

PHYS-4602 Class Project Instructions

You will give a short lesson in class (either in our class or PHYS-3301) on a topic of your choice in advanced quantum mechanics and write a sample homework assignment on that topic with solutions. If you present in our class, your project will address some topic we do not have time to cover in class, for example, a topic from another chapter in the textbook or a different direction in quantum computing. If you present in PHYS-3301, your topic can be something we cover in class, but it should specifically relate a physical system to topics from PHYS-3301.

At a minimum, I expect that these projects should require time and effort equivalent to roughly two weeks' worth of homework assignments. The lesson presentation should take 20-25 minutes, and the sample homework assignment should have 3 problems similar to our homework assignments. You are, of course, free to spend as much time and effort as you like, as well as to write a longer sample homework.

You must have me approve the topic of your project in person by **11 March 2020**. The class presentations will be scheduled for **30 March to 3 April 2020**, depending on whether you present in our class or PHYS-3301 (presentations in PHYS-4602 will be **2 April 2020**). The sample homework assignments are due **10:59PM on 9 April 2020** either emailed to me as a PDF or to the homework drop outside 2L26 as a hardcopy. **This project is worth 15% of your final course grade.**

Please come discuss with me or send me an email if you have any questions.

Lesson Presentation

The lesson you present should be 20-25 minutes long and present material at the level of PHYS-4602 or PHYS-3301 depending on where you present the lesson. You may use slides/powerpoint or the chalkboard, but I strongly suggest that you use the chalkboard to allow the class to keep up. Aim to present the material in a clear, understandable fashion (help the class learn what you are teaching). Be willing to stop and answer questions. Also, make sure the material is organized both in the order of presentation but also visually; making an outline is very helpful.

Sample Homework Assignment

You should write three homework problems in the style of the regular assignments for the class and at the appropriate difficulty level for PHYS-4602 or PHYS-3301. Problems may have multiple parts. If you teach a new calculational technique, some of the problems may simply be practice with that technique, but the majority (if not all) of the problems should be designed to teach a new concept, application, or an extension of calculational tools. Provide a solution for each part of a problem. Your problems may require computer work using Maple software if you wish. If so, include a copy of your Maple solution.

The sample assignment should be written in \LaTeX ; if that is not possible, then a Microsoft Word or similar document (saved as PDF) is permissible but **only** if you use an equation editor for all mathematics. I can provide a \LaTeX template on request.

You may use problems from a textbook under the following conditions: First, you must edit the problem to include some new elements. In particular, if all your problems originate in textbooks, each problem must be 50% new. If only one does, you can edit it less. Second, you must cite the text and problem number (if it is one of the books on course reserve, you can just use the author name(s); otherwise, give author and title). *Using a problem without proper citation will be*

considered plagiarism and therefore cheating.

Evaluation

Marks for the class project will be based on the following distribution:

- **Topic/Plans:** 10%
You must have your topic approved at an in person meeting with me by **11 March 2020**. You will automatically receive these marks if your topic is approved on time.
- **Effort:** 10%
Does the project show evidence of sufficient effort (equivalent to 2 homework assignments)?
- **Presentation Clarity:** 20%
How well can the class understand the physics you are teaching? Were you able to answer questions?
- **Presentation Organization and Length:** 20%
Did the lesson flow logically from one point to the next, or did it jump between topics? Was it easy to keep track of the order of the lesson on the chalk board or slides?
- **Sample Homework Problems:** 20%
Do the problems teach something? Do they meet the conditions outlined above? Is the math formatted properly?
- **Sample Homework Solutions:** 20%
Do the solutions show clearly how to solve the problems? Could another student understand the answers? Is the math formatted properly?

Suggested Topics

I would suggest looking through the later chapters in Griffiths & Schroeter as well as the other textbooks on reserve in the library. Our library also has an electronic subscription to *Physics Today* and the *American Journal of Physics*, both of which will sometimes have articles on appropriate topics. If you want to discuss the project in advance, please feel free to ask me. Remember that you must have your topic approved at an in person meeting by **March 11** and that this is worth **10% of the project grade**.