

Univ. of Winnipeg Dept. of Physics  
Fall/Winter 2015-16

## PHYS-3301 Quantum Mechanics I Revised Outline for Winter

Lecture Times: MWF 9:30-10:20AM

Room: 3M67

Instructor: Dr. Andrew Frey

E-mail: a.frey@uwinnipeg.ca

Office: 2L26

Office Phone: 204-786-9215

WWW: Winter – <http://ion.uwinnipeg.ca/~afrey/FW1516/qm1/>

Office Hours: W 1:30-2:30PM or by appt

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### Course Description

This course provides an introduction to 20th century physics, specifically special relativity and quantum mechanics. There will also be a brief discussion of Newtonian and statistical mechanics.

### Textbooks

There are two required texts, but others may be helpful.

- **Required:** *Introduction to the Relativity Principle* by Barton
- **Required:** *Quantum Mechanics* by Scherrer
- **Supplementary:** Notes by Hogg at <http://cosmo.nyu.edu/hogg/sr/>

In addition, some extra reading (from other texts, journal articles, etc) may be assigned.

### Topics

In the winter term, we will discuss

- Quantum and Statistical Mechanics
  - Hydrogen Atom
  - Quantum Statistics
  - Distribution functions
- Special Relativity
  - Relativity in Newtonian Mechanics
  - Rotations
  - Einsteinian Relativity Principle
  - Lorentz Transformations & Invariants
  - 4-Vectors & The Metric
  - Relativistic Momentum & Energy
  - Particle Collisions
  - Doppler Effect

Not all topics above will be covered equally. Also, some topics may be skipped, added, or substituted due to time constraints.

### Assignment Policies

**Homework:** In the **winter term**, assignments will be posted on the course web page (see above) in PDF format approximately once per week, and you will be notified in class. They will **NOT** be handed out in class, so you must notify the instructor if you cannot access the assignments! The assignment will then be due by 10:59PM at the labeled drop box outside office 2L26 on the due date (the due date will be listed on the web page and the assignment). Make sure to label assignments with your name and “QML.” Alternately, you may email typed or scanned (*not photographed*) assignments to the instructor. Homework solutions will be posted on the course web page as soon as possible after the homework is due. Collaboration on the problems is allowed, but each student must write up the solutions independently. Late assignments will **not** be accepted without prior permission from the instructor.

**Exams:** No electronic equipment is allowed during either in-class tests or the final exam, except at the discretion of the instructor. Students should be prepared to present identification at tests and exams.

**Religious Holidays:** You may choose not to attend class or write tests/examinations on holy days of your religion, but you must notify me at least two weeks in advance. If so, I will provide the opportunity to make up work without penalty.

**Organization:** Your homework and exam solutions should be written (or typed) neatly with steps explained *as if you were writing a research paper or lab report*. Not all algebra need be shown if the steps are explained in words; however, showing your work may improve your credit if you make a mistake. Homework that is not neatly organized and written will not be graded and will be given **zero credit** (one warning will be allowed). In addition, multiple pages must be stapled together.

## Evaluation

**Grades:** Grades will consist of the following components:

- Homework Assignments: 28%
- October In-Class Test: 12%
- December Exam: 30%
- Final Exam: 30%

Guidelines for the assignment of numerical percentage grades to letter grades are as follows:

- A+ = 95-100%
- A = 87-94%
- A- = 80-86%
- B+ = 74-79%
- B = 67-73%
- C+ = 61-66%
- C = 53-60%
- D = 50-52%
- F = 0-49%

Note that these are guidelines. Final grades shall be approved by the Department Review Committee and may be subject to change.

**Appeals and Misconduct:** See the **Regulations and Policies** section of the **Academic Calendar** regarding appeals and academic misconduct. Note that use of solutions from other courses, previous years, or from the textbook publisher will be considered cheating. Students facing a charge of academic or non-academic misconduct may choose to contact the University of Winnipeg Students' Association (UWSA) where a student advocate will be available to answer any questions about the process, help with building a case, and ensuring students have access to support. For more information or to schedule an appointment, visit our website at <http://www.theuwsa.ca/academic-advocacy> or call 204-786-9780.

**Exam & Other Important Dates:** Dates to note for winter include

- Voluntary Withdrawal Date: Jan 20, 2016
- Reading Week: Feb 14-20, 2016
- Last Lectures: April 4 & 5, 2016
- Final Exam: April 12, 2016, 1:30PM, 3M67  
(subject to university scheduling)

## Miscellaneous

**Emails:** I may at times need to communicate with the class as a whole via email, which will be through your official university email address. Please check that account.

**Accessibility Services:** Students with documented disabilities, temporary or chronic medical conditions, requiring academic accommodations for tests/exams (e.g., private space) or during lectures/laboratories (e.g., note-takers) are encouraged to contact Accessibility Services (AS) at 204-786-9771 or [accessibilityservices@uwinnipeg.ca](mailto:accessibilityservices@uwinnipeg.ca) to discuss appropriate options. All information about a student's disability or medical condition remains confidential. <http://www.uwinnipeg.ca/accessibility>.

**Data Collection:** Students who plan to conduct research interviews, focus groups, surveys, or any other method of collecting data from any person, even a family member, must obtain the approval of the appropriate ethics committee before commencing data collection. Exceptions are research activities in class as a learning

exercise. See <http://www.uwinnipeg.ca/research/human-ethics.html> for submission requirements and deadlines.

**Respectful Working and Learning Environment Policy:** All students, faculty, and staff have the right to participate, learn and work in an environment that is free of harassment and discrimination. The UW Respectful Working and Learning Environment Policy may be found online at [www.uwinnipeg.ca/respect](http://www.uwinnipeg.ca/respect).

**Scent-Free:** We ask that you please be respectful of the needs of classmates and instructors/professors by avoiding the use of unnecessary scented products while attending lectures. Exposure to scented products can trigger serious health reactions in persons with asthma, allergies, migraines, or chemical sensitivities. Please consider using unscented necessary products and avoiding unnecessary products that are scented (e.g. perfume).