

Quantum Mechanics

PHYS 4115, Fall 2020

Basic information

Lecturer: Prof. Dima Krioukov

Office: 177 Huntington Ave, 2nd floor, office 227

Email: dima@northeastern.edu

Lecture hours: Mon, Wed, 2:50PM-4:30PM

Classroom: Ryder Hall 435

Office hours: Wed, 11:11AM-2:22PM by appointments only. Appointments must be made at least 24hrs in advance. You should bring your ID when coming to 177 Huntington – the building is secured.

Textbook: *A Modern Approach to Quantum Mechanics*, 2nd Edition, by John S. Townsend, University Science Books, 2012

Background reading: *Philosophy of Physics: Quantum Theory*, by Tim Maudlin, Princeton University Press, 2019

Course description and objectives: Discusses the most important experiments with quantum systems, and how they justify the basic axioms of quantum mechanics. Considers quantum spin systems in static and dynamical settings using advanced topics that include Hilbert spaces and the representation theory of orthogonal and unitary groups and algebras. Introduces the Schrödinger equation and its solutions for one-dimensional systems, such as time evolution of Gaussian wave packets and quantum particles in potential wells.

Grading

The grades will be based on the following components:

- Homework 30%
- Midterm Exam 30%
- Final Exam 30%
- Proof of TRACE Evaluation 10%

The scores on these components will be weighted as indicated above to determine the average weighted total score in the class. The difference between this score and 82.5 (mid-B) will then be added to all individual weighted total scores. The resulting scores will be used to determine the individual grades according to the following table:

- A 92-100
- A- 88-92
- B+ 85-88
- B 80-85
- B- 70-80
- C+ 68-70
- C 65-68
- C- 60-65

Homework: Homework assignments will be announced in the class and via Canvas after a textbook chapter is finished in the class. The assignments will be due typically in one week after the announcement and will have to be emailed to the TA (TBD). No late homework assignments will be accepted under any circumstances. One lowest homework score will be dropped. Homework assignments will be problems from the textbook. Some homework problems will be based on the material in textbook reading assignments not covered in the class.

Midterm: There will be one take-home midterm exam. The exact date is TBD.

Final: The take-home final exam will be distributed during the week of finals. The midterm and final exam solutions will have to be returned via email by TBD deadlines.

The problems in the midterm and final exams will be based on the material covered in the class *and* in the homework assignments. Both exams will have the pledge-of-honor pages that will be collected and stored indefinitely. All other exam-related details will be announced in the class and via Canvas.

Proof of TRACE evaluation (e.g. a submission screenshot) must be emailed to dima@northeastern.edu by a TBD deadline. All the TBD dates and deadlines will be announced in the class and via Canvas.

Reading and material covered

Not all the chapters in the textbook will be covered, and no covered chapter will be covered in full. Since some homework problems will be based on the textbook material not covered in the class, reading the corresponding parts in the textbook will be required. Reading a chapter in full *before* it is covered in the class is strongly encouraged. This way you can focus on asking questions during the class to clarify concepts you did not understand in the textbook. Such questions are strongly encouraged. Some extra material not contained in the textbook will be also covered in the class. Keeping good notes is thus strongly encouraged, especially because the exams may contain problems based on this material. The foundations/interpretations of quantum mechanics will be mentioned but not covered at any depth. Students who find these matters interesting are encouraged to read the excellent background reading book mentioned above (by T. Maudlin, a philosopher).

Class and exam policies

No phone, tablet or laptop use is allowed in the class. Everything else is allowed in the class and at the midterm exam. That is, the textbook, class notes and homework solutions are all allowed at the midterm exam. Everything is allowed on the final exam. No collaborations, consultations, or help from anyone in any form is allowed at either exam.

Academic Integrity Policy

The Northeastern University Policy on Academic Honesty can be found at:

<http://www.northeastern.edu/osccr/academic-integrity-policy/>