Physics 601 – QUANTUM MECHANICS

Daniel G. Suárez-Forero

email. suarez@umbc.edu

Class Meets: Mon, Wed., Fri. 9:00-9:50 am.

Room: Physics 107

Office: Physics building 410, Office Hours: Wed 10:00-11:00 am (virtually or in-person)

Course overview and objective: Postulates, systems with multiple degrees of freedom, harmonic oscillator, Heisenberg uncertainty relation, symmetries and consequences, rotational invariance and angular momentum, and spin.

Upon successful completion of the course, you will know how to "use" quantum mechanics to understand and explain physical phenomena.

Course format & expectations: *Attendance* at lecture sessions (lectures and office hours) is highly encouraged.

Course Website: Information, grades, and course materials will be posted on the Blackboard System. If you have problems accessing the website, please let me know immediately.

Prerequisites: Linear Algebra – eigenvalues and eigenvectors, spectral decomposition, Hermitian and unitary matrices, etc; Fourier transforms; Griffiths-level quantum mechanics.

Recommended Texts: *The course will follow the book:*

- Quantum Mechanics. A modern development. L.E. Ballentine

Homework policy: Homework will be assigned on approximately weekly basis and will be due the following week (upload to Blackboard). Homework will not be accepted after the due date. To solve some problems, you might need a working knowledge of MATLAB, Python, Mathematica or similar scientific computing software.

Exams: Mid-term test and the final exam will be completed in one sitting during class hours. Please contact me at least a week in advance if a potential conflict arises.

Grading: Midterm 30%, Final 40%, Homework 30%. 92.1 – 100 A, 84.1 – 92 A-, 76.1 – 84 B+, 68.1 – 76 B, 60.1 – 68 B-, with the pattern repeating for C and D grades; 60 or less is a failing grade.

Academic Honesty: You are expected to abide by the provisions and the spirit of the UMBC Values for Academic Integrity. You are encouraged to discuss homework problems with other students, but the actual work must be independent. Exact copies of results will be treated as plagiarism, which constitutes academic dishonesty.

Feedback: I highly value student feedback during the course. Please feel free to email me, post on Blackboard or drop a note in my mailbox in the Physics building, if you prefer anonymity. I will provide both individual and group feedback on HWs/exams through grading and in-class discussions.

NOTE: IF THERE ARE SPECIAL CONDITIONS THAT WILL AFFECT YOUR PERFORMANCE IN THIS COURSE, LET ME KNOW IMMEDIATELY.

Tentative schedule

Week	Topic
Aug 27-29	Introduction
Sep 3-5, 2025	A Primer on Linear Algebra
Sep 8-12	Formulation of Quantum Mechanics
Sep 15-19	Time evolution
Sep 22-26	Coordinate representation
Sep 29-Oct 1	Midterm 1
Oct 3-10	Momentum representation
Oct 13-17	Quantum Harmonic Oscillator
Oct 20-24	Angular Momentum - I
Oct 27-31	Angular Momentum - II
Nov 3-5	Midterm 2
Nov 7-14	Measurement in quantum mechanics
Nov 17-24	The hydrogen atom
Dec 1-8	Other bound states
Dec 15	Final exam