

# Syllabus for PHY 520 Fall 2016

## Introduction to Quantum Mechanics I

Class schedule: M W F 11:00–11:50, CP 287  
Instructor: Christopher B. Crawford  
CP 373, 257-2504, [crawford@pa.uky.edu](mailto:crawford@pa.uky.edu)  
Office hours: by appointment  
Homepage: [http://www.pa.uky.edu/~crawford/phy520\\_fa16](http://www.pa.uky.edu/~crawford/phy520_fa16)  
Textbook: David J. Griffiths, “Introduction to Quantum Mechanics,” (required)  
Stephen Gasiorowicz, “Quantum Physics,” (recommended)  
Prerequisites: PHY 361, MA 214

**Course Description** A lecture and problem course providing an introduction to the concepts and formalism of quantum mechanics. Primary emphasis is on the time-independent Schrödinger equation and its applications to simple systems such as the harmonic oscillator, the square-well potential, and the hydrogen atom without spin. The postulates of quantum mechanics will be developed in the formalism of operator observables acting on a linear state space of wave functions, in analogy with finite dimensional matrix operations on vectors.

**Office Hours** The course is conceptually challenging and will require significant effort, but I am committed to help you succeed. I have an open door policy: come by my office and discuss physics at anytime unless my door is closed (for a phone conference or approaching deadline). Please prepare by reading the assigned chapters before coming to my office, and turn off cell phones and text messaging while in my office. We will have an optional one hour homework recitation each week in my office.

**Attendance and Reading Journal** There is no credit for attendance; however, students are responsible for studying the textbook before class and keeping a personal reading journal up to date. Each day before class, students must upload a digital update of their reading journal to Canvas and submit comments and questions for class. While you have already learned most of the mathematical formalism used in the course, the concepts are unintuitive. It will take time and careful thought to organize and master the principles of quantum mechanics. Every person has their unique way of learning, so the reading journal format has flexibility to accommodate your style. However a successful journal will require one hour of effort per entry, and show evidence of creative and critical investigation of the material. It is not sufficient to outline or summarize the reading. For example, one may map out the relations between various concepts, work through derivations, plot functions, work out example problems, contemplate “what if” or “why not” questions, etc.

**Homework** Weekly homework assignments will be collected digitally on Canvas or turned in at the beginning of class. About half credit will be for custom problems and the other half for homework assigned from the textbook. There will be a penalty of 25% per class for late homework. Homework solutions will be posted to Canvas. Students are encouraged to study and discuss homework together, but must turn in their own work. A class list will be circulated to facilitate study groups.

**Group project** Two essential skills for modern physicists are collaboration with others, and numerical simulations to investigate theories or design and analyze experiments. Visual models are very helpful to conceptualize the course material. A multimodal communication project will be assigned in the second half of the semester, where each group of three students will write a computer simulation of a key concept in the course. This will be accompanied by either written or video documentation explaining the physics of the demonstration, and showing how that is illustrated in the applet. The group will give a short 8-10 minute

presentation during class showcasing their simulation and discussing their experiences creating it. See the online assignment description and grading rubric for further information.

**Exams** There will be two 3 hour midterm exams scheduled during the evening, and a cumulative final exam. The exams are closed book, with an  $8\frac{1}{2} \times 11$  in<sup>2</sup> formula sheet.

**Grading** Reading journals must be submitted online before 11:00 each class to receive credit. A buffer of five online submissions is reserved for extra credit. Arrangements must be made with the instructor before the due date to receive a homework extension. Exams will only be rescheduled for officially excused absences. Extra credit will be awarded for finding new errors in the textbook, or solving special questions posed during class. The following table shows the percentage range to guarantee each letter grade, but the instructor may upgrade the final grade based on effort and class participation.

Grade breakdown		Letter grade	
reading journal	10%	A	85–100%
homework assignments	25%	B	70–85%
group project	10%	C	55–64%
midterms exams	2×15%	D	40–54%
final exam	25%	E	00–39%

**Academic integrity** Copying homework or exams from people, solution manuals, online, or any other source is plagiarism and will not be tolerated. University policies and procedures regarding cheating and other academic conduct will be strictly adhered to and can be reviewed at [www.uky.edu/StudentAffairs/Code](http://www.uky.edu/StudentAffairs/Code).

**Course evaluation** Course evaluations are an important component of our Department's instructional program. We value your feedback on both the course content and instructor. We will use the standard university TCE eXplorance Blue (<http://www.uky.edu/eval>) to collect evaluations via your computer, tablet, or smart phone. You will receive an reminder email near the end of the semester with instructions. We would also appreciate immediate feedback at [http://www.pa.uky.edu/~crawford/phy520\\_fa16/feedback.html](http://www.pa.uky.edu/~crawford/phy520_fa16/feedback.html) and will address issues or incorporate suggestions into the course in a timely manner.

**Academic accommodations due to disability** If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center, <http://www.uky.edu/StudentAffairs/DisabilityResourceCenter>, for coordination of campus disability services available to students with disabilities.

See <http://www.ms.uky.edu/~shenz/ma113/ServicesAvailableToUKStudentsF12.pdf>  
or <http://uksga.org/resource-cheat-sheet> for student resources.