



NAZARBAYEV  
UNIVERSITY

**PHYS 451: Quantum Mechanics I – Spring 2017**  
**Course Syllabus**  
**Nazarbayev University, School of Science and Technology**  
**Department of Physics**

**Location & Contact Info**

Instructor: Sergiy Bubin

Lecture Hours: Tue,Thu 12:00 PM - 1:15 PM in room 7.427

Recitations: Fri 1:00 PM - 1:50 PM in room 7.427

Office Hours: Tue,Thu 3:00 PM - 4:00 PM in room 7.204 (or by appointment)

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Course Website: <http://sergiybubin.org/teaching.html>

**Course Description** In this course, students learn the basics of non-relativistic quantum mechanics. The course introduces the concept of the wave function, its interpretation, and covers the topics of potential wells, potential barriers, quantum harmonic oscillator, and the hydrogen atom. Next, a more formal approach to quantum mechanics is taken by introducing the postulates of quantum mechanics, quantum operators, Hilbert spaces, Heisenberg uncertainty principle, and time evolution. The course ends with topics covering the addition of angular momenta, spin, and some basic aspects of many-body quantum mechanics. The course will include two lectures per week accompanied by a recitation.

**Required Textbook**

David J. Griffiths, *Introduction to Quantum Mechanics* (2nd Edition)

**Other Useful References** Many other texts exist on quantum mechanics at the introductory level, some can be found in the library, and can also be very useful in this course. Students are encouraged to explore those. Examples are:

- Richard Liboff, *Introductory Quantum Mechanics* (4th Edition)
- Robert Scherrer, *Quantum Mechanics: An Accessible Introduction*
- Robert Eisberg, David O. Caldwell, and Richard J. Christman, *Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles*
- Ira N. Levine, *Quantum Chemistry* (6th Edition)

**Grading Policy** The course will be graded based on the cumulative score. The minimum cumulative percentages necessary for obtaining the following letter grades are:

Letter grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F
Min. %	95.0	90.0	85.0	80.0	75.0	70.0	65.0	60.0	55.0	50.0	<50.0

There will be two midterm and one final exam. Homework will be assigned every 1-2 weeks. In addition, several short quizzes will be given on random dates. The problems in quizzes may be related to the material in recent lectures or resemble the problems in recent homeworks. The cumulative scores for the letter grades will be computed as follows:

Homework	10%
Quizzes	10%
Midterm 1	20%
Midterm 2	20%
Final Exam	40%

An extra credit (up to 2%) may be earned through active participation in recitations and lectures. Any homework/quiz/exam requested to be regraded must be brought no later than one week after it was given back to the students. Also, this instructor reserves the right to regrade the entire homework/quiz/exam as grading mistakes happen in both directions. Hence, there is a theoretical possibility that a student may get a lower total score after his/her work is regraded.

Some partial credit will be given for those homework/quiz/exam problems where a student demonstrates relevant knowledge of physical concepts and makes mistakes in, say, algebraic manipulations. However, students should not expect that they will automatically get some partial credit for “effort” by simply writing a bunch of irrelevant expressions or copying basic equations out of a textbook or formula sheet.

No late homework assignments will be accepted. One homework with the lowest score will be dropped. There will be no make-up for any of the exams, unless there is a serious and well documented reason for missing it.

**Homework/Exam Submission Guidelines** In order to ensure unbiased evaluation of students’ performance all homeworks, quizzes, and exams should be submitted in the following format:

- Solutions are written on standard white paper of size A4 (blank white paper will be provided for exams and quizzes)
- Do not write your name on the front page! Use your Student ID # instead.

Homeworks and exams must show sufficient proof that a derivation of the solution was carried out and the answers are not just copied from somewhere or guessed. Solutions or answers turned in without explanation will receive no credit. A student who wants to have the best possible grade for a homework assignment must:

- Staple pages together and clearly indicate problem numbers
- Turn in neat and readable work as points may be deducted otherwise

Homeworks are normally expected to be submitted in the paper form. However, electronic submissions via email (e.g. a pdf file of scanned pages) are acceptable for those students who are away or must miss a class when the homework is due.

**Academic Integrity** Students are expected to follow Nazarbayev University student code of conduct, which can be found at <http://registrar.nu.edu.kz/policies-and-procedures>, and adhere to the principles of truth and academic honesty. Students who infringe upon the code of conduct will be subject to sanction. While students are strongly encouraged to discuss the conceptual points of the homework problems among themselves, plagiarism is strictly prohibited and will not be tolerated. No collaboration, notes, books, calculators, or use of mobile phones will be allowed during the exams.

**Communication** Email communication with students is important for this course. Students are encouraged to use email for quick correspondence regarding lecture material, homework problems, and anything else that does not require long explanations (for which office hours exist). It is students’ responsibility to check their NU email regularly as important announcements, homeworks corrections, *etc.* may be sent.

Homework assignments, solutions to homework assignments, exam solutions, and other relevant materials (including this syllabus) will be made available in the electronic form on the course website. Neither homework assignments nor solutions will be handed out to students in paper form in classroom.