

Fall 2022, Physics 4301

Instructor: Aleksandr Chernatynskiy
117 Physics
aleksandrc@mst.edu (~24 hours response time)
Help Session: 3-5 pm Tuesday, PHYS 202
Office Hours: By appointment, or feel free to stop by if the door (Phys 117) is open

Text: *Introduction to Quantum Mechanics*, D.J. Griffiths

See also: R. Shankar, *Principles of Quantum Mechanics*

Web: Canvas, <https://umsystem.instructure.com/>

Instruction: This class follows the standard lecture/discussion approach during the class sessions. My lectures notes will be made available for download through Canvas, but those are my notes. They do not guarantee to contain nether all the material discussed in the class, nor the full details. Approximately half of the lecture will be devoted to the delivery of the material omitting some math details, while the other half will be devoted to filling those gaps by the students under the instructor guidance, example problems, and homework.

Grading:

Homework (10 highest score assignments out of ~12)	15%
Conceptual Quizzes (8 out of ~10)	15%
Exam 1 (09/21) Exam 2 (10/21) Exam 3 (11/18) Final (Comprehensive)	70%

The grade for the class consists of three elements: quizzes, homework and exams, as highlighted in the table above.

- For quizzes, the grade is the average grade of all your scores. Quizzes are **not** “pop-up” quizzes, I will announce in advance that there will be a quiz. The purpose is a periodic review of the material covered, and how it fits into the “big picture” of the quantum-mechanical description of the nature. Some number of quizzes scores (~20%) will be dropped.
- Assigned homework is to be submitted via CANVAS every week on the due date, late homework **will not** be accepted. For an honest attempt to solve the homework **full credit will be given**; Instructor will return the homework with the feedback. Attempting and turning in the homework is a must, if “A” is desired. Solutions will also be discussed during the class sessions.

- The hour exams will be given in class at the following anticipated dates: **1: 09/26, 2: 10/24 and 3: 11/18**. The lowest grade on one of these exams will be dropped. The final will be comprehensive and undroppable.
- Every problem in the exam will be graded on the 10 point scale and the overall score adjusted to make up the percentage indicated in the table. Note, that **incorrect units** of the answer will result in an automatic **1 point deduction**.
- After the first exam, I will have an individual meeting with everyone who would get “C” or lower on it in order to find a way for improvement.

Absolute Grading Scale: The grade cuts are (to four significant figures):

- A for 89.50% of total possible points
- B for 79.50% of total possible points
- C for 69.50% of total possible points
- D for 59.50% of total possible points
- F for less than 59.50% of possible points

The grade cuts are absolute and will not be lowered. Points will not be added to a student’s grade to bring it above the cutoff.

Covid-19 contingency plan: If Instructor will contract Covid-19 and will have to quarantine, all class meetings will be held via ZOOM synchronously, and all assignments will continue as scheduled. Exams will similarly held via ZOOM and will require web-camera to show the work area for proctoring. Students should contact Student Health Services (mstshs@mst.edu), 573-341-4284, if they are quarantined, become ill, or are unable to attend class or take tests on campus. If a student is isolating or quarantining, the student will receive an absence note from Student Health. The student will be responsible of forwarding the absence note to their instructors.

Statement about Copyright, FERPA, and Use of Video: It is vitally important that our classroom environment promote the respectful exchange of ideas. This entails being sensitive to the views and beliefs expressed during discussions whether in class or online. Please obtain instructor permission before recording any class activity. It is a violation of University of Missouri policy to distribute such recordings without authorization and the permission of all who are recorded. More information is provided [online](#).

Accessibility and Accommodations: It is the university’s goal that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on a disability, please contact Student Accessibility and Testing at (573) 341-6655, email dss@mst.edu, or visit <https://saat.mst.edu/> for information.

Student Honor Code and Academic Integrity: All students are expected to follow the [Honor Code](#). [Student Academic Regulations](#) describes the student standard of conduct relative to the University of Missouri System's Collected Rules and Regulations section 200.010, and offers descriptions of academic dishonesty including cheating, plagiarism and sabotage, any of which will be reported to the Vice Provost for Undergraduate Education. Other resources for students regarding academic integrity can be found [online](#).

Student Well-Being: Student Well-Being provides counseling services, health promotion initiatives,

and prevention programs to empower the S&T community to thrive and enhance personal, academic, and professional success. Department office hours are Monday-Friday, 8 a.m. - 4:30 p.m. On the website, you can find information related to individual and group counseling, wellness consultations and trainings, resources for many health and wellness topics, and help for mental health crisis situations.

