

PHY390 Quantum Mechanics

Gustavus Adolphus College Fall 2024

Instructor: Dr. Steven Mellema

Office: Olin Hall 210

Office Hours: MTWRF 10:30-11:30

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Textbooks:

Required – *A Modern Approach to Quantum Mechanics*, Second Edition, by John S. Townsend, University Science Books, ©2012

– *Mathematical Handbook of Formulas and Tables*, by Murray R. Spiegel
(Schaum's Outline Series)

Course Policy and Evaluation:

1. **Class Meetings and Reading Assignments:** The class will meet on Mondays, Wednesdays and Fridays from 9:15-10:20 AM for lecture, small-group problem solving, homework review and exams. Attached is a daily calendar of activities for the course. When reading assignments are made for a class session, the reading is expected to be completed **before** coming to the class.
2. **Homework:** Homework problems will be assigned according to chapters in the textbook and are due at the beginning of class on the due date listed on the calendar. Late homework may be accepted at the discretion of the instructor with a reduction in credit.
3. **Group Problems:** Occasionally in class, students will work together, in assigned groups of 2-3 members, to cooperatively solve problems. A group solution will be submitted, with all group members receiving the same grade. There will be no make-up for group problems missed due to absence.
4. **Problem Presentations:** After each lecture, one student will be assigned an example problem from the material covered in that lecture. The student's solution will be presented and discussed by the class during the first 15 minutes of the following class period. These problems will be assigned to specific student presenters approximately one week in advance, and all students will take turns to present problem solutions. Students will earn credit both for their presentations and for their thoughtful discussion of others' presentations.
5. **Exams :** There will be three hour exams and a two-hour final exam (see the calendar below). Students must arrange **in advance** to take an exam at other than the scheduled time and may do so **only** for a valid health or school-related reason. (It is the responsibility of the student to inform the instructor during the first week of the semester regarding any anticipated absences due to required field trips, athletic events, musical performances, or other extra-curricular activities.) Exams missed without pre-arrangement are entered as zero credit and cannot be made up.

6. Evaluation :	Homework	25%
	Group Problems	5%
	In-Class Problem Presentations	10%
	Hour Exams	15% each
	Final Exam	15%

Assignment of final letter grades will be based upon the following guidelines:

	B+ = 86-90%	C+ = 74-78%	D+ = 62-66%
A = 94-100%	B = 82-86%	C = 70-74%	D = 58-62%
A- = 90-94%	B- = 78-82%	C- = 66-70%	

7. **Attendance :** Regular attendance at all class meetings is expected. Students will be held responsible for informing themselves of all announcements/assignments made in class.
8. **Incompletes :** A grade of incomplete will **only** be given for work not completed due to circumstances beyond the control of the student (*this is the College policy*).
9. **Academic Honesty:** Having signed and agreed to abide by the College’s Honor Code, students thereby pledge that, in all academic exercises, examinations, papers, and reports, they shall submit their own work. In the context of this course, students are expected to collaborate and to discuss their out-of-class assignments. However, submitting under one’s own name work that is merely copied from another is a violation of the Honor Code. Furthermore, seeking outside assistance during exams is expressly forbidden. A full description of the Academic Honesty Policy and the Honor Code can be found in the Academic Catalog (online at: www.gustavus.edu/general_catalog/current/acainfo).
11. **Help for Multilingual Students:** Some Gusties may have grown up speaking a language (or languages) other than English at home. If so, we refer to you as “multilingual.” Your multilingual background is an incredible resource for you, and for our campus, but it can come with some challenges. You can find support through the Center for International and Cultural Education’s (<http://gustavus.edu/cice/>) Multilingual and Intercultural Program Coordinator (MIPC), Pam Pearson (ppearson@gustavus.edu). Pam can meet individually for tutoring in writing, consulting about specific assignments, and helping students connect with the College’s support systems. If you want help with a specific task (for example, reading word problems on an exam quickly enough or revising grammar in essays), let your professor and Pam know as soon as possible. In addition, the Writing Center (<http://gustavus.edu/writingcenter/>) offers tutoring from peers (some of whom are themselves multilingual) who can help you do your best writing.
12. **Requesting Accommodations:** Gustavus Adolphus College is committed to ensuring equitable and inclusive learning environments for all students. If you have a disability and anticipate or experience barriers to equal access, please speak with the accessibility resources staff about your needs. A disability may include mental health, attentional, learning, chronic health, sensory, physical, and/or short-term conditions. When appropriate, staff will guide students and professors in making accommodations to ensure equal access. Accommodations cannot be made retroactively; therefore, to maximize your academic success at Gustavus, please contact them as early as possible. Accessibility resources staff are located in the Academic Support Center (<http://gustavus.edu/asc/accessibility/>). The Accessibility Coordinator (ascsupport@gustavus.edu or x7227) in the Academic Support Center can provide further information.

