Topics in Quantum Physics (PHYS 3770)
Spring 2016
MW 1:00-2:15 PM, Thaw 210

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Office Hours by appointment

Course Description

This course will serve as an introduction to the field of Quantum Information and Quantum Computing, beginning with basic concepts such as entanglement and state teleportation and building towards applications such as Shor's algorithm, quantum cryptography, and quantum search. Nielsen and Chuang's Quantum Computation and Quantum Information will serve as the textbook for the course, and key topics including quantum bits, circuits, and algorithms will be covered, as well as decoherence, quantum errors and correction schemes, and quantum measurement and noise. We will focus especially on different physical implementations of quantum computing systems (ex. trapped ions and superconducting circuits), their challenges and advantages, and survey recent developments in the field.

Course Text: <u>Quantum Computation and Information</u> by Nielsen and Chuang

Homework
Homework will be assigned approximately every two weeks. Each assignment will be given with a due date. Assignments submitted more than one week past the due date will not be graded or receive credit.

Final Project
At the end of the semester, each student will give an oral presentation ~ 20 min. long on a topic mutually agreed upon by student and professor. It will be accompanied by a ~3 pg. written report (not including figures) on the same topic. The report will be typeset in Tex to ensure readability and clarity of equations and scientific notation. Additionally, both oral and written components must properly cite and credit sources. Projects will be selected ~ week 6 of the course.

Student Opinion of Teaching Surveys

Students in this class will be asked to complete a *Student Opinion of Teaching Survey.* Surveys will be sent via Pitt email and appear on your CourseWeb landing page during the last three weeks of class meeting days. Your responses are anonymous. Please take time to thoughtfully respond, your feedback is important to me. Read more about *Student Opinion of Teaching Surveys.*

University Policies:

Academic Integrity

Students in this course will be expected to comply with the University of Pittsburgh's Policy on Academic Integrity Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.

Disability Services

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services (DRS), 140 William Pitt Union, (412) 648-7890, drsrecep@pitt.edu, (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

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Statement on Classroom Recording

To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.