PHYSICS 400 – Quantum Mechanics –

SPRING 2019

Instructor: Luis Anchordoqui, Gillet 132, phone: 347-577-4119, E-mail: luis.anchordoqui@gmail.com

Texts: Lecture notes available @ https://arxiv.org/abs/1512.04361

Course website: http://www.lehman.edu/faculty/anchordoqui/400.html

Lectures: Tuesdays and Thursdays 4:00 – 5:40 PM, Gillet 331. Lectures begin January 29, 2019.

Office Hours: Tuesdays and Thursdays. 5:40 – 6:10 PM

Worksheets: Homework sets are available on the course website. Each homework set consists of questions used as worked examples in lecture, questions covered during discussion, and questions assigned as homework exercises.

Tests: Three tests will be given during the semester. **Midterm Exams**: March 7, April 9, May 14

Final: There will be a comprehensive final exam; Thursday May 21, 2019 3:45 -5:45 PM.
The final is mandatory and you are responsible for making sure that you can attend at this time.

Grading policy: The overall course grade will be determined as follows:
20 % - from quizzes
45% - midterm exams (15% each)
35% - comprehensive final exam

Letter grades will be assigned according to the guidelines

A = 90 - 100
B = 80 - 90
C = 65 - 80
D = 50 - 65
F = below 50

The cutoffs for +'s and -'s will be decided at the end of the semester.

Provisional Course Outline

(Please note this may be revised during the course to match coverage of material during lectures, etc.)

1st week: *Forging mathematical tools for quantum mechanics: elements of linear algebra and generalized functions*

2nd week: *Origins of quantum mechanics: blackbody radiation and photoelectric effect*

3th week: *Origins of quantum mechanics II: line spectra of atoms, wave particle duality, and Heisenberg's uncertainty principle*

4th week: *Introduction to wave mechanics: Schrödinger's equation, expectation values, observables, and operators*

5th week: *Solutions to Schrödinger's equation in one dimension I: motion of a free particle, transmission and reflection at a barrier, and barrier penetration*

6th week: *Solutions to Schrödinger's equation in one dimension II: potential wells*

7th week: *Solutions to Schrödinger's equation in one dimension III: delta-function and harmonic oscillator potentials*

8th week: *Time evolution operator: application to a two-state system (the ammonia maser)*

9th week: *Schrödinger's equation in three dimensions: central potentials*

10th week: *Schrödinger's equation in three dimensions II: introduction to hydrogenic systems*

11th week: *Stern-Gerlach experiment and two-state systems: probability, interference, and entanglement*

12th week: *Identical particles: symmetry and asymmetry of the wave function (fermions and bosons), Pauli's exclusion principle, helium atom, quantum gases*