

PHYS 2380 Quantum Physics 1

January 2017

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Office Hours: Monday, Wednesday and Friday, 14:30 - 15:30, other times by appointment or drop-in
Course Website: <http://www2.physics.umanitoba.ca/rogers/phys2380/>
Lectures: 315 Buller Bldg.
Monday, Wednesday and Friday – 13:30 – 14:20
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Required Textbook:

Modern Physics by Paul A. Tipler and Ralph A. Llewellyn (6th edition) ISBN 978-1-4292-5078-8 (W. H. Freeman & Company, 2012)

Other Books:

Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles (2nd edition) by Robert Eisberg and Robert Resnick, ISBN 0-471-87373-X (John Wiley & Sons, 1985)

Quantum Physics by Stephen Gasiorowicz (3rd edition) ISBN 0-471-05700-2 (John Wiley & Sons, 2003)

Introduction to Quantum Mechanics by David J. Griffiths ISBN 0-13-124405-1 (Prentice Hall, Inc. 1995)

Fundamentals of Modern Physics by Robert Eisberg

Evaluation Procedure:

Event	Value	Date	Location
Assignments (5, ~biweekly)	20%	See schedule	
Mid-term Test (2 hours)	30%	TBA (~March 13)	TBA
Final Exam (3 hours)	50%	TBA (during exam period, Apr. 22-29)	TBA

Assignments must be submitted on time unless a documented and approved reason exists. Penalties of 25% per day will be assessed for late submissions.

Please attach the form found at:

**http://umanitoba.ca/faculties/science/resources/Science_HonestyDeclarationIndividual_June2013.pdf
in front of any material you hand in for credit.**

A Schedule A document is posted on the course website. This document reviews various University and Unit policies regarding academic integrity, student discipline and a respectful learning environment, as well as providing a review of resources and support available for students.

PLAGIARISM AND CHEATING

To plagiarize is to take the ideas or words of another person and pass them off as one's own. In short, it is stealing something intangible rather than an object. Obviously it is not necessary to state the source of well-known or easily verifiable facts, but students are expected to acknowledge the sources of ideas and expressions they use in their written work, whether quoted directly or paraphrased. This applies to diagrams, statistical tables and the like, as well as to written material, and materials or information from Internet sources. To provide adequate documentation is not only an indication of academic honesty, but also a courtesy which enables the reader to consult these sources with ease. Failure to do so constitutes plagiarism. **It will also be considered plagiarism and/or cheating if a student submits a term paper written in whole or in part by someone other than him/herself, or copies the answer or answers of another student in any test, examination or take-home assignment.**

Plagiarism or any other form of cheating in examinations or term tests (e.g., crib notes) is subject to serious academic penalty (e.g. expulsion from the faculty or university). A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty. For more detailed information please see:

<http://umanitoba.ca/faculties/science/undergrad/resources/webdisciplinedocuments.html>

EXAMINATIONS: PERSONATIONS

A student who arranges for another individual to undertake or write any nature of examination for and on his/her behalf, as well as the individual who undertakes or writes the examination, will be subject to discipline under the university's Student Discipline Bylaw, which could lead to suspension or expulsion from the university. In addition, the Canadian Criminal Code treats the personation of a candidate at a competitive or qualifying examination held at a university as an offence punishable by summary conviction. Section 362 of the Code provides:

Personation at Examination

362: Everyone who falsely, with intent to gain advantage for him/herself or some other person, personates a candidate at a competitive or qualifying examination held under the authority of law or in connection with a university, college or school or who knowingly avails him/herself of the results of such a personation is guilty of an offence punishable on summary conviction. 1953-54, c.51, s.347.

Both the personator and the individual who avails him/herself of the personation could be found guilty. Summary conviction could result in a fine being levied or up to two years of imprisonment.

