PHYSICS 1100: Course Syllabus

Physics 1100 (M9) General Information & Course Outline **Fall 2024**

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rtung@brooklyn.cuny.edu (For emergencies only. All other matters: ask in class or office hours.)
Office Hours: Mon. & Wed. 12:00 -12:30

Lectures: Mon. & Wed. 9:30 – 10:45 432 NE
Recitation: 11:00 – 11:50 Mon. IH 2310 or Wed. IH 4428
Lab: 11:00 – 13:45 Mon. or Wed. IH 2408

Textbook: **College Physics** textbook free to download: openstax.org
Reference: James S. Walker (5th edition) "*Physics*" ISBN-13: 978-0-137576-96-8
Download lab material http://depthome.brooklyn.cuny.edu/physics/phylabs_new.html

All Relevant Information on this Course can be Found at:
http://academic.brooklyn.cuny.edu/physics/tung/phys1100S24

Goals Of This Course

To introduce students to some basic concepts of physics.

To let students acquire the ability to apply theories and equations in problem solving.

To let students develop reasoning skills.

I'd like you to take something away from this course.

I need your help in achieving these goals. You need to put in some effort.

If we can achieve these goals together, you'll get good grades.

Syllabus (Cont.)

Textbooks:

- **College Physics textbook free to download: openstax.org**
- **Download lab material from**

  http://depthome.brooklyn.cuny.edu/physics/phylabs_new.html

General Comments: **Basic concepts of mechanics and thermodynamics are covered. Students will be asked not only to understand basic concepts but also to be able to apply them to solve standard problems. Memorization of equations is not emphasized. Practicing problem solving is essential to succeed in this course.**

Attendance: **Will be taken regularly during lecture classes. No points will be deducted from scores of students with poor attendance. However, students with good attendance and good participation records may be put on a more favorable distribution "curve" for their semester scores.**

Syllabus (Cont.)

Exams: There will be 2 lecture exams and a final exam. No makeup exams will be given. Absences from exams must be excused by the lecturer or a grade of zero will be assigned. Generally, a doctor's note is required for an absence due to illness. With instructor's approval, 90% of the student's score on the exam following a missed exam will also be used as the make-up score. Two or more missed exams result in an F. Any cheating on exam will result in a negative score for that exam. Relevant equations will be provided during all the exams. The amount of points given in "partial credit" questions is not subject to discussion.

Syllabus: (Cont.)

Jan. 29, Chap. 1	Jan. 31, Chap 2
Feb 5, Chap 2-3	Feb. 7, Chap 3
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Feb. 22 (Thu), Chap 5	Feb. 21, Chap 4-5
Feb. 26, Chap 6	Feb. 28, Chap 6
Mar. 4, Chap 7	Mar 6, Chap 7-8
Mar. 11, Chap 8	Mar. 13, Chap 9
Mar. 18, Exam #1, Chaps. 1-8	Mar. 20, Chap 9
Mar. 25, Chap 10	Mar. 27, Chap 11
Apr. 1, Chap 11-12	Apr. 3, Chap 12
Apr. 8, Chap 16	Apr. 10, Chap 16
Apr. 15, Chap 17	Apr. 17, Chap 17
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---	May 1, Chap 13
May 6, Exam #2 Chaps 9-12,16,17	May 8, Chap. 14-15
May 13, Review	May 15, Review
May 20, 8:00 – 10:00, Final Ex. 1-12,16,17	

General Laboratory Guidelines

1. Students should read the manual about each week's experiment before coming to lab.
2. Students arriving more than 10 minutes late will be refused entry.
3. Follow safety procedures and safeguard laboratory equipment.
4. Students may be grouped for experiments. However, all students in one group are required to actively participate in the experiments.
5. Lab reports should be prepared by students individually and according to the instructor's specification. They should be submitted at the beginning of lab class the following week. (1 point deduction per week of lateness)
6. Three or more missed labs (or lab reports) will result in failed lab.
7. Students should make every attempt to attend the lab session they are assigned to. In the event that a student cannot attend a particular lab at the assigned time, it is the responsibility of the student to make up missed labs, with permissions from the lab instructors. Reports for missed lab should bear the signature of the instructor of the make-up session, and be submitted to the student's regular lab instructor.
8. "Forged" reports will receive negative points.

New physics department policy: Lab score associated with an "F" course grade in previous semester no longer exempts student from lab. Students retaking, with a passing grade from previous semester, may still use their previous lab grade (exempt from lab).

