spectrum Ch. 30. Wavefronts, rays, laws of reflection, and refraction.	www.masteringphysics.com	Lab 9: Resonance	Thanksgiving Th, Fri Incomplete coverage of geometrical optics (some sections of the book will be skipped).
Dec. 1 MWF	Cont. Ch. 30: Total internal reflection; dispersion of white light; Huygens' Principle. Ch. 31. Image formation in plane mirrors	www.masteringphysics.com	Lab 10: Optics	Incomplete coverage of Interference and Diffraction topics

	and in thin lenses. Ch. 32. Interference, Thomas Young's experiment;			
Dec. 8 MWF	Ch. 32 cont. Interference in thin films. Diffraction from a single slit; diffraction grating, resolving power, fundamental limitation of optical instruments	www.masteringphysics.com	Makeup period for labs 5-10	Incomplete coverage of Interference and Diffraction topics
Friday Dec. 19 Final	FINAL from 11 a.m. to 1:30 p.m.			Final Exam is cumulative, covering the whole course. Room TBA