University of Wisconsin-Milwaukee, Department of Physics Spring 2019
442 Lc 001 (3 credits)

Attendance is required and is part of your grade

For information on UWM policies and procedures, see: http://www4.uwm.edu/secu/SyllabusLinks.pdf

1. SELECTED LEARNING GOALS:
   Students who complete this course will understand and be able to apply:
   • The quantum mechanical treatment of the simple harmonic oscillator
   • Time independent perturbation theory and applications, especially to the hydrogen and helium atoms
   • The quantum mechanical treatment of the system of identical particles, exchange symmetry, and exchange degeneracy
   • Time dependent perturbation theory
   • The Adiabatic and Sudden approximations.

2. PREREQS AND SCHEDULE
   Pre-reqs: Prereq: jr st; Physics 441(NP)
   Go to https://catalog.uwm.edu/courses/physics/ for further details. Please note that the (NP) in the pre-req means that Physics 441 is a non-repeatable pre-req; you cannot retake it to improve your GPA once you have taken the higher level course (in this case, Physics 442)

   Class schedule: Lecture: 9:00 – 9:50AM, M,W,F in PHY 127. Lecture begins Wednesday January 23rd.

3. PERSONNEL
   Instructor: Robert Wood, Kenwood IRC 3038 (Associate Chair of Department)
   (Phone: 229-5303, e-mail: chunnica@uwm.edu)

   Office hours: TBA on the course website. The instructor’s office hours will be updated every week.

   Use of e-mail: If you e-mail the instructor, please state clearly:
   1) Who you are (please use both given and family names)
   2) Please include Physics 442-001 Spring 2019 in the subject line.
   3) By default I shall address students as Ms/Mr and use the family name given in the PAWS class roster. If you want me to use another name or form of address, please let me know asap.

   If you don’t follow 1) and 2), above, there will be some delay in my replying to your message. You may not receive replies to e-mails sent after 5.30pm in the evening or at weekends until the following business day.

4. COURSE MATERIALS
   Text: Quantum Mechanics, by David McIntyre (Pearson, 1st edition)
   Visit: https://uwm.ecampus.com for updated prices and further details/purchase options including the e-book. The publisher’s link (below) is also useful.
   http://www.mypearsonstore.com/bookstore/quantum-mechanics-9780321765796

   Course website: This course uses a standard Desire to Learn (D2L) website. Any UWM student enrolled in this class can reach the website: if you are unfamiliar with the D2L system, please refer to the notes on page 6 of this syllabus. Some essential course material including NOTES, ASSIGNMENTS, AND TAKE-HOME TESTS will be available ONLY on this website. The following link may also be helpful for students unfamiliar with the D2L system: http://d2l.uwm.edu/

   Assignments: Assignments will be posted on the course website. Each assignment will contain both questions written by the instructor and questions from other sources. The due date of each assignment will be clearly specified, and no late work will be accepted. Material handed in for grading must be your own work. If two or more students hand in identical solutions, or solutions with exactly the same careless mistakes in them, the policies for academic misconduct (see below) will be invoked. If you copy (transcribe) other students’ work; transcribe material from on-line sources; transcribe material
from solution manuals; transcribe material from old solution sets previously used in this course; and then present such material as your own (original) work for grading, then the instructor will regard this as academic misconduct (see below for official UW policies).

5. EXPECTED AVERAGE STUDENT TIME INVESTMENT

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class contact (lecture):</td>
<td>50/60 x 42 = 35 hrs.</td>
</tr>
<tr>
<td>Assigned Reading:</td>
<td>14 weeks x 5 hrs. = 70 hrs.</td>
</tr>
<tr>
<td>Assignments:</td>
<td>12 x 8 hrs. = 96 hrs.</td>
</tr>
<tr>
<td>Reviewing for 2 tests:</td>
<td>2 x 10 hrs. = 20 hrs.</td>
</tr>
<tr>
<td>2 tests, timed:</td>
<td>50/60 x 2 = 1.67 hrs.</td>
</tr>
<tr>
<td>2 tests, take-home component:</td>
<td>2 x 5 hrs. = 10 hrs.</td>
</tr>
<tr>
<td>Reviewing for final:</td>
<td>10 hrs.</td>
</tr>
<tr>
<td>Final exam:</td>
<td>2 hrs.</td>
</tr>
<tr>
<td>Total semester commitment</td>
<td>244.67 hrs.</td>
</tr>
<tr>
<td>(including tests and online quizzes)</td>
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</tr>
<tr>
<td>Weekly average (using 15 weeks):</td>
<td>16 hours</td>
</tr>
<tr>
<td>Hours per credit:</td>
<td>82 hrs./credit</td>
</tr>
</tbody>
</table>

6. IMPORTANT UWM DATES

Please understand that these dates (see below) are decided by the school, NOT by the instructor, who cannot change them either for your or for his own convenience.