13. **Academic Accommodation for Religious Observance:** A student whose religious observance conflicts with a course requirement may request an academic accommodation from the instructor. Students should normally make such requests in writing by the end of the second week of classes, but there may be exceptions. Students may also request accommodations for religious traditions surrounding death and dying when the need arises. The Chaplains' Office annually publishes a multifaith holiday calendar with accommodation notations. You can find it here: <https://gustavus.edu/chaplain/multifaith/>. However, this list is not exhaustive and observances are not necessarily days when individuals will not attend work or school. There are also different levels of observance in different traditions. The Chaplains' Office is available for consultation on any requests for accommodation that are not included in their calendar.
14. **Mental Wellbeing:** The Gustavus community is committed to and cares about all students. Strained relationships, increased anxiety, alcohol or drug problems, feeling down, difficulty concentrating, and/or lack of motivation may affect a student's academic performance or reduce a student's ability to participate in daily activities. If you or someone you know expresses such mental health concerns or experiences a stressful event that can create barriers to learning, Gustavus services are available to assist you, and include online options. You can learn more about the broad range of confidential health services available at <https://gustavus.edu/counseling/> and <https://gustavus.edu/deanofstudents/services/>.
15. **Departmental Expectations:** As is expected in any course in the physics department, each student is asked to work, along with the instructor and their student peers, to develop a culture of cooperation and inclusion within our department. The physics major can be challenging, and we all need the respect and support of others. While it would be unreasonable to assume that every single person will develop a close working relationship with every other, it is expected that each individual will be supportive of, and a positive influence on, every member of the departmental community that they encounter.

SEPTEMBER 2024

subject Quantum Mechanics period MWF 9:15-10:20

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SAT/SUN
						/1
WEEK 1	2 No Class: Labor Day	3	4 Townsend Sections 1.1-1.2	5	6 Townsend Sections 1.3-1.4	7/8
WEEK 2	9 Townsend Sections 1.5-1.6	10	11 Townsend Sections 2.1-2.2	12	13 Townsend Sections 2.3-2.4	14/15
Notes:			Chapter 1 Homework Due			
WEEK 3	16 Townsend Sections 2.5-2.6	17	18 Townsend Sections 3.1-3.2	19	20 Townsend Sections 3.3-3.4	21/22
Notes:			Chapter 2 Homework Due			
WEEK 4	23 Townsend Sections 3.5-3.6	24	25 Townsend Sections 3.7-3.8	26	27 Townsend Sections 4.1-4.2	28/29
Notes:					Chapter 3 Homework Due	
WEEK 5	30 No Class: Nobel Conference					

OCTOBER 2024

subject

Quantum Mechanics

period

MWF
9:15-
10:20

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SAT/SUN
WEEK 5		1	2 No Class: Nobel Conference	3	4 Hour Exam #1 Chapters 1-3	5/6
WEEK 6	7 Townsend Sections 4.3-4.4	8	9 Townsend Sections 4.5-4.7	10	11 Townsend Sections 5.1-5.2	12/13
Notes:					Chapter 4 Homework Due	
WEEK 7	14 Townsend Sections 5.3-5.4	15	16 Townsend Section 5.5	17	18 Townsend Sections 6.1-6.3	19/20
Notes:					Chapter 5 Homework Due	
WEEK 8	21 No Class: Fall Break	22	23 No Class: Fall Break	24	25 No Class: Fall Break	26/27
WEEK 9	28 Townsend Sections 6.4-6.6	29	30 Townsend Sections 6.7-6.8	31		

NOVEMBER 2024

subject

Quantum Mechanics

period

MWF
9:15-
10:20

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SAT/SU
WEEK 9					1 Townsend Sections 6.9-6.11	2/3
WEEK 10	4 Townsend Sections 7.1-7.3	5	6 Townsend Sections 7.4-7.7	7	8 Hour Exam #2 Chapters 4-6	9/10
Notes:	Chapter 6 Homework Due					
WEEK 11	11 Townsend Sections 9.1-9.3	12	13 No Class: Advising Day	14	15 Townsend Sections 9.4-9.6	16/17
Notes:	Chapter 7 Homework Due					
WEEK 12	18 Townsend Sections 9.7-9.8	19	20 Townsend Sections 9.9-9.10	21	22 Townsend Sections 10.1-10.2	23/24
Notes:					Chapter 9 Homework Due	
WEEK 13	25 Townsend Section 10.3	26	27 No Class: Thanksgiving	28	29 No Class: Thanksgiving	30

DECEMBER 2024

subject Quantum Mechanics period MWF 9:15-10:20

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SAT/SU
						/1
WEEK 14	2 Townsend Section 10.4	3	4 Townsend Section 10.5	5	6 Townsend Section 10.6	7/8
WEEK 15	9 Townsend Sections 11.1- 11.2	10	11 Hour Exam #3 Chapters 7,9, 10	12	13 Townsend Section 11.3	14/15
Notes:	Chapter 10 Homework Due					
WEEK 16	16 Townsend Section 11.4	17	18 No Class: Reading Day	19	20 Final Exam: 20% on Chapter 11; 80% Comprehensive Review	21/22
Notes:			Chapter 11 Homework Due			
	23	24	25	26	27	28/29