

# Foundations of Nanoscience, Phys1375

Spring 2019

W/F 3:00-4:15 pm (*tentative*), 106 Allen Hall

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Office hours: Friday 11:00-12:00 (*tentative*)

## Course Description

This course provides an introductory overview of the scientific issues that arise when we attempt to study / create physical systems at nanometer length scales. The majority of the course will cover basic physics concepts such as quantum mechanics, electromagnetism, and statistical mechanics and how these concepts shift when the length scale and number of atoms involved become very small. The final portion of the course will cover methods available in modern fabrication facilities to manipulate and characterize nano-scale systems, as well as special topics on nano-systems of interest to the class.

## Required Materials:

No textbook is required. However, it is recommended to have access to an introductory quantum mechanics textbook. If you have never taken a course in quantum mechanics, it is recommended that you get a copy of Introduction to Quantum Mechanics by David J. Griffiths, any edition will do. Excerpts from two older textbooks covering topics in quantum and statistical mechanics are available on the CourseWeb: Modern Physics by Robert Sproull and Statistical Physics by F. Reif

## Course Requirements and Grading:

- **Homework (65% of final grade)**  
Assignments will be given approximately weekly and will be posted on the CourseWeb. No credit will be given for assignments submitted more than one week after the due date. Students are encouraged to work together on assignments. However, each student should submit their own assignment and note with whom they have collaborated.
- **Final Project (30% of final grade)**  
Each student must complete a final project to research a topic in nanoscience chosen by the student with the advice and approval of the instructor. Topics should be submitted for approval no later than the eighth week of class. The project will consist of a 15 minute oral presentation given in the last two weeks of class, and a written report of approximately 3 pages (excluding figures and references), both on the chosen topic. More details on the project

format and suitable topics will be discussed in class. Students are highly encouraged to meet with the instructor several weeks prior to their presentation date to discuss the project scope. Students may work individually or in teams of up to two for the final project, with the caveat that each team member must come from a different major. Teams will be expected to have a slightly expanded project scope compared to individuals.

- **Class Participation (5% of final grade)**

Students should attend class regularly, engage in discussions, and ask questions! It is important to do the readings and other assignments when they are assigned because they will often be necessary to understand upcoming lectures or relevant to in-class discussions. The instructor will make his best effort to make lecture slides available to students on the CourseWeb.

### **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](mailto: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.

#### *Copyright Notice*

Course materials may be protected by copyright. United States copyright law, 17 USC section 101, et seq., in addition to University policy and procedures, prohibit unauthorized duplication or retransmission of course materials. See [Library of Congress Copyright Office](#) and the [University Copyright Policy](#).

### **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.