University of California Los Angeles

EE 270 Syllabus
Applied Quantum Mechanics
Fall 2017

Prof. F. Grillot
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Class Times and Location
Monday & Wednesday 8-10 AM (Boelter 9436).

Office Hours
Tuesday & Thursday 10-11 AM (66-144 Engr. IV).

Course Website
https://eeweb.ee.ucla.edu
Please make sure your email is entered on the eeweb website in order to receive course email.

Midterm Exam
Tuesday, November 21, 10-1145 AM [closed book], to be confirmed.

Final Exam
Presentation (oral) based on a research paper (December), to be confirmed.

Grading policy
HW (19%), Midterm (40%) + Presentation (40%), Survey (1%)
There will be **4 HWs assigned**, **typically due every 2-3 weeks in class**.
Instructor reserves the right to use his judgment rather than strict formulae when determining final grades.

Topics to be covered (tentative)
Postulates, Schrödinger equation, Fourier transform, Ehrenfest's theorem, Hilbert Space, Observable, Commutation, Infinite well, Bound and Scattering States, Finite Well, Asymmetric double well potential, Tunneling effect, Chemical bond, Stability of Matter, Wave-packet, Quantum harmonic oscillator, Photon polarization, Stern and Gerlach experiment, Angular momentum and spin, Bell's theorem, Entanglement, Perturbation theory, Central force problem, Hydrogen atom, Fermi golden rule, Field quantization, Fermions & bosons, indiscernibility, Krönig-Penney's model, Nonlinear chaotic dynamics in quantum systems.
The exact choice and order of coverage may be adjusted or enhanced during the course.

The course will also give various applications of quantum mechanics in our daily life
→ Telecommunications, Microelectronics)
→ Nuclear Magnetic Resonance
→ STM microscopy
→ Quantum cryptography
→ Astrophysics (neutrino oscillation)
→ Spintronics

Resources
I do not plan to follow a specific textbook. The lectures will present complementary viewpoints and topics. However the following references can be considered to grab more information.
1. D. J. Griffiths, Introduction to Quantum Mechanics.
2. R. Liboff, Introductory Quantum Mechanics.
3. P. L. Hagelstein, S. D. Senturia, and T. P. Orlando, Introductory Applied Quantum & Statistical Mechanics.
4. R. P. Feynman, The Feynman Lectures on Physics, Volume III: Quantum Mechanics.
5. C. Cohen-Tannoudji, B. Diu, and F. Laloe, Quantum Mechanics.
6. J. J. Sakurai, Modern Quantum Mechanics.