JOHN JAY COLLEGE OF CRIMINAL JUSTICE
The City University of New York
GENERAL PHYSICS II (PHY 204) SYLLABUS

***** Overview for both LECTURE and LAB Curricula *****

Fall Semester, 2018

Instructors: Daniel A. Martens Yaverbaum dyaverbaum@jjay.cuny.edu
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OFFICE HOURS

Martens Yaverbaum, LAB 04.61.05 NB Ph. (212) 237 8980

Mondays.	1: 40 pm	--->	2:55 pm
Wednesdays.	1:40 pm	--->	2:55 pm
Tuesdays.	7:00 pm	--->	∞

Walters,

Tuesdays.	1:40 p -> 2:55 pm55
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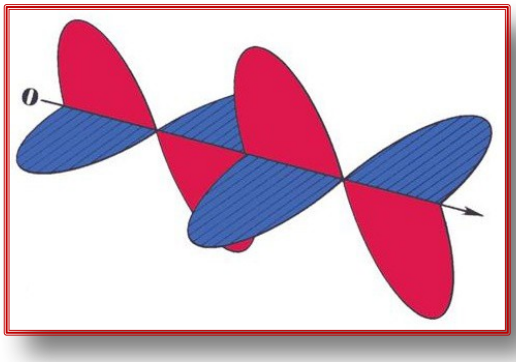
Semester Credit Hours: 4 per Semester
Prerequisites: Physics 203, Math 242

This is the second semester of a two semester introductory course designed to provide the student with a rigorous command of the fundamental principles and problems comprising both classical and modern physics. The umbrella topics covered this semester are waves and fields—specifically those relating to sound, electricity, magnetism, radiation and optics. The central theme is the transfer of *information* and its relationship to principles of relativity. The ultimate purpose is to extend the predictive power of the relativity principles to the 'retro‑dictive' program of modern forensic science.



Textbook:

Halliday, D., Resnick, R. & Walker, J. *Fundamentals of Physics*, 10th Edition, Extended.

Accommodations for Students with Disabilities: Qualified students with disabilities will be provided reasonable academic accommodations if determined eligible by the Office of Accessibility Services (OAS). Prior to granting disability accommodations in this course, the instructor must receive written verification of a student's eligibility from the OAS which is located at L66 in the new building (212‑237‑8031). It is the student's responsibility to initiate contact with the office and to follow the established procedures for having the accommodation notice sent to the instructor.

Statement of the College Policy on Plagiarism: Plagiarism is the presentation of someone else's ideas, words, or artistic, scientific, or technical work as one's own creation. Using the ideas or work of another is permissible only when the original author is identified. Paraphrasing and summarizing, as well as direct quotations require citations to the original source. Plagiarism may be intentional or unintentional. Lack of dishonest intent does not necessarily absolve a student of responsibility for plagiarism. It is the student's responsibility to recognize the difference between statements that are common knowledge (which do not require documentation) and restatements of the ideas of others. Paraphrase, summary, and direct quotation are acceptable forms of restatement, as long as the source is cited. Students who are unsure how and when to provide documentation are advised to consult with their instructors. The Library has free guides designed to help students with problems of documentation.

Learning Outcomes:

Upon completion of this course, a successful student should be able to:

1) ***KNOWLEDGE:*** Solve the simple differential equation governing simple harmonic motion; derive the fundamental wave equation and apply it to sophisticated examples regarding standing waves, overtones, optics and Doppler effects. Extend such knowledge to demonstrate a rigorous command of the distinction between the motion of particles and the propagation of information—particularly as such information relates to the study of forensic science.

2) ***REASONING:*** Relate and apply all four of Maxwell's integral equations in order to solve problems regarding electrostatic fields, magnetostatic fields and electromagnetic induction, thereby deploying a rigorous command of the relationship between electricity and magnetism.

3) ***PRACTICAL SKILLS:*** Design, build, measure, analyze and trouble-shoot circuits involving resistors and capacitors in both series and parallel configurations.

4) ***REASONING:*** Synthesize the relationship among Maxwell's equations with the wave equation, in order to derive the electromagnetic-radiative nature of light.

5) ***PRACTICAL SKILLS:*** Extend the nature of light to solve fundamental problems in reflection, refraction and diffraction, thereby demonstrating familiarity with the use of optical instruments in forensic science.

6) ***REASONING:*** Synthesize the wave behavior of light with Galileo's Principle of Relativity (as mastered in in the prerequisite Physics 203) to find Einstein's First and Second Postulates of Special Relativity, thereby demonstrating a familiarity with the character of physical law in the modern arena of high-speed particles.

Course Web-Page:

www.yaverbaum.org

Consult ***regularly***—every day—for syllabus, assignments, course information and updates. The Web-Page is used for the assignment calendar, supporting documents, exam preparation: in short, everything. Blackboard provides a link to the above site.

