## Syllabus for PHY 520 Fall 2017

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	
Office hours:	by appointment; recitation Thursday at 8:00-9:30	
Grader:	John Gruenwald, john.gruenewald@uky.edu	
Homepage:	http://www.pa.uky.edu/~crawford/phy520_fa17	
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 if you are willing to do the necessary work. 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. There will be have an optional one hour homework recitiation 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. Reading journal entries must be submitted to Canvas before 11:00 each class to receive credit. Each entry will receive a grade of 0 (incomplete), 1 (partial), or 2 (satisfactory). The ten lowest scores will be dropped, but up to five may be kept for extra credit (even above 100%).

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 is being kept open-ended to accomodate your style. However a successful journal requires one hour of effort per entry, and must show evidence of creative and critical investigation. Examples include, but are not limited to: mapping out relations between various concepts, working through derivations, plotting functions, working out example problems, and contemplating "what if" or "why not" questions. It is not sufficient to outline, summarize, or take notes from the textbook.

**Homework** Weekly homework assignments must be turned in to Canvas before midnight of the day they are assigned. Half of the credit will be awarded for problems from the textbook, and the other half for custom problems related to my own research. There is a pentalty of 25% per class for late homework. Arrangements must be made with the instructor the day before the due date to receive a homework extension. Students are encouraged to study and discuss homework together, but must turn in their own work. Students are encouraged to use the Canvas discussion board instead of email for questions of general interest. Please respond to each other's questions. The instructor will also monitor and participate in the discussion.

**Group project** Two essential skills in modern physics are collaboration, 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 assigned during the second half of the semseter, in which 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. Exams will only be rescheduled for officially excused absences.

**Grading** Extra credit will be awarded for finding new errors in the textbook, or solving special questions posed during class. The following table shows the range for each letter grade. The instructor may upgrade the final letter grade based on effort and class participation.

Grade breakdown	Letter grade	
reading journal	10%	A 85–100%
homework assignments	25%	B $70-84\%$
group project	10%	$\mathrm{C}$ 55–69 $\%$
midterms exams	$2 \times 15\%$	$\mathrm{D}$ 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.

**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. The standard university TCE eXplorance Blue (http://www.uky.edu/eval) will be used 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\_fa17/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://uksga.org/resource-cheat-sheet for additional student resources.

**Intellectual property** Class lectures and course materials are the intellectual property of the instructor. Students may record lectures only for their own personal use. Any other use, including sharing with other students in the class, requires written permission from the instructor. Recording for any business/commercial purpose is a violation of federal IP (copyright) law and class policy, and is strictly prohibited.