PHY121 Introductory Mechanics Summer 2018

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Class Information
Location: Bausch & Lomb 269
Class Time: MTWR 9:00 AM – 11:15 AM
Workshop: T or R 1:00 PM – 3:00 PM
Required Texts: None
Supplementary Texts: The Feynman Lectures – Volume I: Mainly Mechanics, Radiation, and Heat
Available in full at http://www.feynmanlectures.caltech.edu/info/
Six Ideas That Shaped Physics, Units N, C, and R: Moore, 2nd ed*
Fundamentals of Physics: Halliday, Resnick, and Walker, 10th ed*
Physics for Scientists & Engineers: Giancoli, 4th ed
Physics for Scientists and Engineers: Serway and Jewett, 9th ed
The New World of Mr. Tompkins: George Gamow*

* = On reserve in the POA

Course Description:
Welcome to PHY121 Introductory Mechanics. The purpose of this course is to provide a foundation for the further study of such exciting topics as quantum mechanics, electricity & magnetism, statics and dynamics, and practical electronics. We will focus on Newtonian mechanics, with a side of topics including fluids, waves, and special relativity. By the end of the course, I hope you will each be able to:

Objectives
- Compute the kinematics of one- and two-dimensional systems
- Use Newton's laws and the conservation of momentum and energy to formulate equations of motion for simple systems
- Analyze wave phenomena, including their relevance to everyday experiences
- Describe the motion of fluids in common situations
- Articulate the consequences of special relativity

Homework
Homework will be assigned daily. There will be two kinds of homework for this course: a few short problems to preview what is to be discussed in the next lecture, and sets of 5 longer problems to solidify the previous lectures' topics in your minds. The short problems will be collected the day following their assignment, primarily for my edification, while the longer problem sets will be collected every Tuesday and Thursday. Each problem on the longer sets will be graded according to the following:

Complete
3 = All parts present and fully developed
2 = Some parts incomplete
1 = Major sections missing
0 = Little meaningful work done

Clear
2 = Model (physical reasoning) was clear to the grader
1 = Some aspects were unclear
0 = Model was completely opaque

Note that Clear includes such things as organization and legibility – if you have arrows pointing all over the page, for instance, I'm unlikely to be able to follow your physical reasoning.

Plausible: One point if the result's magnitude, sign, and/or units were plausible.

Initially OK: One point if the solution is acceptable on the first pass.

Correct
3 = No modeling or algebraic errors
2 = Some modest errors were made
1 = Fundamental errors were made
0 = Almost nothing was correct

Quizzes
Short (5-10 minute) quizzes will be given every Tuesday and Thursday at the beginning of lecture to help you gauge your progress in the course. Each quiz will be worth 15 points.

Exams
Because we have only 6 weeks to complete what is usually a 14-week course, and we can only cover a selection of the ideal course material in any case, exams will be held outside of our scheduled class time. I will provide donuts or other snacks as incentive for you to enjoy this extra time together. Each exam will be worth 225 points, with a cumulative final worth 375 points; they will be held from 9:00 AM – 11:15 AM on Friday, June 1st, Friday, June 15th, and Friday, June 29th. If anyone has conflicts with these dates, please let me know as soon as possible.

Class Discussion
You are *highly* encouraged to come to class with questions, both about material we've covered and material covered in the daily homework assignments. In addition, I encourage you to ask questions at any time during lecture. Some of the best learning comes in the form of spirited discussion of a sticky point.

Electronics
I encourage the use of laptops, tablets, etc. for reference to class materials, including this syllabus, lecture notes, and electronic copies of (a) textbook(s). The use of cell phones is discouraged. If any devices begin to become a distraction, I reserve the right to ask you to place them out of sight and/or turn them off.

Attendance
Attendance at every class is required. If you are unable to attend a particular class, you are not required to provide a reason or excuse. However, if a lack of attendance at a couple of classes is noticed, your grade will be reduced independent of other grading criteria. In the case of extended absence for any reason, inform me as soon as possible.