Health and Well-Being Canvas Course : The Health and Well-Being Canvas Course features trainings, presentations, and other health and well-being resources for students. One feature of the course is the Miner Well-Being Certification Program, a semester-long certification where participants can engage with campus-wide services and initiatives and develop skills that contribute to personal well-being and student success. Students can enroll in the free, non-credit course at any time.

Student Support and Community Standards: Student life can be difficult. During your time at Missouri S&T, you may have a friend or peer who needs help navigating their student experience, facing a challenge, or experiencing distress and could benefit from support and connection to resources. You are not alone. We have a dedicated team of Care Managers, numerous resources and services to support you or your student, friend, or peer. This includes emergency funding support for unexpected emergency expenses. To learn more [visit](#) or [apply online](#).

Nondiscrimination, Equity, and Title IX: Missouri S&T is committed to the safety and well-being of our campus community, and to creating an environment free from discrimination and harassment.

The University does not discriminate on the basis of race, color, national origin, ancestry, religion, sex, pregnancy, sexual orientation, gender identity, gender expression, age, disability, protected veteran status, and any other status protected by applicable state or federal law. As used in this policy, the word “sex” is also inclusive of the term “gender.”

Additionally, US Federal Law Title IX states that no member of the university community shall, on the basis of sex, be excluded from participation in, or be denied benefits of, or be subjected to discrimination under any education program or activity. Sexual harassment violations of this law include quid pro quo, hostile environment, sexual assault, dating/domestic violence, and stalking. The U.S. Department of Education has stated the prohibition on discrimination on the basis of sex includes sexual orientation and gender identity.

Students who are experiencing pregnancy or pregnancy-related conditions, including the birthing parent and non-birthing parent, have rights protected under Title IX. Students should contact the Office of Equity and Title IX to learn more about their rights and pregnancy-related assistance/accommodations provided by the University to ensure equitable access to University educational programs and activities.

In accordance with the University of Missouri’s Collected Rules and Regulations, all faculty and staff are required to report any information concerning discrimination disclosed through communication including, but not limited to, direct conversation, email, social media, classroom papers and homework exercises to the Equity Officer/Title IX Coordinator.

Office of Equity and Title IX

Equity Officer and Title IX Coordinator: Dr. Paul Hirtz
Phone: (573) 341-7734
Location: 900 Innovation Drive, Suite 500
E-mail: equity@mst.edu

Classroom Egress Maps: For all in-person instruction, faculty should explain where the classroom emergency exits are located. Classroom egress maps are posted at <http://designconstruction.mst.edu/floorplan/>.

Writing Center: The Writing Center's mission is to assist **all students** in their efforts to become better writers, communicators, and critical thinkers. The Writing Center's peer consultants provide free individualized one-on-one and small-group conversations to offer meaningful feedback and guidance to students across all disciplines. More information can be found on their website and through email: writing@mst.edu.

Student Success Center: The Student Success Center (SSC) provides additional assistance for students academically and helps bolster non-academic life skills. The SCC offers individualized tutoring, peer-to-peer life skill coaching, and campus programming while providing free coffee and hot beverages! All student Miners are encouraged to utilize the SSC's free services to get timely support and to enhance their S&T Miner Experience. Visit the SSC at 198 Toomey Hall, contact us at success@mst.edu, or join us on social media [@sandtssc](https://twitter.com/sandtssc). To see the course offerings and times for SSC Tutoring, visit studentsuccess.mst.edu/tutoring/.

Student Veterans Resource Center: The Student Veterans Resource Center (SVRC) is the nexus of resources and support for student veterans at S&T. The SVRC's veteran resource consults provide one-on-one consultations to guide students to various resources on campus. Visit the SVRC at Harris Hall Room G10, contact us at svrc@mst.edu.

Intro to Quantum Fall 2022 (Phys 4301)

Course topics

Date	Topics/Reading material	Homework
	Foundations: Superposition & uncertainty principles, Postulates of quantum mechanics, Spectral representation, 1D problems: Harmonic Oscillator, Potential well, Potential barrier.	# 1
		# 2
		#3
		#4
09/26	Midterm Exam 1	
	Time-independent Schrödinger equation in 3D and it's applications: Spherical coordinates, Theory of angular momentum, Identical particles, Spin, Electronic structure of atoms.	#5
		#6
		#7
10/21	Midterm Exam 2	
	Approximate methods: Perturbation theory and Variational methods and their applications. Multielectron atoms and molecules.	#8
		#9
		#10
11/18	Midterm Exam 3	
	Current developments and interesting discussions: Alternative formulations, quantum-classical boundary, Bells inequalities (no-hidden variables), philosophical issues, Quantum computing.	#11
		#12
12/12	Final Exam @ 7.30 am	