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Online considerations:

I will only use canvas to do things that cannot be done because we are not face to face. So canvas will be used for exchange of papers, tests and quizzes, lectures, office hours, and recording lectures.

I will not use canvas to tell you when assignments are do, or when tests, quizzes will be given (this information will be given at the beginning of class as part of daily announcement). I will not use canvas to calculate any grade averages – only raw scores for each assignment (out of 100 % will be given).

A) General information

Physics Fall 2021

Instructor: Ronald Francis

PHD in Experimental Physics: (MIT).

Thesis topic: Dynamic light scattering in 2D melting transition of iridescent colloidal crystals

BS in Applied Physics (Caltech).

Advanced classes in statistical mechanics, quantum mechanics and fluid mechanics.

Additional classes in theory of education

Instructor of AAPT New England Region Physics Bowl Champions (2 separate years)

Email: francisronald@deanza.edu

Homepage: used to be <http://nebula.deanza.edu:16080/~ronald/> (probably not working)

Office: E34A Due to pandemic I won't be there. (I'm not there very often anyway...too far away ... I'm usually in tutorial center)

My Class Schedule

Phys 4C: Mon - Fri 9:30 – 10:20

Phys 4D: Mon - Fri 1:30 – 2:20

Phys 4A Tuesday lab 2:30 – 5:20

Phys 4C Thursday lab 10:30 – 1:20

Phys 4D Friday lab 2:30 – 5:20

Office Hours Online

Office Hours online zoom session

Monday: 10:30 – 11:00, 2:30 – 3:15

Tuesday 10:30 – 11:00,

Wednesday 10:30 – 11:15, 2:30 – 3:00

Thursday 2:30 – 3:00

Friday 10:30 – 11:00

Students can also email me at any time (usually evening works well). I'll usually respond within hours but definitely within 48 hours

Length of this syllabus

This syllabus is a little long but it is not that complicated. Part of the reason it is long is because it is attempting to be very clear/detailed or it is attempting to cover many possible situations (reducing personal biases) in order to be fair. So do not worry about the syllabus; just read it, follow the basic rules and you'll be fine in most cases. Most important rules are in bold.

Student Success Center:: <http://www.deanza.edu/studentsuccess/>

Deanza college has tutoring services and I highly recommend that every student get regular tutoring if she / he needs it or even if you don't need it. Tutoring is available and free... why not use it?...Check the website for online tutoring. There is also the "Net Tutor" link in Canvas that has many options.

Non-discrimination policy:

My belief is that any and every person is capable of learning physics regardless of any personal,

cultural or physical characteristics. I won't tolerate attitudes or behaviors that are classist, racist, sexist, homophobic or otherwise discriminatory in class. We shall attempt to use gender neutral language and respect the fact that people of different backgrounds can bring unique and useful perspectives to every discipline including physics. In teaching I will use clear English spoken at a slow-moderate pace and often avoid idiomatic expressions. Terms that may be unusual will be defined.

Textbook and pre-requisites

You can use any edition of the books listed below, some other equivalent textbook, or no book at all.

Physics 10 uses Hewitt's Conceptual Physics.

Physics 50 uses James Walker's Physics

Physics 2A – 2C series uses Halliday, Resnick and Walker

Physics 4A – 4C series uses Physics for Scientists and engineers by Serway and Jewett.

Physics 4D uses Modern Physics by Serway Moses and Meyer 3rd edition

For chapter 1 (Intro to Physics generally for physics 50, 2A and 4A only), I like the Open Stax textbook which you will be required to read as a Practice at Home (PH) assignment. See below for info about PH assignments

You are not required to buy any specific textbook but you must use some textbook (or online source) in order to do required Chapter Summaries (CS)... but it could be any equivalent book that you like (or is inexpensive) or is online. Textbook HW assignments (THW) from the "official" textbook will be made available to you at the library or by email, if you choose to not use the "official" textbook.

