

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 *****

Summer Semester, 2014

Instructor: Daniel A. Martens Yaverbaum,

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Martens Yaverbaum Office Hours:

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Mondays, 2:30 pm – 4:30 pm,
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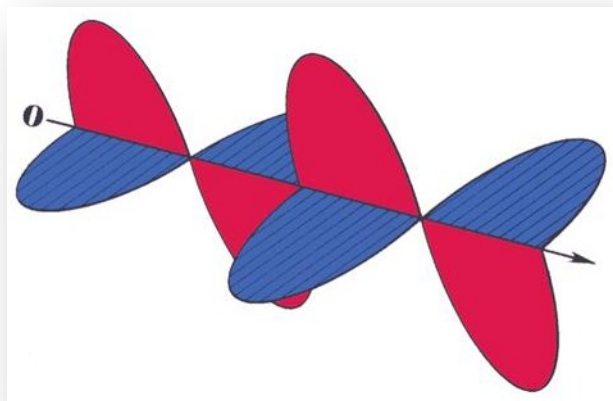
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PLEASE, whenever at all possible, email in advance and *schedule a specific time slot*. This maximizes the quantity and quality of individual attention. In general, let us all try to minimize surprises. Both the universe and New York City provide plenty without our assistance.

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 retrodictive 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 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.

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) TWO LAB REPORT DOCUMENTS PER GROUP will be submitted a week after each typical lab and each will be graded on a 1-10 scale: One report is "Informal" and one report is "Formal". Each is explained below. The grade on a "Informal" Lab Report counts once in the lab grading average while the grade on the "Formal" Lab Report counts twice. The lab reports cannot be hand-written.

All lab reports must conform to a FIVE PART format that is contained and explained in detail in the first lab assignment. All details of this five part format, as explained in the first lab assignment, must be met in every lab report, unless explicitly otherwise stated. In brief, the five parts are:

- i. Title Page,
- ii. Abstract
- iii. Methods & Findings Section
--always includes
 - a) a RESEARCH QUESTION (or hypothesis or prediction)
 - b) a fully labeled diagram (not photograph),
 - c) a full description of reproducible methods for data collection,
 - d) a full qualitative and quantitative analysis of all data – insuring that any relevant equations are off-set, centered and explained in English,
 - e) a thorough uncertainty analysis and
 - f) a clear and concise conclusion,
- iv. Appendices,
- v. SEPARATE DOCUMENT: The informal report. Special Instructions and Questions ("Triple-Starred") that apply to a given particular lab and/or were found in the particular lab hand-out. This "Triple-Star" report is Titled, Stapled and Submitted as a SEPARATE, informal, document.

3) Lab Activities known as “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 lab report grade is instead assigned 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.

4) There will be no lab mid-term; there is generally at least one “Lab Practicum”.

5) We supply student laptops for laboratory investigations.

6) If you know in advance that you have to miss a lab, you 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.

7) You may miss and make up exactly one lab by the method described in (6), above.

8) For any missed labs beyond the one, you will not be able to receive a grade for the associated work; you will receive a 0 for that lab day—equivalent to a 0 on a formal report.

9) 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.

10) ***The average of all your weekly 10-pt lab write-ups (approximately fourteen) will count for essentially 20% of your entire Physics 204 grade.*** (See below for precise details.)

General Grading:

1) Every assessment which is scored out of 100% (one final exam, two midterm exams, and one final lab grade) is given equal weight. One arithmetic mean is computed from all such assessments. This is your pre-assignment class average. When all is said and done, these assessments will together constitute essentially—**approximately**—80% of your final grade. (If, with sufficient notice, the instructor adds or eliminates a formal assessment, then every 20% piece changes accordingly—in order to maintain equal weight.) The rest of this formula explains how the remaining 20%--homework and extra credit—get factored in.

2) Every collected homework assignment is scored **out of 4** and the homework scores are added together. Every zero may result in the deduction of up to 3 points from this total. The sum is divided by a constant weighting factor. This weighting factor may differ from semester to semester and is dependent on the overall class dynamic, participation and calendar. **WHEN CALCULATING YOUR OWN GRADES, it is SAFE TO DIVIDE YOUR TOTAL HW points by 5.** That is conservative.

3) The result from step (2) is treated as pure percentage points and added to your pre-assignment class average, step (1). This produces your pre-participation class average.

4) All points gained on written "Extra Credit" Assignments as well as 0 or 1 points of "Class Participation" points are added to your pre-participation class average. 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) and (3) 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. As a result of this system, the weighting percentages will not always be precisely 20%, 20%, 20%, etc. From semester to semester, they fluctuate slightly around such round numbers. The grading weights will, however, always be precisely ***uniform from student to student and from lab section to lab section.***

The BOTTOM GRADING LINE:

Each formal assessment is given equal weight in a straight average.

The sum total of all homework points (divided by approximately 5) and all extra credit points (not divided by anything) are raw points added straight onto your class average.

You cannot "lose" points on homework unless you literally do not submit it.

That's it. Now let's spend the rest of our time thinking about physics.

May the net force be with us.