*** The course Web-Page is dynamic; it responds in real-time to the flow and needs of a particular class. The advantage is that the class becomes that much more student-driven. The disadvantage is that students are required to be flexible. Be prepared for frequent changes in the sequence of assignments. Check the web frequently and do not try to work many weeks in advance of assignments. Always understand that you will be tested on the correct solutions to problems that are presented on the chalkboard in class—as opposed to explanations in the text or to solutions attempted by students in response to homework assignments. ***

Read the course web-page from left to right. The left-most column refers to the date of a particular class or lab—depending on which page you look at. The next column provides a brief title for the subject matter to be covered in class that day. The assignment column tells you WHAT IS DUE THAT DAY (***not*** what is assigned that day). The last column highlights relevant equations or expressions for that topic.

The assignments and labs are quite often links to original documents. You are always expected to ***print out and bring*** whatever is due and relevant for a particular class meeting.

You are then expected to complete all assignments on separate sheets of paper.

Frequently, the assignments are NOT exercises intended to review what was already discussed in lecture. They are quite often the reverse. They are problems to consider and attempt to solve ***prior to lecture.*** Each problem set assumes that you have done the relevant reading and that you are trying your best to push yourself to the next level of problem-solving skill and concept application. The lecture is designed to clarify and assist with questions you have developed in your attempt to solve fresh problems. It is for this reason that you are awarded credit for thoroughness, clarity and engagement with the problems ------- rather than for accuracy of answers.

Course Policies

Labs and Lab Grading.

1) Every lab activity is done in a group of three (3) or four (4) people, assigned by instructor. The groups will change two (2) to three (3) times in the semester. The lab-group change dates will be indicated on the lab web-page.

2) The instructions for each lab can be found on the lab web-page. It must be downloaded, read thoroughly and printed out prior to lab period.

3) TWO DOCUMENTS PER GROUP will be submitted a week after each typical lab and each graded on a 10-point scale. These two documens are the Post-Lab and the Formal Report. Each is explained below. Both documents MUST be typed (though diagrams may be hand-drawn—in fact, hand-drawn diagrams are encouraged.).

4) ***POST LAB:*** The ***Post-Lab*** is a short document to be completed BEFORE the formal report. Methodical completion of each ***Post-Lab*** exercise helps us maintain a clear idea of what we should expect to know (therefore deploy) and what we should not expect to know (therefore figure out) from one laboratory investigation to the next. Each ***Post-Lab*** contains the same four brief sections; these sections are explained in detail in the Manual for Lab #1. The ***Post-Lab*** is a document designed to sharpen thought and communication among physics students—within, for example, a university classroom. Among other intended educational purposes, each ***Post-Lab*** should help us build a ***Formal*** Laboratory ***Report***, briefly introduced below; the ***Post-Lab*** is therefore always the first of two reports to be written.

   A Post-Lab is generally assigned/expected every time a Formal Report is upcoming, but if no particular post-lab can be found for a given lab on a given week or if one is posted to the web such that students would have fewer than three nights to complete and submit, then student are not held accountable to the customary deadline. A reasonable and extended deadline will be established and students will then be held accountable for the adapted arrangement.

5) ***FORMAL REPORT***: the formal report must conform to a strict format that is contained and explained in detail in the first lab assignment. All details of this format, as explained in the first lab assignment, must be met in every lab report, unless explicitly otherwise stated. The sections and sequence of the Formal Report are as follows:

i. Title Page,
ii. Abstract,
iii. Introduction,
iv. Research Question,
v. Data Collection: what you measured and how you measured it: similar to that which is sometimes known as *Materials & Methods*,
vi. Diagram: not a photograph: an original rendering of your experimental design, fully labeled with all variables & constants,
vii. Analysis: a thorough step-by-step narrative that both quantitatively and qualitatively explains how a trend, relationship and/or generalized finding was ultimately inferred from the data,
viii. Uncertainty: a precise explanation of the uncertainty associated with each individual (type of) measurement as well as a meaningful application of the combined uncertainty for all measurements taken together,
ix. Conclusion: a clear, concise and final answer to your Research Question(s), explicitly including uncertainty.
x. Appendices.

6) LAB QUIZ: on the day that your group hands in its post-lab and its formal report (one week after the lab was completed), each individual in the class will take a quiz on the lab that was completed the week before. This quiz is <u>not</u> taken as a group. It will have only three short questions and will be taken in the first 5-10 minutes of the period. PLEASE NOTE: if you are late by even five minutes, you risk missing the quiz and receiving the minimum possible score. The quiz is graded on a scale from 0.5 to 1.1, so the minimum possible score is 0.5 and the maximum possible score is 1.1. Sound complicated? Do not worry: It becomes second nature fairly quickly.

