

Syllabus for PHY 520 Fall 2015

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
Homepage: http://www.pa.uky.edu/~crawford/phy520_fa15
Textbook: Stephen Gasiorowicz, “Quantum Physics,” (recommended)
David J. Griffiths, “Introduction to Quantum Mechanics,” (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.

Office Hours I am committed to helping 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 turn off cell phones and text messaging while in my office. I expect you to read the textbook before coming to my office. I will hold an optional one hour problem-solving session each week in my office.

Attendance There is no credit for attendance; however, students are responsible for studying the textbook before class and keeping a personal reading journal. Each day before class, you must submit a digital update of your reading journal and fill out a short web form with information which will guide the current lecture. This is a significant aspect of the course, and the homework load will be reduced to accommodate it. While you have already learned most of the mathematical formalism which will be used in the course, quantum mechanics is conceptually unintuitive, and it will take time and careful thought to organize your understanding and master the principles of quantum mechanics. Every person has their unique way of learning, so the format of the reading journal is flexible by design; however, a successful journal will require an hour of effort per entry, and show evidence of creative and critical investigation of the material, not just an outline or summary of the textbook. 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. Before class, I will scan the web form and tailor the lesson to individual comments and questions.

Homework Since quantum mechanics deals with physics outside the realm of ordinary experience, it is necessary to create your own intuition by working through homework problems. Problems very similar those in the standard text books will be assigned and due at the beginning of class each week. Homework solutions will be posted to the website. Students are encouraged to study and discuss homework together and a class list will be circulated the first day of class to facilitate this; however students must turn in their own work as part of their academic integrity.

Group project Two essential skills for modern physicists are proficiency in collaborating with others, and the use of numerical simulations to investigate theories or design and analyze experiments. Moreover, the principles that distinguish quantum mechanics from classical mechanics are counterintuitive on many levels, and it is important to have visual models with which to relate important concepts. The capstone

multimodal communication assignment in our class is a project in which groups of three students will write a web application which simulates a key concept of the class. This will be accompanied by either written or video documentation which explains the physics of the demonstration, and shows how that is illustrated in the applet. The group will give a short 8-10 minute presentation of their simulation and experience creating it during class. See the online assignment description and grading rubric for further information.

Exams There will be two untimed midterm exams and a cumulative final exam. The exams are closed book, but an $8\frac{1}{2} \times 11$ in² formula sheet is allowed. We will try to schedule these exams during the evening to reduce the pressure of a 1 hour exam.

Grading Reading journals and web forms 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 in order 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.

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_fa15/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.