

PHY390 Quantum Mechanics

Gustavus Adolphus College Fall 2022

Instructor: Dr. Steven Mellema

Office: Olin Hall 210

Office Hours: MTWRF 10:30-11:20

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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 five days a week from 9:00-9:50 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 completing the lectures for each chapter in the textbook, we will take one day to have example problem solutions presented to and discussed by the class. 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 (<https://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 (<https://gustavus.edu/writingcenter/>) offers tutoring from peers (some of whom are themselves multilingual) who can help you do your best writing.
10. **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. Students with a documented elevated risk of COVID-19 may also request academic accommodations. 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 (<https://gustavus.edu/asc/accessibility/>) (x7227). Accessibility Resources Coordinator, Katy Clay, (clayk@gustavus.edu), can provide further information.

11. **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/>.

12. **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 2022

subject QUANTUM MECHANICS period 2

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SAT/SUN
				1	2	3/4
1	5 No Class: Labor Day	6 Classes begin; Syllabus; Introduction	7 Townsend Sections 1.1-1.2	8 Townsend Sections 1.3-1.4	9 Townsend Sections 1.5-1.6	10/11
WEEK	Notes:					
2	12 Problem Presentations Chapter 1	13 Townsend Sections 2.1-2.2	14 Townsend Sections 2.3-2.4	15 Townsend Sections 2.5-2.6	16 Townsend Section 2.7	17/18
WEEK	Notes:	Chapter 1 Homework Due				
3	19 Townsend Section 2.8	20 Problem Presentations Chapter 2	21 Townsend Sections 3.1-3.2	22 Townsend Sections 3.3-3.4	23 Townsend Sections 3.5-3.6	24/25
WEEK	Notes:		Chapter 2 Homework Due			
4	26 Townsend Sections 3.7-3.8	27 Problem Presentations Chapter 3	28 No Class: Nobel Conference	29 No Class: Nobel Conference	30 Townsend Sections 4.1-4.2	
WEEK	Notes:				Chapter 3 Homework Due	

OCTOBER 2022

subject QUANTUM MECHANICS period 2

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SAT/SUN
WEEK 4						1/2
WEEK 5	3 Townsend Sections 4.3-4.4	4 Townsend Section 4.5	5 Hour Exam #1 Chapters 1-3	6 Townsend Sections 4.6-4.7	7 Problem Presentations Chapter 4	8/9
WEEK 6	10 Townsend Sections 5.1-5.2	11 Townsend Sections 5.3-5.4	12 Townsend Section 5.5	13 Townsend Section 5.6	14 Townsend Section 5.7	15/16
WEEK 7	17 Problem Presentations Chapter 5	18 Townsend Sections 6.1-6.3	19 Townsend Sections 6.4-6.6	20 Townsend Sections 6.7-6.8	21 Townsend Section 6.9	22/23
WEEK 8	24 No Class: Fall Break	25 No Class: Fall Break	26 Townsend Section 6.10	27 Townsend Section 6.11	28 Problem Presentations Chapter 6	29/30
WEEK 9	31 Townsend Sections 7.1-7.3					

Notes:

Notes: **Chapter 4 Homework Due**

Notes:

Chapter 5 Homework Due

Notes:

Notes: **Chapter 6 Homework Due**

NOVEMBER 2022

subject QUANTUM MECHANICS period 2

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SAT/SUN
WEEK 8		1 Townsend Sections 7.4-7.6	2 Townsend Sections 7.7-7.8	3 Hour Exam #2 Chapters 4-6	4 Townsend Sections 7.9-7.11	5/6
WEEK 9	7 Problem Presentations Chapter 7	8 Townsend Sections 9.1-9.2 Chapter 7 Homework Due	9 Townsend Sections 9.3-9.4	10 Townsend Sections 9.5-9.6	11 Townsend Sections 9.7-9.8	12/13
WEEK 10	14 Townsend Sections 9.9-9.10	15 Problem Presentations Chapter 9	16 Townsend Sections 10.1-10.2 Chapter 9 Homework Due	17 Townsend Section 10.3	18 Townsend Section 10.4	19/20
WEEK 11	21 Townsend Section 10.5	22 Townsend Section 10.6	23 No Class: Thanksgiving Break	24 No Class: Thanksgiving Break	25 No Class: Thanksgiving Break	26/27
WEEK 12	28 Problem Presentations Chapter 10	29 Townsend Sections 11.1-11.2 Chapter 10 Homework Due	30 Townsend Section 11.3			

DECEMBER 2022

subject QUANTUM MECHANICS period 2

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SAT/SUN
WEEK 12				1 Townsend Section 11.4	2 Townsend Section 11.5	3/4
Notes:						
WEEK 13	5 Hour Exam #3 Chapters 7, 9 and 10	6 Townsend Section 11.6	7 Problem Presentations Chapter 11	8 Townsend Section 12.1	9 Townsend Section 12.2	10/11
Notes:				Chapter 11 Homework Due		
WEEK 14	12 Townsend Section 12.3	13 Townsend Sections 12.4- 12.5	14 Problem Presentations Chapter 12	15 No Class: Reading Day	16	17/18
Notes:				Chapter 12 Homework Due		
WEEK 15	19 Final Exam 8:00-10:00 am (40% on Chap. 11-12; 60% comprehensive review	20	21	22	23	24/25
Notes:						
WEEK 16	26	27	28	29	30	31
Notes:						