7) LAB GRADING: the grade for labs is calculated as follows. The GROUP GRADE is calculated by taking a weighted average of the post-lab and formal lab report (formal lab report is worth twice as much as post-lab). Then, an INDIVIDUAL GRADE is calculated for each student by <u>multiplying</u> the Group Grade by that individual's score on the Lab Quiz. Two examples will make this clearer.

Example 1: say your group gets an 8.0 (i.e. 80%) for its Group Grade and you miss your lab quiz, thus receiving an 0.5 on the quiz. Your Individual Grade would be $0.5 \times 8.0 =$ **4.0**, or **40%**.

Example 2: say your group gets a 7.0 (i.e. 70%) for its Group Grade and you ace your lab quiz, thus receiving a 1.1 on the quiz. Your Individual Grade would be $1.1 \times 7.0 =$ **7.7**, or **70%**.

8) Approximately three lab periods during the semester will be devoted to Board Meetings, instead of labs. Board Meetings are highly specialized discussion formats—involving the presentation of student work on white "Boards". For these discussions, no lab report is assigned. The grade is instead calculated as follows:

- 0 = Absent from discussion.
- 8.5 = Present for discussion, but not actively participating.
- 10 = Present for discussion and contributed at least one substantive and respectful comment.

This grade will have the same weight as a regular lab grade in the final average.

9) There will be no lab mid-term; there is generally at least one "Lab Practicum".

10) We supply student laptops and iPads for laboratory investigations.

11) If you know in advance that you have to miss a lab, you may obtain permission of your lab instructor to join another lab period. If the instructor for that lab period gives you permission, you will complete your lab work in a different lab section that week.

12) You may miss and make up exactly **one** lab by the method described in (10), above. For any missed labs beyond the one, you will **not** be able to receive a grade for the associated work.

13) Instructors have the discretion not to assign a passing grade—for the entire course—to any student who is missing for more than three lab periods.

14) The average of all your lab write-ups (approximately 7) and your board meetings (approximately 3) will count for 31% of your entire Physics 203 ***Base Grade.*** (See below for precise details.)

General Grading:

1) There are three exams: two midterms and one final. Initially, each exam is weighted equally and thereby counts for one-third of the Base Grade you earn in the Lecture component of the course. The Lecture component is weighted to account for 60% of your final grade in the whole course, so each exam counts for closer to 20% of the grade you ultimately earn in the course. In any given semester, a physics lecture instructor reserves the right to disproportionally weight one or more of the exam grades IF and ONLY IF the following conditions are met: (1) Such weighting is intended and insured to have an increasing effect on student grades (in order to compensate for some circumstance or condition determined to have negatively contributed to the representation of student performance on a particular exam or set thereof). (2) Such weighting must be applied in a uniform manner and to uniform effects with respect to all students in the class. (3) Such weighting and its basis must be made transparent to all students. In general, grading discretion can be exercised mindfully and occasionally by a lecture instructor as long as the three above considerations remain fixed as the governing criteria.

2) Once this ***Base Grade*** is calculated, all HOMEWORK CREDIT and any/all EXTRA CREDIT is then ADDED DIRECTLY to this Base Grade. The calculation for HW is explained below.

` 3) Every HW assignment is scored in two portions, the 'Work' (part A) and the 'Short Form' (part B). Each part makes approx. 15 pts of credit available to the student, althoughr the exact amount varies from assignment to assignment, depending on length. All such possible points accumulate throughout the semester -- to the extent that a student produces work and does so successfully. There are different means by which to earn points on a HW assignment -- via thorough and rigorous thought (part A) or through prompt and correct answers (part B). There is, however, essentially ***no*** way to lose points. By the end of the semester, all earned HW points are added together. The sum is divided by a constant weighting factor (such as 50) to produce the ***Weighted Homework Average***. This weighting factor may differ from semester to semester and is dependent on the overall class dynamic, participation and calendar. In a given semester, however, it will never differ from student to student. This ***Weighted HW Average***, once determined, is treated as raw percentage points and added directly to your ***Base Grade***.

4)All points gained on written "Extra Credit" Assignments as well as up to 1 point for "Class Participation" are also added to your Base Grade. This class participation evaluation is based on signs of your vocal and auditory engagement in lecture, group work ethic in lab and general assignment trend (e.g. a great many "4"s have an impact that goes beyond the straight numerical sum). The sum of steps (1), (2), (3) and (4) is your Final Class Average.

5) Please do note: The seeming complexity of the above system is in place so that your homework grade reward CONTINUAL EFFORT AND THOROUGHNESS above all else —even above accuracy of results. All four large assessments will ***always***, however, be weighted equally. The grading weights will always, moreover, be precisely ***uniform from student to student and from section to lab section***.