February 4th is the LAST DAY for students to add full-term courses.
February 18th is the LAST DAY to withdraw from classes without W on transcript.
April 7th is the LAST DAY to drop classes with transcript notation (W). After this date, drops and withdrawals require the signature of the instructor and the school/college advising office. Signatures are given on appeal and only for non-academic reasons.
See also: http://uwm.edu/onestop/dates-and-deadlines/important-dates-by-term/

FINAL: Wednesday May 15th, 12:30 – 2:30pm, in Physics 127

7. IMPORTANT COURSE DATES (decided by instructor)

TWO tests will be held during the semester at regularly scheduled class times on the following dates: FRIDAY March 8th, and FRIDAY April 26th. Test dates will be rearranged for students who have conflicts with religious observance (see note 5, page 5 for official UW policy). Tests will also include a TAKE-HOME COMPONENT that will be due on the day of the timed test.
8. TESTS AND FINAL

Tests:
1) TWO TIMED tests will be held during the semester at regularly scheduled class times on the following dates: FRIDAY March 8th, and FRIDAY April 26th. A take-home component, available on D2L after the Friday meeting of the class during the preceding week, will be due IN CLASS AT THE DATE OF THE TIMED TEST.

2) If you want a passing/good grade, then you must complete all tests, including BOTH THE TAKE-HOME COMPONENT AND THE TIMED COMPONENT. Failure to do so will adversely affect your overall grade.

3) THE TAKE-HOME PORTION OF EACH TEST MUST BE COMPLETED WITHOUT SEEKING ANY HELP OF ANY SORT AND WITHOUT COLLABORATION WITH ANYONE ELSE. The grading of the take home test will include an in-person meeting with the instructor in the week following the test. During this meeting you will be required to explain your work.

4) It is the responsibility of each student to complete the tests: oversleeping, lapses of memory, and similar excuses will not be considered grounds for a make-up.

5) Make up tests will be allowed only in cases of: illness resulting in hospitalization or a documented emergency/urgent care visit to a physician; documented family emergencies/bereavement; and verifiable (documented) traveling difficulties. All such absences must be supported by appropriate documents. If a student misses any test for medical reasons, a physician’s note, clearly showing the signature and letterhead of the physician, must be produced before a make-up can be allowed. The note must state clearly that in the student was not fit to take the test. A note stating only that a student visited (for example) the campus Norris Health Center is not sufficient. Notes from family members/relations are not acceptable; if the parent/family member is a physician, such notes could constitute a reportable breach of medical ethics.

6) Tests will be rearranged for students who have conflicts with religious observance. See Note 5, page 5 for Religious Observance.

Final:
Wednesday May 15th, 12:30–2:30pm, in Physics 127. The final is comprehensive (cumulative). The final is also mandatory: you are responsible for making sure that you can attend at this time. If you do not attend the final, you have not completed the course: you will receive an F or an I (incomplete), depending on the circumstances. Incompletes are issued only for valid reasons (e.g., medical emergency).

Other official UWM policies concerning finals are given below.

Final Examination Policy: One-hour final examinations in one-credit courses may be given during the last class period; two-hour final examinations in all other courses shall be given during the regular examination period. The time of a final examination for an individual or a class may be changed only with the prior approval of the dean or director. The change will involve a postponement to a later date. The Provost’s Office and Classroom Assignments shall be notified of any approved changes in final examinations in order to avoid scheduling conflicts of day, hour and room.

Conflict: When a departmental combined-lecture examination conflicts with another examination, it is the responsibility of the department giving the combined-lecture examination to resolve the conflict.

Student Responsibility for Scheduling: Each student is responsible for arranging a study list that will permit satisfactory progress towards degree requirements and a class schedule that avoids (a) class and final exam scheduling conflicts and (b) an excessively demanding exam schedule.