Basic Short Overall description of class (attendance, quizzes and tests):

1) There will usually be 1 to 2 short (approximately 10 minutes) quizzes for every 4 hours of lecture. Quizzes, (of length 10 to 12 minutes) are given nearly exactly at the end / start of class in canvas. Quizzes will be on material covered in 3 previous lectures but not including the lecture on the day before a quiz There is one midterm and a final.

2) Students are expected to be on time for every session. There are penalties for latenesses and absences .. see below.

3) Save all of your quizzes, essays, exams etc... so that you have a record of your grades and in case I accidentally make a recording error and need the graded work a 2nd time.

4) You should record all of your graded work in a single spot so that you, or I, can easily estimate your "current" grade at any time in the course. I would not rely on canvas to keep a record of your scores (canvas could stop working at any time ! (save your quizzes, midterm and final in a separate non-canvas place). You will be provided with a sheet to estimate your grade at anytime during the course.

Exam dates:

Please reserve these dates; there are no make-ups

Final Exam : See school calendar. This date is set by the school administration

Reserve the Final Exam Date NOW ! No make-up finals or alternative dates will be allowed

Midterm

Phys 4B Tuesday of Week 8

Phys 4C Friday of Week 7

Other important dates: Double check the dates below with admin as it could change from year to year.

Students should see their own personal "My Portal" webpage for important dates like the last day to add and withdrawal dates. Here are some key dates:

Last Day to Add

Students who have not added a class by this date will not be able to remain in class (and cannot add the class after this date – no exceptions by school rules). Even if a student has an add code, the code will expire after that date, and she / he will not be allowed to register!

Last day to Drop without having to pay for class (usually Sunday of Week 2)

There is no grade of record issued for students who drop on or before this date. Students also do not have to pay for the class if they drop by this date. Such drops do not count towards the “three attempts” limit. Students who do not drop by this date must receive a grade, which could be a “W” (withdrawal). “W”s now count toward the “three attempts” limit.

Last Day to Withdraw with a “W”

A student who does not withdraw on or before this date must receive a letter grade, but cannot receive a “W”. A student should evaluate her/his status before this date – if a student is not doing well, neither the student nor I will be able to withdraw the student after this deadline. Withdrawing from a class is the responsibility of the student and you must do it before the deadline.

Last day to withdraw with an “EW”

See school calendar for this date

B) Course Goals:

Critically examine new, previously un-encountered problems, analyzing and evaluating their constituent parts, in order to construct and explain a logical solution utilizing, and based upon, the fundamental laws of physics

In order to test lab skills students are expected to gain confidence in taking precise and accurate scientific measurements, with their uncertainties, and then with calculations from them, analyze their meaning as relative, in an experimental context, to the verification and support of physics theories.

Students should be able to

- a) identify and use fundamental ideas to answer conceptual questions clearly
- b) systematically use fundamental equations that are useful in solving problems.

Basic description of the course

The “lecture” time will consist of formal instructor-led lectures, as well as collaborative work among students. It is important to obtain and understand all class notes as not all of the material in the class is in the text and **usually 90% of the problems on the quizzes and midterms will involve material that was discussed in class in detail.**

The instructor’s class notes will be recorded in zoom

It is important to review notes nightly in order to identify items that you do not understand. If you don’t understand what is happening in class, then make a special note to yourself (in a right hand column of your lecture notes notebook) in order to get help from someone including possibly the instructor.

If you do not understand very well the material covered during class, then you are unlikely to do well on quizzes and tests. The textbook should be seen as one of many resources that supplement class instruction; knowing some problems / ideas from the textbook problems is only part of being prepared.

Students are expected to learn and understand how to use the fundamental laws and theorems / principles discussed in class and also how to derive any theorems / principles from fundamental laws. Note: fundamental laws CANNOT be derived (proven) by other ideas or laws (that is what “fundamental” means). Students are also expected to know and understand the human definitions used to describe nature.

When giving answers students are expected to give an analysis or argument that begins with fundamental principles and laws.

