

Introduction to Modern Physics
PHYS 2305
Syllabus
Spring 2025

Course Description:

An elementary survey of the modern concepts in physics and their applications; relativity, quantum mechanics, atomic physics, solid state physics, nuclear and particle physics. Prerequisites: Math 2222 and Physics 2135 or 2111.

Instructor:

Jim Musser, Ph.D.

Physics 122

musserj@mst.edu

Reserved Student Hours:

- Monday and Wednesdays, 11:00 am – 12:00 pm
- Tuesdays and Thursdays, 9:00 – 10:00 am

Class:

Mondays, Wednesdays and Fridays, 2:00 – 2:50 pm. Attendance is required. In addition to homework, some in-class activities will be graded.

Study Session:

Optional session where students may work together on homework and get assistance from the instructor. Day and time to be determined in consultation with students.

Textbook:

Modern Physics for Scientists and Engineers, 5th Ed.

By Stephen T. Thornton, Andrew Rex and Carol Hood

ISBN: 978-1-337-91945-6

Course Work:

Assignments (TBA) 40%

Exams (3) 60%

Grading Scale:

≥89.5%	A
≥79.5%	B
≥69.5%	C
≥59.5%	D
<59.5%	F

Assignments:

Homework problems will be assigned throughout the semester. In addition, in-class assignments and quizzes may be collected. There will be an automatic penalty for late submission of homework problem solutions. In-class assignments/quizzes that are missed due to an unexcused absence will earn a score of zero.

Exams:

There will be three exams. See schedule for topics covered in each exam. Note that the third exam will be given during the final exam period.

Absences:

If you are required to be absent due to participation in an official university-sponsored event, inform the instructor in advance.

If you are sick or must miss class due to circumstances beyond your control, inform the instructor as soon as possible.

If you are absent for any reason, it is your responsibility to inform the instructor and discuss with the instructor if and what arrangements may be made to address missed instruction.

In accordance with university policy, students with excessive absences may be dropped from the course.

Schedule: (chapter in parentheses)

- The Birth of Modern Physics (1)
- Special Theory of Relativity (2)
- The Experimental Basis of Quantum Physics (3)
- Structure of the Atom (4)
- Wave Properties of Matter and Quantum Mechanics I (5)

Exam I (February 21 in class, Date subject to change)

- Quantum Mechanics II (6)
- The Hydrogen Atom (7)
- Atomic Physics (8)
- Statistical Physics (9)
- Molecules and Solids (10)

Exam II (April 11 in class, Date subject to change)

- Semiconductor Theory and Devices (11)
- The Atomic Nucleus (12)
- Nuclear Interactions and Applications (13)
- Particle Physics (14)
- Modern Astronomy and General Relativity (15)

Exam III (Wednesday, May 14, 3:00 – 5:00 pm)

S&T Campus-Wide Policies

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. Student Accessibility and Testing provides services and accommodations that facilitate full participation in Missouri S&T's learning experience for students with disabilities. If you anticipate or experience physical, academic, and/or digital barriers due to 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 [Standard of Conduct](#) and [Honor Code](#).
- [The Standard of Conduct](#) defines the behavioral expectations of all students and student organizations with clear descriptions designed to protect a specialized educational environment conducive to learning. This environment promotes learning while fostering integrity, academic success, personal and professional growth, and responsible citizenship.
- Additional resources regarding academic integrity are available [online](#).

Student Mental Health and Well-Being

Your well-being is important, and it contributes to your success in this course. At S&T, we provide resources to support your mental, physical, and social well-being. Any of us can experience challenges that make learning difficult. If you are struggling, take advantage of the following resources offered by the university:

[Student Well-Being](https://wellbeing.mst.edu/) (<https://wellbeing.mst.edu/>)

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 confidential individual and group counseling, wellness consultations and trainings, case management services, resources for many health and wellness topics, and help for mental health crisis situations. For the 988 Suicide and Crisis Lifeline, call or text 988, or visit missouri988.org.

[Health and Well-Being Canvas](#)

[Course](https://umsystem.instructure.com/enroll/G3LY3G) (<https://umsystem.instructure.com/enroll/G3LY3G>)

The Health and Well-Being Canvas Course features trainings, presentations, and other health and well-being resources for students. The course is free for all

students, is non-credit, and students can enroll at any point in the semester.

Student Emergency Fund (SEF)

The SEF is administered by the Division of Student Success to help ensure Missouri S&T students have access to the support and resources they need to successfully recover from an unforeseeable financial emergency. The goal of this fund is to prevent one small emergency or unexpected expense from derailing a student's progress toward degree completion.

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 prohibits discrimination and harassment 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 Student Accessibility and Testing or 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.

For more information regarding support for those that have been impacted or to report an incident of discrimination or harassment as defined by

[Chapter 600](#) of the University's Collected Rules and Regulations, visit the Office of Equity and Title IX or visit their website at equity.mst.edu.

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/>.

University Libraries

The library provides students and faculty with physical and electronic books, journals, articles and databases as well as recreational reading and video materials. You can also check out laptops, calculators, tool kits and more and reserve study or meeting rooms. Talk to us one-on-one via chat, email, phone or in person for any assistance regarding library services or finding peer-reviewed, credible research materials for study and research needs. Find out more information about the library here: library.mst.edu.

Writing and Communication Center

The Writing and Communication Center's mission is to assist all students in their efforts to become better writers, communicators, and critical thinkers. The Center's peer consultants and coaches 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 our website, through email: writing@mst.edu or stop by Curtis Laws Wilson Library 314-315.

Student Success Center

The Student Success Center (SSC) offers peer tutoring and success coaching to help students succeed in their academic goals. Additionally, we work as a resource hub and can connect you to the campus resources necessary to help you dig deeper and finish the semester strong. Visit the SSC in Room 117 Innovation Lab and contact us at ssc@mst.edu or 573-341-7590. To learn more about the SSC, visit <https://ssc.mst.edu/>

S&T Tutoring Opportunities

The Student Success Center (SSC) helps you with your studies in three ways:

- **LEAD Drop-in:** Our LEAD Drop-in service provides convenient access to experienced peer learning assistants for a multitude of courses across campus. No appointments necessary. Simply check our tutoring schedule to discover when support for your specific course is available:

<https://ssc.mst.edu/leaddrop-in/>

- **LEAD Group Sessions:** Our LEAD Group sessions offer after-hours group tutoring, facilitated by our dedicated peer learning assistants in partnership with faculty members. Explore the LEAD Group schedule to see if your course is featured and join us at the next session: <https://ssc.mst.edu/leadgroup/>
- **Knack Tutoring:** If your schedule clashes with our LEAD offerings, or if your course isn't covered, Knack is your solution. Request a tutor for either a virtual meeting or an in-person session on campus, ensuring you get the help you need, when you need it. To sign up for your FREE Knack account, visit: <https://ssc.mst.edu/knacktutoring/>

Military & Veterans Services Center (MVSC)

The Military & Veteran Services Center at Missouri S&T is dedicated to supporting those who have served, are currently serving, and those who aspire to serve in our nation's armed forces, along with their families. We are committed to fostering a welcoming and inclusive environment that empowers military-connected students to achieve their educational and personal goals. Through tailored resources, academic and career support, and community connections, we aim to enhance the success and well-being of service members, veterans, and their loved ones as they transition into and thrive within higher education here on campus.