See: http://www4.uwm.edu/secu/docs/other/S22.htm
https://uwm.edu/onestop/enrolling/finding-classes/#finals

9. GRADES AND INCOMPLETES

Grades:
The overall course grade will be determined as follows:
1) 30% from two tests of equal weight administered during the semester.
2) 30% from assignments (all of equal weight).
3) 35% from a comprehensive (cumulative) final.
4) 5% attendance. Each student is allowed 4 unexcused absences without penalty.
Incompletes:

Incompletes. A notation of "incomplete" may be given in lieu of a final grade to a student who has carried a subject successfully until the end of a semester but who, because of illness or other unusual and substantiated cause beyond the student's control, has been unable to take or complete the final examination or to complete some limited amount of term work. See https://www4.uwm.edu/secu/docs/other/S_31_INCOMPLETE_GRADES.pdf

INCOMPLETE POLICY FOR UNDERGRADUATES (Fac. Doc. #1558, 2536) An incomplete may be given to a student who has carried a subject successfully until near the end of the semester but, because of illness or other unusual and substantiated cause beyond that student's control, has been unable to take or complete the final examination or to complete some limited amount of term work. An incomplete is not given unless the student proves to the instructor that s/he was prevented from completing course requirements for just cause as indicated above.

A course marked incomplete must be completed during the next succeeding semester, excluding summer sessions and UWinterim. If the student does not remove the incomplete during this period, the report of "I" will lapse to "F".

10. Proposed schedule (this is only a rough guide)

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Review and Chapter 9. Simple Harmonic Motion</td>
</tr>
<tr>
<td>02</td>
<td>Simple Harmonic Motion</td>
</tr>
<tr>
<td>04</td>
<td>Perturbation Theory</td>
</tr>
<tr>
<td>05</td>
<td>Perturbation Theory</td>
</tr>
<tr>
<td>06</td>
<td>Chapter 11. Hyperfine structure and coupled angular momenta</td>
</tr>
<tr>
<td>07</td>
<td>Test 01, Friday March 8th. Chapter 11 continued.</td>
</tr>
<tr>
<td>08</td>
<td>Chapter 12. The Hydrogen atom</td>
</tr>
<tr>
<td>09</td>
<td>Chapter 12. The Hydrogen atom.</td>
</tr>
<tr>
<td>10</td>
<td>Chapter 13. Identical Particles</td>
</tr>
<tr>
<td>11</td>
<td>Chapter 13. Identical Particles</td>
</tr>
<tr>
<td>12</td>
<td>Chapter 14. Time dependent perturbation theory</td>
</tr>
<tr>
<td>13</td>
<td>Test 02, Friday April 26th. Chapter 14. Time dependent perturbation theory</td>
</tr>
<tr>
<td>14</td>
<td>Special topics.</td>
</tr>
<tr>
<td>15</td>
<td>Special topics.</td>
</tr>
</tbody>
</table>

11. OTHER IMPORTANT INFORMATION: PLEASE READ THIS CAREFULLY

1. Discriminatory conduct (such as sexual harassment): Discriminatory conduct will not be tolerated by the University. It poisons the work and learning environment of the University and threatens the careers, educational experience, and well-being of students, faculty, and staff. See: http://uwm.edu/deanofstudents/conduct/ and https://www4.uwm.edu/secu/docs/other/S_47_Discriminatory_Policy.pdf

2. Title IX/Sexual Violence. Title IX is a federal law that prohibits sex discrimination in education program or activities, and UWM policy prohibits such conduct (see Discriminatory Conduct, above). This includes sexual violence, which may include sexual harassment, sexual assault, relationship violence, and/or stalking in all educational programs and education-related areas. UWM strongly encourages its students to report any instance of sex discrimination to UWM’s Title IX Coordinator (titleix@uwm.edu). Whether or not a student wishes to report an incident of sexual violence, the Title IX Coordinator can connect students to resources at UWM and/or in the community including, but not limited to, victim advocacy, medical and counseling services, and/or law enforcement. For more information, please visit: https://uwm.edu/titleix/

3. Cheating and academic misconduct: all work handed in for grading (including electronic submissions) must be the result of your own efforts. Copying the work of
another student or using solutions/answers to problems from an on-line or other source and presenting them as your own, original work, will be regarded as cheating. Cheating/academic misconduct will be dealt with by the instructor according to the UW policies and procedures. Cheating on exams or plagiarism are violations of the academic honor code and carry severe sanctions, including failing a course or even suspension or dismissal from the University.