C) Calculation of Grade:

Please keep a record of all of your grades as this will make it easier for me to assess what your “current” grade is, at any time in the class. You should be able to estimate your own “current” grade

using the chart below.

For classes without lab (Physics 10 and Physics 50)

Final: 20 % (2/3 of final is on 2nd half (post midterm material) of class, 1/3 of final on 1st half)

Midterm: 20 %

Quizzes 45 % (all will be graded with lowest counted for half of the others)

PN = Practice "Notebook" 7 % (approx 25% will be graded)

CS = Chapter Summaries 2 % (all will be graded)

THW = Textbook HomeWork 6 % (approx 25% will be graded)

THW Bonus 2%

minus Penalties for lateness / unexcused absences

For classes with lab: (Physics 2ABC and 4ABCD series classes)

Final: 20 % (2/3 of final is on post-midterm material, and 1/3 of final on pre-midterm material)

Midterm: 15 %

Quizzes 40 % (all will be graded with lowest counted for half of the others)

Lab final 6 %

Lab Reports 4 % (6 will be graded but not equally weighted – see below)

PN = Practice "Notebook" 7 % (>= 25% will be graded based on effort)

CS = Chapter Summaries 2 % (>= 25% will be graded based on effort)

THW = Textbook HomeWork 6 % (>= 25% will be graded based on effort)

THW Bonus 2%

minus Penalties for lateness / unexcused absences

OR

A student can elect to replace 60 % her/his quiz average with the score received on the final exam (so 60 % of 40 %) would be based on final exam score, and the rest of the 40 % would be based on the quiz average.)

You should be able to estimate your grade at anytime using the percentages above. At the halfway point in the class you will be given a worksheet to help you if you want to estimate your grade.

There is no "extra" work that can be done at the end of the class to try to improve your final course grade. It is also considered inappropriate to pressure instructors to give a grade that is higher than the grade that was earned based on the chart above.

D) Materials Needed

Straight Edge, Calculator. Also helpful are Protractor, Circle Template, Regular white copy paper for doing HW and other assignments that are collected.

(Calculators are not allowed on any quizzes, midterms or the final. They can be used on THW, PN, Lab and other class work.)

NO TYPED WORK IS EVER ALLOWED IN THIS CLASS: Work must be done "by hand" on blank white copy paper (no lines)

E) Practice in Class (PC Work)

In non-online environment students keep a separate Practice Notebook (PN) that gets submitted for grading. In the online environment this is not possible but I still call the work "Practice Notebook" work. For online classes work will be done on separate white pages and submitted to Canvas.

PC: Practice in Class: These assignments are practice questions and problems that are started in class often with other students in a small group. These assignments must be completed at home on the same day **by midnight**. (Note: all other assignments are due 15 mins before class begins on the date indicated; this will also be shown on canvas calendar)

PC assignments (daily) may be used to determine if a student attended and participated in class enough to get credit for attending (and not get an absence).

a) Practice in Class (PC assignments) are 100 points each

After each 15 to 25 minute lecture that I often give, students will often do "Practice in Class" questions and problems. Each practice assignment must be labeled at the beginning in a BOX like this "PC 10/4/15 A". There is a 10 % deduction for work that is not labeled properly. Many PC assignments are started in class but will not be finished in class. In those cases, the work must be finished at home (by midnight). The finished work is due at midnight.

Practice Notebooks will be graded every couple of weeks approximately. About 25 % of PC work will be graded. You will not be told which assignments will be graded so do them all to give yourself the best chance of getting a good PN grade.

F) Chapter Summaries (CS)

The chapter summary is basically a summary of the main ideas in the chapter organized in any way that makes sense to you. Feel free to make outlines, charts, diagrams, flowcharts, venn diagrams etc... these must be hand-written (no computer) on blank sheets of paper (no lined paper)

You are required to do minimum of 3 sides of paper (**3 completely filled ! pages**) for each chapter and submit it when it is due. You will be told the due date during class announcements. You can use more pages if you need to and pages must be stapled (vertically in upper left corner – in the top left 1.0 square cm of upper left corner - so that the pages can be turned easily).