Academic Honesty

Collaboration in the sciences is the rule, not the exception. Therefore, you are encouraged to discuss homework problems both with me and with each other. However, all submitted work should be your own (a test: can you explain everything you've written down?). You should credit anyone from whom you receive help, including online references; you will never be penalized for citing assistance. Copying homework from any source will be considered cheating. I expect all students to be familiar with the University's academic honesty policy, located at http://www.rochester.edu/college/honesty. **If you have any questions or doubts at any point in the semester, don't hesitate to ask.**

Grading Criteria

Homework	525 (35%)
Quizzes	150 (10%)
Exams (each)	225 (15%)
Labs	150 (10%)
Total	1500 (100%)

Labs

The lab course is independent from this lecture. I will do my utmost to ensure that we've covered the material necessary for the lab before the first section each week. Although I am not responsible for any of the labs, I am happy to answer any questions you may have about them. The two components of each lab are as follows:

Pre-Lab: To be completed **before** each lab. Graded out of 2 points.
Post-Lab: The majority of your lab work, completed during lab and graded out of 20 points. You should not have any work outside of lab (other than the pre-lab).

For your grades, each pre-lab score will be quintupled, for a total of 10 possible points. (For those keeping score, that means each pre-lab is worth 0.6% of your final grade.)

Grading Scale

A, A- = 90.0%-100%	D+ = 60%-69.9%
B+,B,B- = 80.0%-89.9%	D,D- =50%-59%
C+,C,C- = 70.0%-79.9%	E < 50%

Accommodations for Disabilities

Your success in this course is important to me. In addition, it is the policy and practice of the University to create inclusive learning environments consistent with state and federal law. If you have a documented disability or need to have a disability documented, please contact the Center for Excellence in Teaching and Learning (CETL) or myself as soon as possible so that we can discuss how best to meet your needs. You can also visit the CETL website at http://www.rochester.edu/college/disability/ for more information.

Tentative Course Outline

Find below a tentative schedule for this course. The dates are subject to change, and we may add or remove topics depending upon our progress throughout the course. Chapters with an F prefix are in reference to Volume I of the Feynman Lectures; chapters with an H prefix are in reference to Halliday, Resnick, and Walker; chapters with an N, C, or R prefix reference the corresponding Six Ideas book.

Week #: Class # – Date	Topic	Assignments	Chapters
Week 1: Class 1 – M 5/21	Course Overview; Measurement; Math Review		F11&22, N2.1, H1
Class 2 – T 5/22	1D, 2D, and 3D Kinematics	Problem Set #1 Due	F5&8, N3,4&10, H2&4
Class 3 – W 5/23	Newton's Laws; Forces		F9&12, N1,3&4, H5&6
Class 4 – R 5/24	Friction; Uniform Circular Motion	Problem Set #2 Due	F7&12, N8&12, H4&13
Week 2: **NO CLASS M 5/28**	Enjoy your (sunny?) day off		
Class 5 – T 5/29	Linear Momentum: Conservation	Problem Set #3 Due	F10, C4&5, H9
Class 6 – W 5/30	Energy: Conservation		F4, C6-8, H7&8
Class 7 – R 5/31	Angular Kinematics	Problem Set #4 Due	F18&20, C9, H10
Exam 1 – F 6/1	**Lectures 1-4**		
Week 3: Class 8 – M 6/4	Angular Dynamics		F18&20, C13&14, H11
Class 9 – T 6/5	Static Equilibrium	Problem Set #5 Due	N4, H12
Class 10 – W 6/6	Simple Harmonic Motion		F21, N10, H15
Class 11 – R 6/7	Springs	Problem Set #6 Due	
Week 4: Class 12 – M 6/11	Fluids		F2.40, H14
Class 13 – T 6/12	Fluids cont.	Problem Set #7 Due	
Class 14 – W 6/13	Waves & Sound		F47, H16
Class 15 – R 6/14	Standing Waves & Music	Problem Set #8 Due	F49&50, H17
Exam 2 – F 6/15	**Lectures 5-13**		
Week 5: Class 16 – M 6/18	Thermodynamics		F44, H18
Class 17 – T 6/19	Newtonian Relativity	Problem Set #9 Due	R1&2
Class 18 – W 6/20	Time & the Metric Equation		R3&4
Class 19 – R 6/21	Time & Space	Problem Set #10 Due	R5&6
Week 6: Class 20 – M 6/25	Space & Causality		R7&8
Class 21 – T 6/26	Relativistic Dynamics	Problem Set #11 Due	R9&10
Class 22 – W 6/27	Quantum Mechanics		
Class 23 – R 6/28	Review	Problem Set #12 Due	
Final Exam – F 6/29	**Lectures 1-23**		