Physics 204 LAB: Summer, 2014

John Jay College of Criminal Justice: The City University of New York

Daniel A. Martens Yaverbaum

LAST UPDATED JUNE 2, 2014

[Procedures & Policies](#)

[Formal Lab Report Writing/Grading Rubric](#)

[Informal Lab Report Writing/Grading Rubric](#)

[UNCERTAINTY DISCUSSION](#)

[email me](#)

DATE	LAB	READING	ASSIGNMENT	PRINCIPLE
Wednesday, May 28	Lab #1. A Thing on a Spring: A Vertical Application of Hooke's Law	HRW: Chapter 15		
Monday, June 2	Lab #2. A Thing on a String: The Planar Pendulum, <i>Measurement of Effects;</i> <i>Derivation of Cause</i>	Chapter 16	Lab #1: Only ABSTRACTS Due --one per INDIVIDUAL.	
	Lab #3A. A Video Creation for the Wave Equation, <i>Oscillations in both Time and Space</i>		Lab #1: Full Reports Due: Fully follow the 5-part format explained at the end of the lab assignment. In so doing, make sure to: Provide two separate documents, one formal	

<p>Wednesday, June 4</p>	<p>LoggerPro TUTORIAL: -- For Data Plotting & Curve Fitting.</p> <p>Lab #3B.</p> <p>B: Video Creation for the Wave Equation</p> <p><i>Analysis</i></p>	<p>YOU MUST BRING GOGGLES FOR THIS LAB!</p>	<p>and one informal.</p> <p>Submit one value for K, two graphs and one final expression for period as a function of mass.</p> <p>Your Analysis section must ultimately explain how you derived spring period as a function of spring mass and how the function makes use of your value for K</p>	
<p>Monday, June 9</p>	<p>Lab #4.</p> <p>Relative to the Medium: Video Simulation Lab for the Doppler Effect</p>	<p>Chapter 17</p>	<p>Lab #2: Abstracts Due-- One Per GROUP.</p>	
<p>Wednesday, June 11</p>	<p><i>Rotate Lab Groups:</i> Lab #5.</p> <p>BOARD MEETING Alpha: The Doppler Effect</p>	<p>Chapters 21, 22</p>	<p>Lab #2: Full Reports Due</p>	
<p>Monday, June 16</p>	<p>Lab #6</p> <p>Electrostatic Interaction (Vernier Lab #20)</p> <p>Video File #1</p> <p>Video File #2</p> <p>LoggerPro TUTORIAL: -- For Data Plotting & Curve Fitting.</p>	<p>Chapters 23, 24</p>		
			<p>Lab #3: Full Reports Due:</p>	

<p>Wednesday, June 18</p>	<p>Lab #7 BOARD MEETING Beta: Electric Flux & Closed Integrals</p>	<p>Chapters 25, 26</p>	<p>Both Informal and Formal Reports. In addition to everything else that is always required, every Formal Report for this lab MUST INCLUDE:</p> <ol style="list-style-type: none"> 1) Two Complete and Clear Graphs of your Experimental Results (from 3A) 2) A clear, conceptual and explanatory English explanation for the following: How does the function $y = A \cos (wt + kx)$ relate to waves and to the WAVE EQUATION? 	
<p>Monday, June 23</p>	<p><i>Rotate Lab Groups:</i> Lab #8. Electric Potential & Electric Current Simple (and Steady) Circuits</p>	<p>Chapter 27</p>	<p>NO Write-Up Due: Devote all physics time to preparing for MidTerm Exam.</p>	
<p>Wednesday,</p>	<p>Lab #9. Ohm's Law</p>	<p>Chapters 28, 29</p>	<p>LAB #4: Abstracts Due</p>	

June 25	Less Simple (yet still Steady) Circuits			
Monday, June 30	Lab #10. The RC Circuit Time-Dependent (no longer Steady) Circuits	Chapters 32, 33	LAB #6: Full Reports Due Make certain to Finish Lab #9 before moving onto Lab #10. In order to complete Lab #10 within one lab period, you need to execute, analyze and report on only one full CHARGING process (and/or DISCHARGING process): Despite what the lab manual instructs, you do <i>not</i> need to worry about both a charge and a discharge.	
Wednesday, July 2	<i>Rotate Lab Groups:</i> Lab #11. Board Meeting Gamma , A Last Circuit: "Pole to Pole"	Chapters 35, 34 (Intentionally out of sequence)	LAB #8: Abstracts Due	
Monday, July 7	Lab #12. <i>Magnetism</i>	Chapter 34 (Intentionally out of sequence)	LAB # 9: Full Reports Due: FULL and Customary 5-Part Format (Abstract, Diagrams, Methods & Findings, etc.)	
Wednesday, July 9	Lab #13. <i>Electromagnetic Radiation:</i> Light Intensity	Chapter 37	LAB # 10: Full Reports Due	
Monday, July 14	Lab #14. <i>Electromagnetic Radiation:</i> Light Refraction	Chapter 37	Lab # 12: Abstracts Due	
Wednesday, July 16	Lab #15. <i>Electromagnetic Radiation:</i> Light Diffraction . & The Interferometer .		Lab # 13: Full Reports Due. Lab #14: Abstracts Due.	

Monday, July 21	Lab #16. <i>Pre-Exam Practice Session:</i> FIELDS		LaB # 15: Full Reports Due.	
Wednesday, July 23	Lab Practicum	REVIEW PACKET SOLUTIONS (Solutions Updated/Corrected as of 5/17/14)		Final EQUATION List

Note: All assignments are 1) **highlighted**, 2) **DUE** the day on which they appear and 3) hyper-linked as we progress through the year.

Physics 204: LECTURE	Physics 203: LECTURE	Physics 204: LAB
Skies of Yesternight	Physics 203: LAB	Yaverbaum HOME PAGE