Lab Schedule

GENERAL PHYSICS 1100 and 1150 LAB SCHEDULE **SPRING 2024**

	Topic	Monday	Tuesday	Wednesday	Thursday		Room #
		M9AB 11:00am-1:45pm Elkaduwe, K.		M9BB 11:00am-1:45pm Rivera-Cancel, J.			
		PHYS1150 MEAB 2:15pm-5:00pm Rivera, J.	T6BB 2:15pm-5:00pm Pranto, T.	PHYS1150 MEBB 2:15pm-5:00pm Godenko, L.			
					T6AB 8:00pm-10:45pm Shakya, N.		
1	Introduction to Laboratory Experiment and Measurement	29-Jan	30-Jan	31-Jan	25-Jan		2408
2	Measurements -- Acceleration due to Gravity	5-Feb	6-Feb	7-Feb	1-Feb		2408
3	One and two-dimensional motion with Constant Acceleration	**22-Feb**	13-Feb	14-Feb	8-Feb		2414
4	Vectors	26-Feb	20-Feb	21-Feb	15-Feb		2408
5	Newton's Laws of Motion	**28-Feb**	27-Feb	6-Mar	29-Feb		2414
6	Centripetal Force	4-Mar	5-Mar	13-Mar	7-Mar		2408
7	One-dimensional Collisions	11-Mar	12-Mar	20-Mar	14-Mar		2414
8	Mechanical work and energy conversion into heat	18-Mar	19-Mar	27-Mar	21-Mar		2408
9	Conservative Force System	25-Mar	26-Mar	3-Apr	28-Mar		2414
10	Static Equilibrium	1-Apr	2-Apr	10-Apr	4-Apr		2408
11	Conservation of Angular Momentum	8-Apr	9-Apr	17-Apr	11-Apr		2408
12	Archimedes Principle	15-Apr	16-Apr	1-May	18-Apr		2408
13	Simple Pendulum and Properties of SHM Motion	6-May	7-May	8-May	2-May		2414
14	Standing Waves on a String	13-May	14-May	15-May	9-May		2408

Homework

Students are required to do their homework assignments online from

http://www.theexpertta.com

- **Student Registration - PHYS 1100 (Spring 24) Gen Physics I w/ Prof Tung $30.00?**
- **Registration Link: http://goeta.link/USU34NY-3095F3-33B**
- **Solutions to the assigned homework problems are available as a student does these problems online.**

Homework Website

Homework assignments are posted on our class website. They are also pre-selected on the Expert TA website. Deadlines for online submissions are posted on Expert TA website.

Deadlines will not be relaxed for individual students. In anticipation of possible web problems, you should submit homework well ahead of actual deadlines! Report problems to ExpertTA website and not to your instructor.

Expert TA Registration Instructions CUNY-Brooklyn College Spring 2024

Getting Started: See steps below for registering and using Expert TA.

Step 1: Copy and Paste the class registration link from below into a browser.

BCPHYS1100 (Spring 2024) Tung Student Registration Link:
http://goeta.link/USU34NY-3095F3-33B

Step 2: Enter your email. You will see information about your class at the top. You will be asked to enter your email address. In Expert TA, your email address will serve as your username. Please remember to use the one provided by your school. Some schools assign more than one email to students. You will only be able to log into Expert TA with the exact email you register with. Click Continue.

Step 3: Choose a password. After entering your email address, you will be taken to a page to enter a password. Your password must be at least 7 characters. We recommend including a mixture of upper- or lower-case letters with numbers and one special character (ex: #, !, etc...). Click Continue.

Step 4: Your Personal Info. Enter or verify your first name, last name, and student ID. The student ID would be the one provided by your school. Double check the class information at the top to make sure you are registering for the proper course section. Scroll down to accept Terms of Service; click Continue.

Registration is Complete and you are almost done!

Step 5: Check-out. You will not be able to do homework until you complete the payment process. - *You will need to click on the check box* to confirm that you are purchasing access for the class listed.

- After you have clicked the check box, you will choose your method of payment. If you are using a credit card to pay now, click "Credit Card." The option for a free Trial will allow you to delay your payment for exactly two weeks. If trial is chosen, you will be able to do homework immediately, and asked to make your actual payment with a credit card after the trial period has ended.

Step 6: Payment with a Credit Card - After clicking "Credit Card" you will be redirected from our site to Authorize.net - Authorize.net is an industry leader in secure payments and used by tens of thousands of companies. - Enter your credit card information. Note: Pay careful attention when entering the address information. This information must match the billing information on the card (this is normally your house; not your dorm address). If the zip code entered here doesn't match, the transaction will not process. This is a security measure that helps to keep people from using your card if it is stolen.