See: http://uwm.edu/deanofstudents/conduct/conduct_procedures/academic-misconduct/

4. **Special Consideration.** The principle of equal treatment of all students shall be a fundamental guide in responding to requests for special consideration. No student should be given an opportunity to improve a grade that is not made available to all members of the class. This policy is not intended to exclude reasonable accommodation of verified student disability, or the completion of work missed as the result of religious observance, verified illness, or justified absence due to circumstances beyond the student's control. (Authority: UWM Faculty Documents 860B and 1927)

5. **Religious observance.** In the syllabus, you will find a schedule of tests. Please inform the instructor ASAP if you see a conflict with religious observance. Also inform the instructor ASAP if the deadline of a quiz or an assignment conflicts with religious observance. A suitable date/time for the test (that does not conflict with the religious observance) or other deadline can then be arranged. Please note the following official UW policies: http://www4.uwm.edu/seccu/docs/other/S1.5.htm
See also: http://www.interfaith-calendar.org/2019.htm

**Authority: UWS 22 and UWM Fac. Doc. 1918**

I. **Declaration of policy.** It is the policy of the board of regents that students' sincerely held religious beliefs shall be reasonably accommodated with respect to all examinations and other academic requirements. The board of regents adopts this chapter in order to ensure that all institutions of the university of Wisconsin system have in place appropriate mechanisms for ensuring the reasonable accommodation of students' sincerely held beliefs, and for appeals related to these matters.

II. **Accommodation of religious beliefs.**
1. A student shall be permitted to make up an examination or other academic requirement at another time or by an alternative method, without any prejudicial effect, where:
   (a) There is a scheduling conflict between the student's sincerely held religious beliefs and taking the examination or meeting the academic requirements; and
   (b) The student has notified the instructor, within the first three weeks of the beginning of classes (within the first week of summer session and short courses), of the specific days or dates on which he or she will request relief from an examination or academic requirement.
2. Instructors may schedule a make-up examination or other academic requirement before or after the regularly scheduled examination or other academic requirement.
3. Instructors shall accept, at face value, the sincerity of students' religious beliefs.
4. Student notification of instructors and requests for relief under sub. (1) shall be kept confidential.
5. Complaints of failure to provide reasonable accommodation of a student's sincerely held religious beliefs as required by this rule may be filed under UWM Complaint and Grievance Procedures.
6. The chancellor shall, through appropriate institutional publications (to include at a minimum the Schedule of Classes and Bulletin), provide notification to students and instructors of the rules for accommodation of religious beliefs, and of the procedure and appropriate office for filing complaints.

6. **Students with disabilities:** please arrange for the authorization for special accommodations issued by the Accessibility Resource Center (ARC) to be sent to the instructor as soon as possible. The link for the ARC is https://uwm.edu/arc/connect/
Page 6 shows you a screen grab of what you will see if you go to this link; a new system which has replaced the old paper "visa forms".

Please note that I cannot allow students to take tests under conditions different from those experienced by the rest of the class (extra time, separate room, etc.) unless they have permission from the ARC. This permission is issued by ARC in the form of an
email, but it is the student’s responsibility to make the appropriate contact with ARC. The ARC will issue formal instructions to me about how students with disabilities are to be accommodated. Because of limited space in the Physics building, **ALL STUDENTS WHO REQUIRE SPECIAL ACCOMMODATIONS SUCH AS EXTRA TIME MUST ARRANGE TO TAKE THEIR TESTS IN ARC.**

**ARConnect**

ARConnect provides online access for students, instructors, and notetakers to request and manage disability-related student accommodations. Tutorials are available on the ARConnect Resources webpage.

**Academic Accommodations**

Students with an Accommodation Plan who are registered with the Accessibility Resource Center (ARC) may request accommodation services for academic related activities such as tutoring, supplemental instruction, exam reviews and the writing center. Requests for accommodations must be related to your academic coursework and be made by submitting the Student Service Request Form. This form is for ARC student use only.

**Notetaking**

UWM students who are registered with the Accessibility Resource Center (ARC) and approved for a note taking accommodation can request a notetaker through ARConnect by selecting the “Manage Accommodation Services” button above.

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7. **Students called to active military duty:** accommodations and advice for students who anticipate an absence due to call-up of reserves to active military duty are available at this link: [http://uwm.edu/active-duty-military/](http://uwm.edu/active-duty-military/)

8. **Complaint procedures:** Students may direct complaints to the head of the academic unit or department in which the complaint occurs. If the complaint allegedly violates a specific university policy, it may be directed to the head of the department or academic unit in which the complaint occurred or to the appropriate university office responsible for enforcing the policy.