You must use unruled (no horizontal guidelines) white regular-sized copy paper; there is a 10 % penalty for the wrong paper. It must be a minimum of 300 words (most students do about 500 words and 3 pages). You can include diagrams but this is not a substitute for the word requirement.

G) Textbook HomeWork (THW)

There is a file called "formats" which shows you how to do THW as well as other types of assignments.

See appendix A for more details on how to do THW

How to turn in THW and other Assignments:

Assignments (THW, CO etc...) will be due 15 mins before the beginning of lecture in canvas.

Penalties for not turning THW or other assignments ontime:

Any THW that is late, but submitted before midnight, is worth a maximum of 50% credit..

HW submitted on a date after the due date will not be accepted.

Grading of THW:

Approximately 25 % the THWs will be collected and graded based on overall effort. You will not be told in advance which of the THWs will be graded.

Homework Excellence Final Course Grade Bonus:

Any student who submits every homework (including THWs not graded) and get a 70 % score (or higher) on all graded textbook homework receives a **2.0 point** bonus on the final grade for the class. (score is 1.7 points if only one assignment is below 70 %). A student who averages over 75 % gets a **1.5 %** bonus on final grade for class. Students can get either 2.0 %, 1.7 % or 1.5 %.

H) Laboratory Notebook

Laboratory experience is critical for any person entering a scientific or technical field. All lab reports should be written by each individual student even if the lab is done with other students. Lab reports will emphasize error analyses; an experiment without error analysis is essentially worthless. You will be taught how to do proper error analysis using a variety of techniques.

Students must be ontime for lab. If you are late then you lose points proportionately for the time you are late. You are not allowed to receive credit for a lab if you are more than 30 minutes late.

Students are only allowed a certain number of latenesses and absences. (See below).

Each lab that is missed results in a 5 % deduction of the grade of the lab part of the class and counts toward the total number of absences in the class.

For each lab you will have two sections: (this will be explained in lab)

a) Lab Notes/Skills Section (called section "0")

Here you keep notes for the lab given by the instructor during the first 15 - 40 minutes of lab.

b) Lab Report Section

Here you will write a formal lab report including any or all of the following: introduction, theory, hypothesis, raw data, presentation of error of each raw data measurement, data analysis, graphs, error analysis, discrepancy, presentation of result with error for calculated quantities, specific conclusion and any 1D graphs, and general reflection (see webpage for more lab report details). Your lab reports will be written in the lab and your lab notebooks will be graded. Lab notebooks stay in the lab. No extra time will be allowed to write the lab report; the report must be finished in class. Occasionally a problem is given as a supplement to lab work and is done in the lab notebook.

There will be 8-10 labs. 2 will be graded for content. 4 will be graded for effort. You will not be told which ones will be graded before they are graded. There are no makeup labs. If you miss a lab that is graded and it is excused (see below for definition of "excused"), then the instructor will choose the lab prior to the one being graded as a substitute lab to grade for you. If you miss a lab and it is not excused then your score for that lab is a zero.

Lab Final: you will be given a lab final on the last lab day. You can use any equipment including a calculator.

Grading of Lab part of class:

The lab final is worth 50 % of your overall lab grade. The 2 content-graded lab reports are 30%. The 4 effort-graded labs are worth 20 %. You will not be told which labs will be graded.

I) Question on Lecture (QL) Assignments (not for Winter 2022 classes)

J) Attendance and Tardiness

You are expected to be here at the beginning of each class, every day, for the rest of the quarter. If you must be absent then provide physical documentation to have the absence excused (see below).

You must sign the attendance sheet every day with your initials (or login to canvas). This is required by the State of California.

If you miss more than 20 percent of a class, then you are considered absent, otherwise you are just considered late. Your daily PC work will be used to determine if you participated in class enough to receive credit for attending; missing PC work will result in your being considered absent for the class.

