PHYSICS 362 / 274,
Quantum Mechanics II / Applications of QM
Spring 2023

Instructor: Valeri Kotov

Office: Innovation Hall E207
E-mail: Valeri.Kotov@uvm.edu
Phone: (802) 656-4548

Lectures: MWF, 9:40 am - 10:30 am
in Lafayette L406

Office hours: Wednesdays 1-3 pm, or by appointment

Textbooks: (1) J.J. Sakurai and J. Napolitano,
Modern Quantum Mechanics, 2-nd Edition,
Cambridge University Press, 2017
ISBN: 9781108422413

We will also use:

(2) “Introduction to Quantum Mechanics,”
by David J. Griffiths and D.F. Schroeter, 3-rd edition,
Cambridge Univ. Press, 2018
or, “Introduction to Quantum Mechanics,”
by David J. Griffiths, 2-nd edition, Prentice-Hall, 2005
(these are practically the same)

Reading material and homework assignments will be given from the above textbooks.

Other books:

"Principles of Quantum Mechanics," 2-nd edition, R. Shankar, Plenum Press, 1994. (advanced undergraduate/graduate text; also contains Dirac equation and path Integrals)

"Quantum Mechanics (Non-relativistic Theory)," 3-rd edition, L.D. Landau and E.M. Lifshitz, Pergamon Press, 1991. (comprehensive classic text as part of the famous Landau-Lifshitz theoretical physics course (Volume 3))

Prerequisites: Good working knowledge of Quantum Mechanics at undergraduate level.

General Course Description: This is a graduate course devoted to advanced topics in quantum mechanics. We will cover:

1. Dirac's bra-ket formalism.
2. Quantum Dynamics (including Feynman path integral approach to quantum mechanics).
3. Theory of Angular Momentum.
4. Symmetry operations in quantum mechanics.
5. Advanced topics in perturbation theory (including time-dependent perturbations and Berry's phase).
6. Selected topics in scattering theory.
7. Identical particles and Second Quantization.
   Quantization of the Electromagnetic Field.
8. Introduction to Relativistic Quantum Mechanics.
   Dirac Equation.

Homework/Exams/Grades: Homework will be assigned on a regular basis. There will be one midterm and a final exam, possibly/probably take-home (the final). Grades will be based on the homework (roughly 50%), and the exams (50%).