

# Phys 1375: Foundations of Nanoscience

## Spring 2021

WeFr 3:25-4:40 PM

Location: Zoom 999 4685 9831 (no room is currently assigned to this course)

PW: 026987

## Michael Hatridge, Assistant Professor

Office: virtual

hatridge@pitt.edu

Office Hours: TBD / by appointment

**Logistics:** I will establish 2 hrs. per week of regular office hours, with additional availability by email appointment (please request the day in advance). Pending student agreement, classes will be recorded and made available for asynchronous access, see Canvas for detailed instructions on accessing lectures.

## 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 (for 'small' systems of few atoms/electrons, etc.), statistical mechanics, and thermodynamics (which govern 'large' systems we see in our everyday life) and how these concepts overlap for systems in the nanometer range. The course will also 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.

**Course Text:** I strongly recommend **Introduction to Quantum Mechanics** by David Griffiths (any edition will be fine). We will have sections of older textbooks online as well, but Griffiths is very readable and much more modern. For those taking quantum mechanics later it is also a frequently used text and useful reference.

## Homework (65 % of total grade)

Homework will be assigned ever 1-2 weeks, with 6-10 total assignments. Each assignment will be given with a due date. Each student will be granted two 'free' assignments which can be submitted up to one week late. If your circumstances require further accommodation, please notify me as soon as possible. Homework will be submitted electronically via Canvas. You must show enough work to demonstrate that you have worked the problem. There is an easy instructor error to make in Canvas which renders homework unsubmitable, if you see this notify me so I can correct the issue.

## Final Project (35 % of total grade)

At the end of the semester, each student will give an oral presentation 10 min. long on a topic in nanoscience mutually agreed upon by student and professor. It will be accompanied by a 2-3 page written report (not including figures) on the same topic. Both oral and written components must properly cite and credit sources. Projects will be selected ~ week 6 of the course (as a homework assignment). I strongly encourage

those already doing nano research to pick a topic outside their direct research experience.

**Canvas:**

The University of Pittsburgh provides a web-based resource called Canvas, which is a portal to web sites for individual courses. A Canvas site for this course has been created and there you can view announcements, send email to the instructor, and download course material such as the syllabus and in-class slides or recordings. Reading and homework assignments will all be announced on Canvas. To access Courseweb go to <https://canvas.pitt.edu/>. Use your Pitt email username and password to login to Canvas. If you have forgotten your username and password or need to set up an account, contact the help desk at 412-624-4357, or 4-HELP. Once you have logged into the system simply click on the link for this course to access the available material.

**\*Note: users can configure which site changes trigger email notification, I recommend activating email notification for course announcement and new assignments.**

**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.

To learn more about Academic Integrity, visit the [Academic Integrity Guide](#) for an overview of the topic. For hands- on practice, complete the [Understanding and Avoiding Plagiarism tutorial](#).

**Disability Resource Statement:**

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and the Office of Disability Resources and Services, 140 William Pitt Union, 412-648-7890/412-624-3346 (Fax), as early as possible in the term. Disability Resources and Services will verify your disability and determine reasonable accommodations for this course. For more information, visit [www.studentaffairs.pitt.edu/drsabout](http://www.studentaffairs.pitt.edu/drsabout).