   [https://www4.uwm.edu/secu/docs/other/S_47_Discrimina_duct_Policy.pdf](https://www4.uwm.edu/secu/docs/other/S_47_Discrimina_duct_Policy.pdf)

   For your information:

   **Chair of Physics:** Professor Prasenjit Guptasarma: KEN 3077, (414)229-6497, pg@uwm.edu

   **Dean of Students’ Office:** [http://www4.uwm.edu/dos/](http://www4.uwm.edu/dos/)

   **Equity and Diversity:** [http://uwm.edu/equity-diversity-services/about/](http://uwm.edu/equity-diversity-services/about/)

   *Please remember that instructors have the same legal protection and redress against libel, slander, defamation, and harassment as you: some students seem not to know or understand this*

9. **Grade appeal procedures:** A student may appeal a grade on the grounds that it is based on a capricious or arbitrary decision of the course instructor. Such an appeal shall follow the established procedures adopted by the department, college, or school in which the course resides or in the case of graduate students, the Graduate School.
These procedures are available in writing from the respective department chairperson or the Academic Dean of the College/School. See http://www4.uwm.edu/secu/docs/other/S_28_Grade_Appe_by_Students.pdf
http://uwm.edu/letters-science/advising/answers-forms/policies/appeal-procedure-for-grades

10. **Behavior during lecture:** please do not disrupt the lecture by talking loudly with neighbors, refusing pay attention when the lecturer has started teaching by ostentatiously reading the newspaper, texting etc. Please be civil and reasonable.

11. **Cell phones:** please turn off cell phones during lectures, discussions, and tests; please do not sit in front of the instructor or TA during class while texting your friends (or anyone else).

12. **Attendance:** attendance is required and is part of your grade.

12. **UW-Milwaukee Desire2Learn (D2L) course web sites:**

   Materials for this course are available on a Desire2Learn (D2L) course web site. Students may see these materials there anytime using a standard web browser.

   **Recommended browsers:** A complete and up-to-date list of recommended browsers and settings can always be found at: http://kb.wisc.edu/helpdesk/page.php?id=3210. Please contact the UWM Help Desk, as described at the bottom of this page, with any questions about these requirements.

**To find and browse the D2L course web site:**


2. On the D2L Landing page, choose the button labeled [UWM ePanther].

3. On the next page, type in your ePanther Username (your ePanther campus email, but without the "@uwm.edu") and Password (the same password you use for Panther Link and PAWS). Then hit [Login].

   - You may bookmark the D2L.UWM.edu landing page, if you wish.
   - To prevent failed log-ins, please DO NOT BOOKMARK the UWM ePanther login page.

4. On the D2L My Home screen, find the area called My Courses. You’ll see your active courses here, arranged by Semester, with the newest semester at the top.

5. Click any course title to see the Course Home page. Click [Content] in the navigation bar to begin exploring the site.

6. If you have any difficulty getting into the course web site, please close down your web browser completely and open it up again. Then try logging on again, using the instructions above. If you do not know your ePanther username or password, please get help as indicated below.

7. When you are finished looking around your D2L course sites, always click on [Logout]. This is especially important if you are in a computer lab. Otherwise, the next person who uses the machine will be using your D2L account!

**What to do if you have problems with Desire2Learn (D2L)**

If you have any difficulties with D2L, including problems with your login (e.g., you forgot your password, or if you just can’t get on), please contact the UWM Help Desk. You may do one of the following:

   - Report the problem via online web form at GetTechHelp.uwm.edu
   - Call the UWM Help Desk at 414.229.4040 if you are in Metro Milwaukee.
   - Go to Bolton 225 (this lab is not open all day or on weekends – call 414.229.4040 for specific hours)
   - From outside the 414 or 262 area codes, but from within the USA, you may call the UWM Help Desk at 1.877.381.3459
Each student enrolled in this course is asked to sign the following statement and return it to the instructor no later than lecture on Monday January 28th. Students who fail to do this will be administratively dropped without further notice.

Please print your name on the line below.
FAMILY NAME FIRST, GIVEN NAME LAST______________________________________________________________

Statement by student:
1) I have READ THE SYLLABUS FOR THIS COURSE (Physics 442-001) and acquainted myself with the policies therein.
2) I have checked that I satisfy the pre-reqs for this course; if I do not satisfy them, I have discussed my situation with the instructor.
3) I have checked the schedule of tests for conflicts with religious observance and informed the instructor if such conflicts exist.
4) If I intend to ask for special accommodations because of a disability, I have at this date **either** handed the ARC forms to the instructor **or** I have notified the instructor that I have contacted the ARC which is currently assessing my case.
5) I have noted the two UWM drop dates clearly stated in this syllabus.
6) I have noted the date and time of the final and checked this on the official schedule of finals at: https://uwm.edu/onestop/enrolling/finding-classes/#finals

Date______________________________________________________________

Please sign your name legibly here______________________________________________________________