It is important to experience the discussion of physics with the instructor and classmates. Therefore there are penalties for being late or for unexcused absences. See appendix B for Penalty values

If you are unable to make it to class ontime, on a regular basis, then you probably would do better and be less frustrated in a class with less rigid attendance rules.

If you come very late (more then 2 mins late), then come to the front of the class, as soon as you walk in, and sign the late sheet (not necessary in canvas).

If there is an accident on the roads, then document with a photo and live date on your phone camera, and offer that as evidence of an excusable event.

Some FAQs:

Do I need a doctor's note or equivalent for an excused absence ?

Yes. And you must bring a physical copy of the note to class.

Will I be dropped if I don't attend the first few classes ?

If you miss the first and the second day of class then you will be dropped.

Can I miss the final exam ?

You cannot be absent for the final exam; you must take the final exam in order to pass the class.

K) Waiting List and Adding into the class.

If you are on the waitlist and/or not yet enrolled in the class, then your absences and tardies count for 50 % compared to students who are enrolled. Other penalties associated with not being present because of not being registered are also reduced by 50 % . (for example a missed quiz only counts for ½ of a zero grade and not a full zero quiz grade)

I will accept several students over the class limit up to the end of the second week.

L) Midterm

There will be 1 midterm in this class. The midterms will consist of multiple choice questions as well as "free response" questions and problems. No calculators will be allowed in order to guarantee that everyone has an equal chance at the exam; learn to approximate answers using basic arithmetic.

Students will be allowed to earn back points for questions that were missed on the midterms by writing a "reflection" document. You will be told the specific format for the "reflection" document. Students can earn back up to 20 %.

There will not be make-up midterm. If you miss a midterm and it is unexcused (see below) then the score is a zero. If you miss a midterm and it is excused (see below), then a substitute grade will be given that is equal to the average of the final exam grade and your quiz grade average.

If you are tardy for a quiz, midterm or final, you will not be given additional time.

No calculators will be allowed for any quiz, midterm or final. Calculators are allowed for the lab final.

M) Quizzes

There will be approximately 10 short quizzes (about 1.5 per week) in this class of about 10 minutes each at the Start (or end) of class (upload on canvas). We will do one quiz as a trial run to make sure that everyone has canvas quiz experience understood.

Quizzes emphasize material in the 3 prior days of class lecture (NOT including material covered on the day of the quiz, and also NOT including material covered on the day before the quiz); for a class meeting Mon – Friday, a quiz on Wednesday would test material covered on Thurs, Fri, Mon, but NOT cover material on Tuesday or Wednesday. There will not be make-up quizzes. If you miss a quiz and you are not excused (see below) then your score is a zero. If it is excused (see below) then the missed quiz grade will be the average of your other quiz grades. The lowest of your quiz grades will count for half the weight of the others.

Students are responsible for adding up all of the deductions given by the instructor in grading and writing a final grade at top of quiz (in "comment" section for online classes). This serves as a check for the quiz grade.

N) Final:

The Final exam will be given as per the school calendar. There will be no make-up final. You may bring 2 sides of regular paper with notes and equations to the final exam. You must bring a photo ID

to the final exam and show it to the instructor during the test if asked. If you are late to the final then you will NOT be given additional time. No calculator is allowed on the final or any other exam in the class. You are only allowed a single pencil/pen and a straight edge like a ruler.

If the class as a whole cannot take the final exam because of extraordinary circumstances (earthquake / power outage etc...and cannot be rescheduled), then your midterm grade, (with reflection points) will be used for your final exam grade

O) How work will be graded (HW, Quizzes and Tests) and Cheating

On homework, in-class quizzes, midterms and final, you must **show all your work** to receive full credit. You must show logical steps using laws / theorems or definitions. This includes qualitative questions – do not simply restate the question or leave out critical thinking steps. Usually work will be returned within one week. If you need to use material that you are submitting, then copy the work prior to submitting so you can use it even if I still have it.

