

PHYS-4710: QUANTUM MECHANICS Syllabus, Spring 2018

Instructor

Oscar Varela

SER 238

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Office hours: Tue, Thu 3.00 – 4.00 pm, or by appointment.

Meeting times

Tue, Thu 1.30 – 2.45pm, SER 122.

Teaching Assistant

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Recitations

Wed 3.00 – 4.00 pm, SER 122.

Course description

Foundations and applications of Quantum Physics. Survey of the basics of quantum physics and its applications to the theory of particles, atoms, molecules and solids. Problem solving techniques based on perturbative methods will be developed.

Subjects covered include:

- Indistinguishability of quantum mechanical particles.
- Quantum statistics
- Time-(in)dependent perturbation theory and applications
- Variational principle and the ground state of Helium
- The WKB approximation

Goals

- Become familiar with the basics of quantum physics.
- Be able to compute probabilities for processes and transitions using quantum mechanical prescriptions.
- Understand the basics of perturbative methods in physics.

Text

The course will be based on the following textbook:

- D.J. Griffiths, *Introduction to Quantum Mechanics*, second edition, Cambridge University Press, 2017.

Another book of similar level that I find useful is:

- R. Eisberg, R. Resnick, *Quantum Physics of atoms, molecules, solids, nuclei and particles*, second edition, John Wiley & Sons, 1985.

More advanced texts include:

- J.J. Sakurai, *Modern Quantum Mechanics*, revised edition, Addison Wesley, 1993.
- S. Weinberg, *Lectures on Quantum Mechanics*, second edition, Cambridge University Press, 2015.

Homework

Homework sets will be posted on Canvas every two weeks. The sets will contain selected problems from the textbook. Homework will be due one week after it is posted.

Exams

There will be a midterm before Spring break and a final exam.

Grading

The final grade will be based on the homework and final exam according to the following weights:

- Homework: 40%
- Midterm exam: 30%
- Final exam: 30%