IMPORTANT NOTE FROM THE DEAN OF SCIENCE

It is your responsibility to ensure that you are entitled to be registered in this course. It means that you have:

- the appropriate prerequisites, as noted in the calendar description, or have permission from the instructor to waive these prerequisites;
- not previously taken, or are concurrently registered in, this course and another that has been identified as "not to be held with" in the course description. For example, BIOL 1000 cannot be held for credit with BIOL 1020.

The registration system may have allowed you to register in this course, but it is your responsibility to check. If you are not entitled to be in this course, you will be withdrawn, or the course may not be used in your degree program. There will be no fee adjustment. This is not appealable. Please be sure to read the course description for this and every course in which you are registered.

Calendar listing PHYS 2380 – Quantum Physics 1

(Formerly 016.238) The first in a sequence of three courses on Quantum Physics. This course introduces the basic principles of quantum theory including cavity radiation and Planck’s postulate., wave-particle duality, the Bohr model, and the Schrodinger theory of quantum mechanics. Special emphasis is placed on the derivation of the time-independent Schrodinger equation and its solutions in one dimension. Not to be held with the former 016.250. Prerequisites: PHYS 1070 or PHYS 1071 (or 016.107) (C) and one of MATH 1690 (or 136.169) (C), MATH 1700 or MATH 1701 (or 136.170) (C), MATH 1710 (or 136.171) (C), MATH 1730 (or 136.173) (C).

3.000 Credit Hours

Tentative Schedule for PHYS 2380 Quantum Mechanics 1, Winter 2017

Date	Day	Lecture	Assignment	Lecture Topic
Jan 18	Wed	1		Introduction: Matter, interactions and relativity
Jan 20	Fri	2		Black body radiation
Jan 23	Mon	3		Black body radiation
Jan 25	Wed	4		Statistical quantities
Jan 27	Fri	5	Assig. 1	Bohr atom
Jan 30	Mon	6		Wave-particle duality (Ch. 5)
Feb 1	Wed	7		de Broglie waves, Uncertainty
Feb 3	Fri	8		
Feb 6	Mon	9		Born interpretation
Feb 8	Wed	10	Assig. 2	Zero-point energy
Feb 10	Fri	11		
Feb 13	Mon	12		Schrodinger Equation in 1D (Ch.6)
Feb 15	Wed	13		Interpretation and solutions
Feb 17	Fri	14	Assig. 3	Free particles, infinite wells
Feb 20	Mon		Louis Riel Day	
Feb 22	Wed		Mid-term Break	
Feb 24	Fri		Mid-term Break	
Feb 27	Mon	15		Step and barrier potentials
Mar 1	Wed	16	Assig. 3 Due	
Mar 3	Fri	17		Finite well, expectation values
Mar 6	Mon	18		Probability currents
Mar 8	Wed	19		1-D Simple harmonic oscillator
Mar 10	Fri	20		
Mar 13	Mon		Term test	Time and Location TBA

Date	Day	Lecture	Assignment	Lecture Topic
Mar 15	Wed	21		Examples and applications
Mar 17	Fri	22		
Mar 20	Mon	23		Extend S. Eqn to 2D and 3D systems (Ch 7+)
Mar 22	Wed	24	Assig. 4	
Mar 24	Fri	25		Rotation and angular momentum
Mar 27	Mon	26		Examples and applications
Mar 29	Wed	27		
Mar 31	Fri	28	VW Deadline	
Apr 3	Mon	29		Additional SHO details
Apr 5	Wed	30	Assig. 5	Molecular spectra (Ch. 9)
Apr 7	Fri	31		
Apr 10	Mon	32		3D S. Eqn and the H-Atom
Apr 12	Wed	33		
Apr 14	Fri		Good Friday	
Apr 17	Mon	34	Assig. 5 Due	
Apr 19	Wed	35		Review
Apr 21	Fri	36	Last lecture	Review
Apr 24			Exams Begin	
			Final Exam	Time and Location TBA
Apr 28			Exams End	
May 6				Final Grades available