Your work must be distinguishable from a student who guessed.

Do not give more than one “answer” as the grader will not choose the correct answer out of two answers for you ! If you put down two answers, you automatically lose 75 %.

Solutions should show your step-by-step reasoning to obtain the solution. No credit will be given if no work is shown even if you obtain the correct answer to the problem (accidentally or not).

Usually you will solve the problems algebraically before “plugging in” numerical values... but sometimes it is worth it to plug in numbers for an intermediate step. Be certain to include the appropriate units with your answer and proper significant figures.

Note: If there is a dispute in the grading of any exam homework, quiz, or exam I will consider looking at it a second time only if it is handed back to me within 2 school days after I return it, and if there is a neatly written appeal. You cannot make an appeal immediately after a quiz is given back to you.

Save all of your graded work in case of any lost records of student grades.

Cheating

I have caught about a half dozen students cheating over the last year. Please don't try it. Better to just try hard to actually learn the material.

a) Quizzes: A student found cheating on a quiz will receive a zero for the quiz as well as the previous graded quiz. A student found cheating on the first quiz will receive a zero on the 1st and 2nd quiz

b) Textbook HomeWork, Chapter Summaries, Labs, PN work have same policy as quizzes applied to work that is graded. (Note that not every THW, CS, Lab, or PN is graded)

c) Midterm and Final: A student found cheating on a midterm or final will receive a zero for both; the student will likely be unable to pass the class

P) Letter Grades for the course

The calculated percentage will be rounded to the nearest whole number. Letter grades will be determined as follows:

A+: 97-99% A: 93-96% A-: 90-92%

B+: 87-89% B: 83-86% B-: 80-82%

C+: 77-79% C: 65-76%

C grades will be also be given to students between 60 and 64% if a 75 % average is obtained on all THW assignments and a score of 50 % on the final exam

C- grades cannot be given at Deanza

D: 55-64% F: 0-54%

The grading scale shown above is firm. Although unlikely, all tests and assignments may be curved,

Slightly if the occasional question is deemed too difficult (rarely happens). Being close to a grade does not entitle a student to that grade (89.4% is a "B+", 89.5 % is an A-).

There is no "extra work" that you can do at the end of class to gain more points.

Typically 15 % of students will get an A, 30 % will get a B, 35 % will get a C and the remainder will get a D or F grade.

Q) De Anza College Academic Integrity and Cheating Issues

The following types of misconduct for which students are subject to disciplinary sanctions apply at all times on campus as well as to any off-campus functions sponsored or supervised by the college: cheating, plagiarism or knowingly furnishing false information in the classroom or to a college officer. Copying another student's work or problem solution, or copying from a "solution manual" both fall into the above categories and may result in disciplinary action.

In many cases students find it advisable to immediately withdraw from the class.

R) Things to do to give yourself a good chance of doing well.

I may send to you suggestions from previous students about how to do well in this class.

Also, you should

- a) Realize that physics is based on key principles that build upon each other, and the reasoning that follows from them. You cannot succeed by trying to memorize certain procedures or equations; it just won't work. So read the text and listen to lectures with this in mind. Keep asking yourself " what is the fundamental idea here ?"
- b) Review Lecture notes and regular HW assignments . It is extremely rare for a student to be able to do well in physics without doing assignments. Ask for help electronically if you don't understand lecture or any assignments.
- c) Attend every class as it is difficult to learn physics without an interactive dialogue with an instructor who can help you understand the particular difficulties (conceptual or operational) that you are having. Learn your class notes well; the course emphasizes material covered in class especially on quizzes
- d) Read the chapter before you come to class and take notes on things you don't understand while reading.
- e) Make sure that you have the necessary math background.
- f) Do not allow yourself to fall behind as the situation will likely get progressively worse
- g) Ask questions in class when you don't understand and take advantage of any office hours that are set up
- h) Plan your schedule so that you have enough time to do the class. Consider reducing your work hours or number of classes.
- i) Take advantage of the well organized Math / Science Tutorial Center, EOPS, and the Student success and retention program.
- j) Work with other students so you can share their insights. Be mindful however of the plagiarism and cheating (see above).
- k) talk to another student who has taken any of my classes

S) Other Resources

You may choose to look at these other texts which cover the same material. You'll need to look at calculus based texts however.