Step 7: Once a credit card payment has been made, or another payment option was used during your registration, you can begin using Expert TA. You will be directed to the main class management screen where your class and assignment details can be found. The Class Resources area has optional links added by your instructor. Additionally, your instructor decides on grading policies and may release assignments as practice assignments in tutorial mode in the "Student Practice Area" under Class Menu.

Grades

Grades: Will be based on lecture exams (18% x2), final exam (34%), homework (10%), and laboratory work (20%). However, to pass this course a passing grade for laboratory is required.

***transparent scoring system**

***hands-off policy**

***student has full control**

How To Do Well In This Class

Be responsible. Attend all classes. Pay attention in class. Study the textbook before each chapter/section begins. Understand the material and ask questions when you don't. Read and re-read the textbook after each chapter is finished. Pay attention during lab experiments and turn in reports on time.

Practice problem solving. Do the assigned homework and make a habit of writing down your solutions step by step. Explain every step you make. (Important! This helps you spot your own mistakes.) Study unassigned textbook problems and study the solutions posted on the HW website. If necessary, go back to certain sections of the textbook and read them over carefully. Attend the recitation class, and don't be afraid to ask questions. If you need help, come see me or, if the need is extensive, inquire at the Learning Center.

Do well on tests. Pay attention to what will be covered in each tests. Study hard for your tests. Read the test problems carefully. Be neat and clear on the exam paper.

Comments on Homework

Working out as many textbook problems as possible is a tremendous help to grasping the concepts discussed in class and seeing how the equations and theories can be applied to actual situations. In addition, you should work out as many of the unassigned problems as possible. Many problems are similar in nature. Remember, practice makes perfect.

When there is a problem that you cannot seem to do all by yourself, you should study the solution posted here carefully. However, try not to just memorize the solution. Pay attention to the concept used to solve this. Go away from the same problem for some time (a day?) and then come back and try to solve it again. Remember that concept this time. Repeat this process, if you have to, until you feel very confident about this particular problem. Then you can move on. Don't get discouraged if this seems to take a lot of time, because it will get easier.

Recommended Problem Solving Procedures

Pre-requisites:

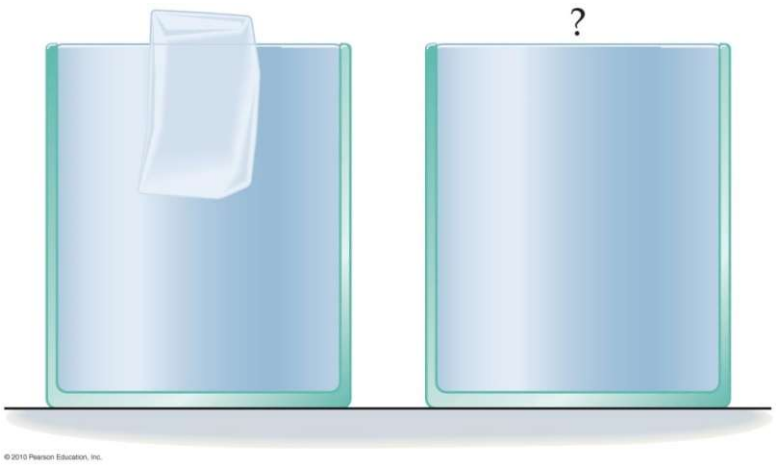
Know the definition of specific terms.
Know the concepts to the point that you are able to explain to others.
Know algebra.

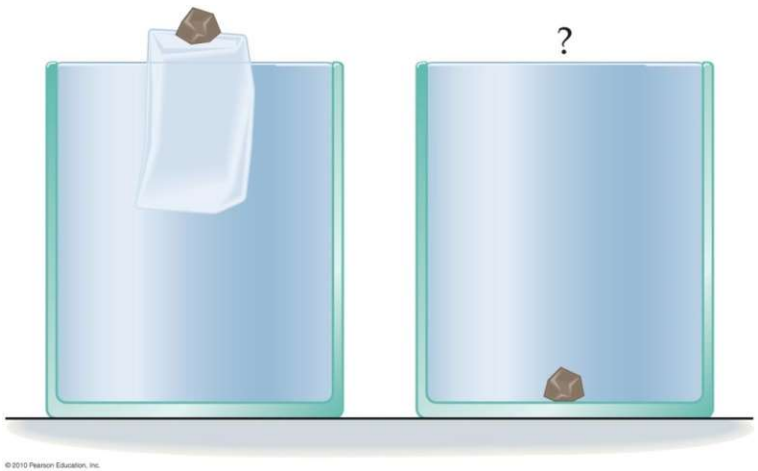
For a particular problem:

1. **Recite the concept for this problem ("Recite the nursery rhyme")**
2. **Find and write the equation(s) for this concept.**
3. **Collect all the quantities to be used in this equation(s).**
4. **Very carefully solve for solutions.**
5. **Double check numbers, signs, and units.**

Examples

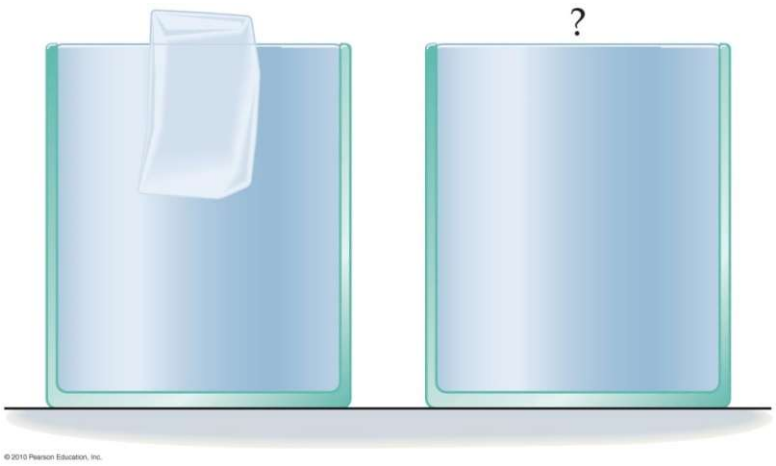
What happens to water level?

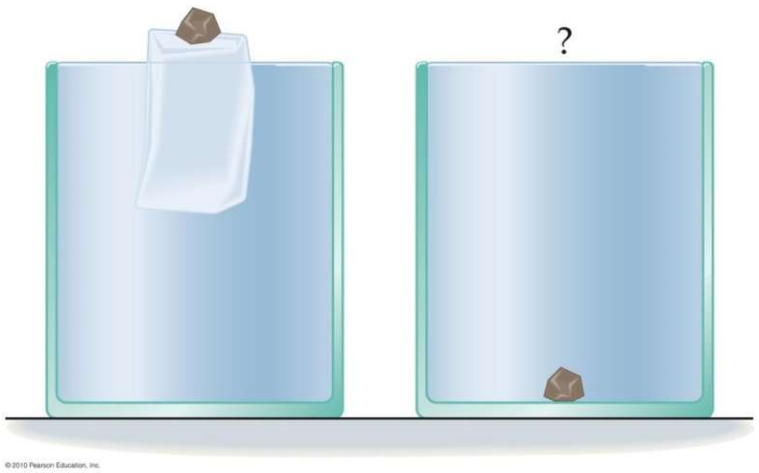




Examples

What happens to water level?





When thinking about physics concepts or problems:

1. Do not go with first instincts. Take your time reviewing basic principles and then argue your way to answers/solutions.
2. When you think you know how to solve a problem, try explaining it to a fellow student (or yourself), using only physical laws. That can be a confidence builder. And sometimes, you spot your own flaws.
3. Look at the numerical answers you are about to give. Do they make sense? (Sanity check!)

Chap1. Nature of Science & Physics

Physics is a study of nature.

Models, Theories and Laws: role of experimentation.

Limit on laws of classical physics.

Quantitative comparison requires measurements.

Units

Textbook uses SI units: meter (m), kilogram (kg), second (s)

TABLE 1–5 Dimensions of Some Common Physical Quantities

Quantity	Dimension
Distance	[L]
Area	$[L^2]$
Volume	$[L^3]$
Velocity	[L]/[T]
Acceleration	$[L]/[T^2]$
Energy	$[M][L^2]/[T^2]$

Dimensional analysis can be used to check for errors in equations and calculations. (If the dimensions don't agree, the equation must be wrong).

Example:

$E = 1/2\ mv^2 + 3\ gh$ must be wrong!

