

PHYS 4707: Introduction to Quantum Mechanics I - Fall 2021

Mondays and Wednesdays, 16.05-17.25, 360 TB

<p style="text-align: center;">Professor Dr. Seyda Ipek (pronounced Shae-duh E-peck) 3348 HP, seydaipek@cunet.carleton.ca Pronouns: she/her Student hours: Tue and Thu 10.30-11.30am or by appointment</p>	<p style="text-align: center;">Teaching Assistant Carlos Henrique de Lima carloshenriquedelima@cmail.carleton.ca Pronouns: he/him Student hours: By appointment</p>
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First and Last day of class: Sep 8 - Dec 10, 2021 (see below for detailed schedule)

Class website: Brightspace

Book (recommended): *Quantum Physics*, 3rd Edition, Stephen Gasiorowicz, Wiley, 2003.

What you will learn: Fundamental postulates of quantum mechanics, their mathematical description and application to 1D systems with various potentials, e.g. Delta function, harmonic oscillator, operator methods and how to apply it to solve systems involving angular momentum and spin.

Course Assessment

- **Homeworks (40%)** There will be 6-7 problem sets. They will be given out on a Monday and will be collected the following Monday. Late homeworks will not be accepted without a reasonable excuse. You are encouraged to work with others, but **the work you turn in must be yours.** Homework is a very important part of your learning. You should use the office hours or contact me if you need help. Read the Homework section of the course webpage for more detailed info.
- **Midterm (20%)** There will be one midterm, *tentatively* scheduled for Oct 20 during class time.
- **Final (40%)** The final exam will be given during the finals week.

Please make yourselves familiar with the Department of Physics academic policies:

<https://research.physics.carleton.ca/current-undergraduate-students/academic-policies>

Deferred final exams will be permitted for documented reasons (illness, injury or other extraordinary circumstances beyond the student's control). For more information, please see Section 4 of the Academic Regulations of the University:

<http://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/>

Academic Accommodations

Write to me with any requests for academic accommodation due to pregnancy or religious obligations during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website: <http://www2.carleton.ca/equity/>

The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities, psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder, Autism Spectrum Disorders, chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made.

Tentative Schedule

Week 1	Sep 8, Wed	Welcome! Review of syllabus, introductions, Schrödinger equation, particle in a box
Week 2	Sep 13, Mon Sep 15, Wed	The potential barrier, WKB approximation, tunneling
Week 3	Sep 20, Mon: Quiz due Sep 22, Wed: <i>Last day to change courses or sections (including auditing) for fall term.</i>	Delta function potential, the harmonic oscillator
Week 4	Sep 27, Mon: HW1 due Sep 29, Wed <i>Sep 30, Thu: Last day to withdraw from fall term and fall/winter courses with a full fee adjustment.</i>	Wave mechanics, observables, vector spaces and operators
Week 5	Oct 4, Mon: HW2 due, course survey due Oct 6, Wed <i>Oct 8, Fri: Dec examination schedule available online.</i>	Operator methods, projection operator
Week 6	Oct 11, Mon: <i>Statutory holiday, no class</i> Oct 13, Wed	The energy spectrum of the harmonic oscillator, the time dependence of operators
Week 7	Oct 18, Mon: HW3 due Oct 20, Wed: Midterm	Review Midterm
Week X	Oct 25, Mon: Fall break, <u>no class</u> Oct 27, Wed: Fall break, <u>no class</u>	<i>Have a nice break!</i>
Week 8	Nov 1, Mon Nov 3, Wed	Angular momentum
Week 9	Nov 8, Mon Nov 10, Wed <i>Nov 12, Fri: Last day to request Formal Examination Accommodation Forms for December examinations to the PMC</i>	3-dimensional potentials, the hydrogen atom
Week 10	Nov 15, Mon: HW4 due Nov 17, Wed	Matrix representation of operators
Week 11	Nov 22, Mon: HW5 due Nov 24, Wed	Spin
Week 12	Nov 29, Mon: HW6 due Dec 1, Wed	Spin, Entanglement
Week 13	Dec 6, Mon: HW7 due Dec 8, Wed Dec 10, Fri: Monday schedule, Last day of class	Time-independent perturbation theory Review
Week 14	Dec 11-23: Final examinations	<i>Good luck!</i>