Alternate Texts: Knight, Physics for Scientists and Engineers, Giancoli, Physics Hewitt, Conceptual Physics. Holt (Publisher), Physics, Feynman Lectures on Physics Khan Academy videos, Walter Lewin video lectures and other online lectures Wikipedia. and many more....

T) Excused Absences:

A class, lab, or quiz, midterm, PN work is excused if

- a) you inform the instructor before the next class of the class AND
- b) you have a doctor's note, a legal notice, a death in the family, or other documentation of "extraordinary circumstances" (to be judged by the instructor).

What is an extraordinary circumstance ?

An extraordinary circumstance would be an absence that you must take because otherwise it would cause a great or irreversible hardship. The instructor determines when an excused absence is considered an "extraordinary circumstance". A wedding or a car accident would be examples of extraordinary circumstances.

What do if you have an excused absence / excused lateness

If you are excused from class, that does not excuse you from turning in work that is due that day in class (unless the excused absence prevented you from doing the work.. like a medical procedure... but not like a wedding)

Making up the missed work

You have 3 days from the end of the excused absence to make up the work that was missed

Appendices:

Appendix A: THW details

i) basics structure of THW:

These assignments will be emailed to you (and in canvas) in advance (at least 3 days) and you will be given a due date.

It is critical to do all of your THW. The attention you give to the assignments is crucial to your success in this course. Doing physics is a skill that you develop, and practicing that skill is necessary. Don't just "do" the homework; instead think about what each problem is trying to teach you and try to organize those things in your own brain if possible, or write down all of these things. Your understanding must improve slightly with each question or problem, or else you aren't really learning (you are just "doing"). It is possible to "do" all of the THW and still not get a good score on a quiz or midterm that involves that HW material.

In each chapter you will be given approximately 8 Qualitative Conceptual Questions (CQs) that require a clear written explanation and approximately 10-20 Quantitative Problems (QPs) that require a mathematical solution.

CQs are more challenging and are often more important than (QPs), because you need to have "true" understanding in order to answer a qualitative question whereas a quantitative question allows you to "fake" your way through to an answer by using some equation).

CQs will count for about 50 % of the grade for the THW. QPs will count for the remaining 50 %.

Your work must be your own. You may consult with students after you have made an attempt to do THW problems on your own. You may not copy another person's THW. Instead, contact them for help, and then do your own work. If your THW has been obviously copied from another person's THW then you will be guilty of cheating and reported to the appropriate authorities (see below). The school's honor code is in effect on this matter.

In most cases, the final answers to the odd THW problems are in the back of the text. We will not have much time in class for going over THW problems; see a tutor or email me for help if you get stuck on a THW problem.

You do **not have to copy the questions** to get full credit but a **physical diagram is required** for each question / problem. There is a 100 % penalty (no credit) for any question or problem without a physical diagram.

Conceptual Questions on the HW are usually more difficult for students (since they require "true" understanding) and will have greater weight compared to problems.

Make a serious effort in answering conceptual questions and get help if you can't answer. Put your name in the upper right side of the assignment.

Assignments must be stapled together in upper left square centimeter of the page (see website) in order to make reading of the assignment possible). No staple for online submission

ii) Format of THW (for both conceptual questions AND quantitative problems)

There is a 15 % penalty for each aspect (indicated below) of the required format that is not followed.

See formats document to see sample THW submission and also sample submission for other assignments.

a) Questions are to be done on **BLANK white copy paper (no ruled lines on the paper)**.

