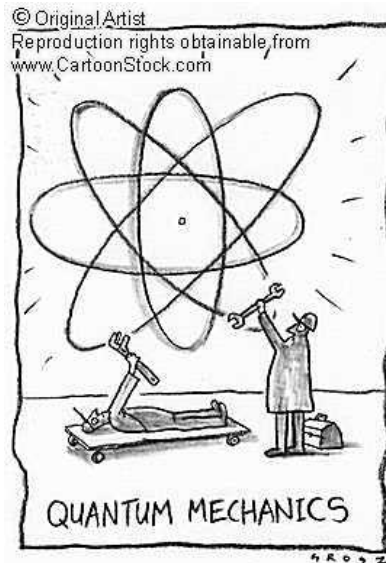
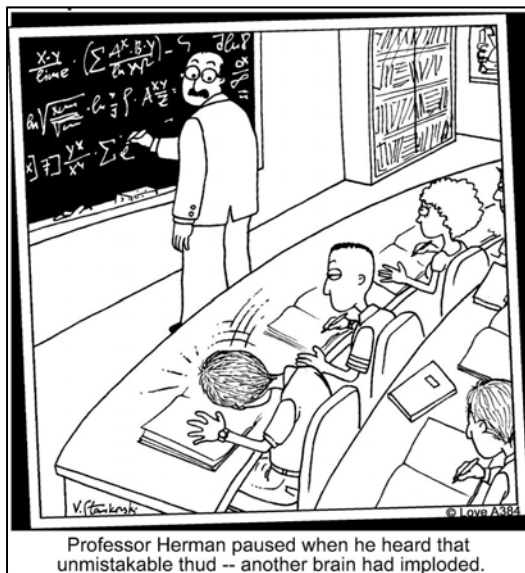
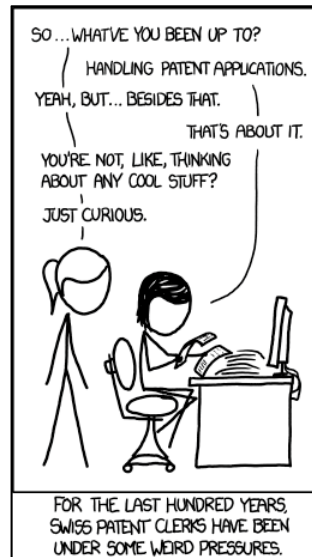
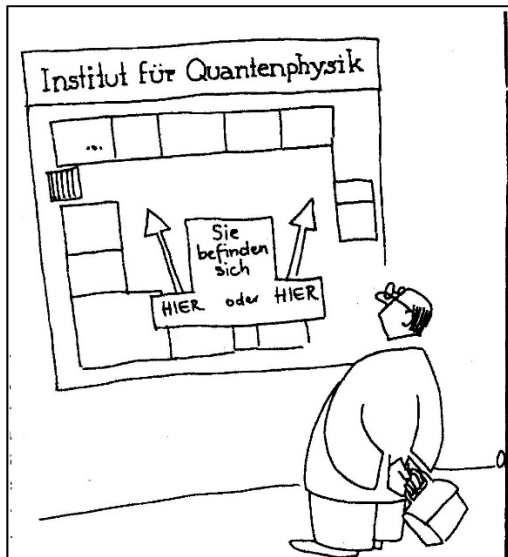


Physics 251 – Modern Physics

Block 3, 2018



Welcome to Modern Physics. This block we will explore the developments in physics in the 20th Century. We will focus mostly on quantum mechanics with some study of special relativity. By the end of the block you will be understand why a sodium streetlamp is only a certain color yellow, why it is impossible for an electron to stay in one place, what Einstein meant when he said "God does not play dice with the universe", and how twins can age at a different rate.

Professors

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It is physics department practice to request that students in 100 and 200 level courses use titles when addressing faculty, e.g. Dr. Lang/Professor Lang or Dr. Burns/Professor Burns.

Text

The required textbook for the course is Modern Physics for Scientists and Engineers by John Taylor, Chris Zafiratos, and Michael Dubson, Second Edition.

Online Course Information

All documents related to the course are on Canvas. Check this page for assignments, schedules, handouts, and solutions.

Class Schedule

There are three components to our class meetings: class, lab and exams. Our daily routine will be as follows:

9 AM - 12 PM Class. Class will include lectures, activities, problem sessions and clicker questions.

You must be on time to all class meetings and you must return to class in a timely manner after breaks. If students are arriving late and disrupting the class after it has started, it will be necessary to lock the classroom door promptly at the start of class and at the end of break each day to avoid this disruption. If you are late at the beginning of class and find the door locked, you are permitted to rejoin the class at a break.

1 PM Lab. Plan to spend about three hours on each lab- one hour before the lab to prep and two hours in lab. Students will sign up for lab ahead of time and must come on their assigned day. Students will do five labs in the block.

Exams will be given on the days listed on the course schedule.

Reading and Problem Assignments

Daily reading and homework assignments are listed in the course schedule. In addition, there are computer homework problems assigned which are listed on the webpage:

<https://faculty1.coloradocollege.edu/~sburns/courses/18-19/pc251/ComputerProblems.html>

You should do the assigned reading before class, i.e. the reading assigned for Tuesday should be read before morning class on Tuesday. Class lessons will assume you have read the appropriate material. You should also read with a pencil and paper handy to work out derivations and examples that are not clear from just reading them.