Conversion of Units

Carry units like algebraic quantities.

$$\frac{3.5\,cm/s * 2.0\,cm}{10\,g} = 0.70\,cm^2\,s^{-1}\,g^{-1}$$

Can divide one side of a conversion equation into another to make unity.

$$1\,mile = 1609\,m = 1.609\,km$$

$$\frac{1\,mile}{1609\,m} = 1 = \frac{1609\,m}{1\,mile}$$

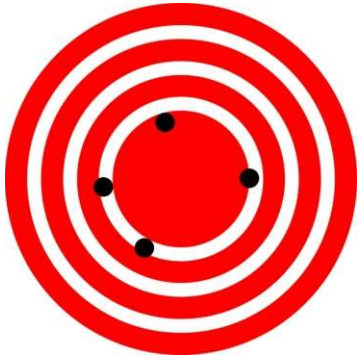
Which is faster, 10 m/s or 25 mph?

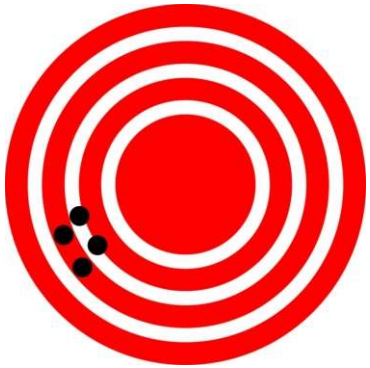
Can express Greek prefixes with their mathematical equivalents.

Table 1.2 Metric Prefixes for Powers of 10 and their Symbols

Prefix	Symbol	Value[1]	Example (some are approximate)			
exa	E	10^{18}	exameter	Em	10^{18} m	distance light travels in a century
peta	P	10^{15}	petasecond	Ps	10^{15} s	30 million years
tera	T	10^{12}	terawatt	TW	10^{12} W	powerful laser output
giga	G	10^{9}	gigahertz	GHz	10^{9} Hz	a microwave frequency
mega	M	10^{6}	megacurie	MCi	10^{6} Ci	high radioactivity
kilo	k	10^{3}	kilometer	km	10^{3} m	about 6/10 mile
hecto	h	10^{2}	hectoliter	hL	10^{2} L	26 gallons
deka	da	10^{1}	dekagram	dag	10^{1} g	teaspoon of butter
—	—	10^{0} (=1)				
deci	d	10^{-1}	deciliter	dL	10^{-1} L	less than half a soda
centi	c	10^{-2}	centimeter	cm	10^{-2} m	fingertip thickness
milli	m	10^{-3}	millimeter	mm	10^{-3} m	flea at its shoulders
micro	μ	10^{-6}	micrometer	μm	10^{-6} m	detail in microscope
nano	n	10^{-9}	nanogram	ng	10^{-9} g	small speck of dust
pico	p	10^{-12}	picofarad	pF	10^{-12} F	small capacitor in radio
femto	f	10^{-15}	femtometer	fm	10^{-15} m	size of a proton
atto	a	10^{-18}	attosecond	as	10^{-18} s	time light crosses an atom

Accuracy, Precision and Uncertainty





$$A \pm \delta A \qquad \% \ unc = \frac{\delta A}{A} \times 100\%$$

Multiplication and division. Use the smallest number of significant figures.

$$\frac{106.7s \times 98.2m}{46.210kg \times 1.02s^2} = ?$$

Addition and subtraction. The first digit with uncertainty is the last digit of significant figures.

$$1.452m + 2cm - 4.5m + 3.002km = ?$$

Reasons for rules on significant figures

$$1.1111 \times 2.22 = ?$$

$$\begin{array}{r} 1.1111 \\ \times 2.22 \\ \hline 22222 \\ 22222 \\ 22222 \\ \hline 2.466642 \end{array}$$

$$\begin{array}{r} 1.1111\underset{\leftrightarrow}{1} \\ \times 2.22\underset{\leftrightarrow}{2} \\ \hline 22222\underset{\leftrightarrow\leftrightarrow\leftrightarrow\leftrightarrow}{2} \\ 22222\underset{\leftrightarrow}{2} \\ 22222\underset{\leftrightarrow}{2} \\ \hline 2.466642\underset{\leftrightarrow\leftrightarrow\leftrightarrow\leftrightarrow}{2} \end{array}$$

$$1.1111 \times 2.22 = 2.47$$

Order of Magnitude Calculations

Useful in the old days when there were no electronic calculators.

Useful today for very rough estimates and for error checking.

Use the first digit of a number: convert 1-3 down to 1 and convert 4-9 up to 10.

760 becomes 1000 (10^3), 20 becomes 10 (10^1), 0.05 becomes 0.1 (10^{-1}).

(760 x 20 x 0.05 is estimated to be 10^3)

Review of Chapter 1

Physical laws are based on experimental observations.

Units of measurement; Conversion; Dimensional analysis.

Significant Figures.

Order of Magnitude Calculations.