Divide each paper that you use into two vertical columns and do one or more questions / problems in each column (see Formats document for sample THW)

b) Each question / problem must be labeled with a circle around the Question or Problem number like this (CQ3) or (P17). Each question of problem must be accompanied by a well-labeled physical diagram. **If there is no diagram of the physical situation, then no credit is given** for the problem. **Repeat: no diagram means no credit.** Physicists use diagrams to build intuition about physical situations and make geometry clear to themselves or other people trying to understand the question / problem involved.

Very infrequently there may be a question that makes no physical reference (question does not mention any physical object like a sled, dog, book, electric field, engine, light ray, electron, ocean, person, table, rocket.etc...). **In those cases create your own physical situation.**

The diagram of the physical situation makes your homework more useful as a stand-alone document that you can review without having to refer to the text. The diagram also helps you make connections between fundamental ideas and physical situations – often the first and critical step in solving a problem. See sample THW

The diagram may **NOT be an abstract mathematical diagram (like a vector diagram, graph, or free-body force vector diagram)**. It must be a diagram of the physical situation and therefore it must involve matter/energy/fields (represent using arrows).

iii) Additional requirements for Conceptual Questions:

If the question is conceptual, then give a complete explanation of your answer in the following way:

A) If appropriate, first give a short basic answer to the question like “yes” or “left” or “c)” (for multiple choice) or “increases”, or “that’s not possible” etc.

B) Then give an explanation **and try to make an argument from fundamental laws or fundamental principles of physics.**

In answering a question, try to **use reasoning that begins with fundamental laws or theorems / principles of physics.** Many people can answer a question and actually NOT understand the reasoning behind their own answers. Sometimes a question can be answered by using a proof by contradiction. Students often do not receive credit for Conceptual Questions because they fail to give a logical argument... instead they just given an answer that could be interpreted as a guess.

Your ability to answer qualitative conceptual questions is the “real” measure of your understanding. You may want to see if you can tell your explanation to a friend / parent / fellow student in order to gauge if your answer makes sense.

iv) Additional suggestions for Quantitative Problems:

a) present the given information,

b) Establish coordinate system (+x, +y, and +z, directions and location of origin if needed) and identify any physical systems that principles are being applied to (for example: system can be just a book, or book and earth, or book, earth and table,...)

c) Begin with fundamental laws / theorems or definitions.

d) write one equation under the other as you apply various physics principles or mathematical steps

e) put a box around your final answer for each part (like a), b) , c) etc..) of the question.

Usually, at least a full ½ page column is needed for each problem There is a sample HW on my website so that you can see the allowed format. The work must be neat, in a dark pen or pencil, and relatively large so that it is easy to read.

If you have handwriting that is difficult to read then use printed letters.

Appendix B

Non-summer classes: Points off of final course grade

1st lateness 0.2 1st unexcused absence 1.0 points

Additional points off for each further lateness or unexcused absence

2 nd lateness	0.5	2 nd unexcused absence	1.0 points
3 rd lateness	0.5	3 rd unexcused absence	2.0 points
4 th lateness	1.0	4 th unexcused absence	2.0 points
5 th and more	2.0	5 th and more unexcused absence	3.0 points

Summer classes: Points off of final course grade

1st lateness 0.2 1st unexcused absence 2.0 points

Additional points off for each further lateness or unexcused absence

2 nd lateness	0.5	2 nd unexcused absence	2.0 points
3 rd lateness	0.5	3 rd unexcused absence	3.0 points
4 th lateness	1.0	4 th unexcused absence	3.0 points
5 th and more	2.0	5 th and more unexcused absence	5.0 points

Student Learning Outcome(s):

*Critically examine new, previously un-encountered problems, analyzing and evaluating their constituent parts, to construct and explain a logical solution utilizing, and based upon, the fundamental laws of waves, fluids, optics, and thermodynamics.

*Gain confidence in taking precise and accurate scientific measurements, with their uncertainties, and then with calculations from them, analyze their meaning as relative, in an experimental context, to the verification and support of physics theories.