For each reading assignment you will find a listing of problems to work. You should have read, thought carefully about, and worked or at least tried to work all the assigned problems before class on the day their reading is assigned, i.e. problems pertinent to Tuesday's reading should be considered before class on Tuesday. Your understanding in class will be augmented from having already thought about the problems. After class you should then go back and finish any problems you did not complete or fully understand from that day's assignment, before continuing to the reading and problems for the next day.

The assigned problems will not be collected on a daily basis. This gives you flexibility in when you choose to work them fully- either before or after the class in which the subject matter pertinent to them is discussed. You should figure out for yourself what schedule best enhances your learning. However, in the end you should work all the assigned problems fully and understand them. The course schedule lists when problems are due.

Approximately one third of the written problems will be randomly chosen and graded from the turned in problem sets. All of the computer problems will be graded. Homework collectively comprises 25% of your grade which means each day's problem set is worth about 1.5% of your grade. Unless you make prior arrangements with the professor, you must turn in your homework when it is due. Late homework will be penalized at the discretion of your (now grumpy) professor, up to and including not accepting such homework.

Problems will be graded according to the following scale:

0% = little to no effort or a completely wrong answer indicating a complete lack of understanding.

70% = some effort but answer is substantially wrong or missing important concepts. indicates lack of understanding of the material.

85% = a good answer, substantially correct and indicating a substantial effort and understanding of the material.

100% = a correct answer indicating a thorough understanding of all concepts.

Your learning will often be enhanced by working with a partner or in a group on the assigned problems. You are encouraged to do this; however, be sure that at the end of group sessions you understand the problems and their write up is entirely your own. While doing your homework you may not consult solution sets obtained from any source.

Answers to the even numbered problems are posted on the course website. The odd-numbered problem answers can be found in the back of your book. Homework solutions will be posted on the web after the homework has been turned in.

In-Class Activities

Class sessions will include a variety of activities including worksheets, problems, and clicker questions. Worksheets and problems will be graded using the same rubric and scale as is employed for the homework except that the score will depend not on completion of the problem, but rather on the displayed intellectual effort and thought. Clicker questions will earn full credit (100%) when answered correctly, will earn partial credit (80%) when answered incorrectly, and will earn no credit (0%) when not answered. We will begin using clickers on the first day of class after break, and you must follow the instructions provided in the “Clicker sign-up instructions” to obtain and register a clicker for use in the course before class resumes that day.

Your performance or participation in these activities will collectively be worth 10% of your grade. There are no make-ups for the in-class activities. If you miss class you will receive a 0 for that day's in-class grade. However, your lowest day's grade (including a zero) will be dropped when calculating this portion of your grade.

Labs

We will do five labs this block. You are required to complete all five labs in order to pass the course. In addition, you will write one lab technical report. Please see the lab webpage for more information. <https://faculty1.coloradocollege.edu/~sburns/courses/18-19/pc251/labs.html>

Exams

There will be one quiz (10%), one midterm (20%), and one final exam (25%) during this course. Please see the course schedule for dates. All exams will be cumulative; however, each will emphasize the material immediately preceding it. We will give you credit for learning on the midterms; if your final exam score is higher than either or both of your previous scores, we will replace those scores with your final exam score.

There are no makeup exams. You will receive a score of zero for any missed exams and your final will then replace that exam. Except under dire circumstances, if you miss the final exam, you will fail the course. Requests to reschedule the time you take an exam must be made well in advance and will be considered on a case by case basis.

All tests will be closed book. Calculators are permitted and you may bring one 8.5” x 11” sheet of paper with whatever you want written on it. We will provide any numerical values or unit conversions that you require during the exam. Exams will consist of problems and questions similar in difficulty to homework or may resemble material encountered during the in-class activities or labs. In addition to quantitative problems, we may ask you to explain a concept or answer in a short answer format.

Extra Help

You may come by your instructor's office to ask questions whenever the door is open. You may also make appointments to get extra help from your instructor. In addition, the Quantitative Reasoning Center (QRC) located in the library also provides tutoring services and can help with a refresher on math skills that may have become a little rusty. The director of the center is Steve Getty (Steve.getty@coloradocollege.edu) and the schedule for the QRC is online.

Honor Code

Science is a social enterprise, and we encourage you to work with your peers on homework, in-class activities, labs, studying for exams, etc. For your homework assignments, you should, however, be certain that you have your own understanding of every problem assigned and the problem write-ups should be entirely your own. In doing your homework, using homework solutions obtained from any source is not permitted. For in class-activities, although you will work in groups, the final write-up should be entirely your own. Answering a clicker question for someone else is prohibited. Lab checkouts may be done with your partners, but the lab instructor will make sure all partners understand the lab. Don't let your lab partners take over--be sure you understand what you are both doing. Of course, your work on quizzes and exams should be entirely your own.

It is the student's responsibility to clarify any situation not explicitly addressed here. If you encounter a situation not covered, assume it is inappropriate until you ask the instructor and are explicitly told otherwise. Suspected honor code violations will be referred to the Honor Council without exception.

Disability Accommodations

If you have a disability and require accommodations for this course, please speak with the instructor as soon as possible so that your learning needs may be appropriately met. All requests must be accompanied by a current letter from Accessibility Resources (Armstrong Hall, Room 211, 227-8285). It may not be possible to adjust for accommodations requested shortly before or during an exam or shortly before the due date for any assignment.

Grades

Quiz	10 %
Midterm Exam	20 %
Final Exam	25 %
Homework	25 %
In-Class Activities	10 %
Labs	10 %