

PHYSICS 2135 Syllabus

Spring 2025

This syllabus is your guideline for Physics 2135: *Engineering Physics II*. If corrections are required, the “official” version of this syllabus is maintained in the Canvas lecture course.

Course Description: An introduction to electricity, magnetism, and light, with emphasis on topics needed by engineering students. Prerequisites: Physics 1135 or Physics 1111, Math 1221 or Math 1215

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

Textbook: *University Physics Vol. 2 and Vol. 3*, Ling, Sanny and Moebs. May be viewed or downloaded from the OpenStax web site.

<https://openstax.org/details/books/university-physics-volume-2>

<https://openstax.org/details/books/university-physics-volume-3>

Purpose

The purpose of this course is to provide students with knowledge, conceptual understanding and problem-solving skills in the discipline, so that students have the opportunity to be successful in further studies in science and/or engineering.

Major Course Elements

Lecture [Required] (Mondays and Wednesdays). Lectures will elaborate on concepts that are difficult to master or understand on a first reading of the material. In addition, examples will be worked to demonstrate the concepts and assist in the development of your problem-solving skills.

Recitation [Required] (Tuesdays and Thursdays). Recitation will be an additional source of instruction on important course concepts, with emphasis on developing the problem-solving skills necessary for completion of the assigned homework. Your mastery of the material and your problem-solving skills will be tested through collection of the assigned homework and other recitation exercises.

Laboratory [Required] (alternating weeks). Laboratory details will be provided by your lab instructor. The laboratory is designed to reinforce concepts learned in lecture and recitation, to connect those concepts to physical experience, to illustrate scientific methods, and teach measurement theory.

Physics Learning Center (PLC) [Recommended] (Mondays and Wednesdays). This is an open learning environment where you can solve problems in informal student groups, get help and insight in a relaxed setting, and prepare for your recitation class. You can come at *any* time during operating hours (2-4:30pm and 6-8:30pm) in rooms 129-130 of the Physics Building. The PLC is staffed by peer tutors and course instructors. For more information about the Physics Learning Center, contact your recitation instructor or the LEAD office (573-341-7276, lead@mst.edu).

Sources of Points and Grading

Exams. There will be three hour long exams, given only **5:00 pm – 6:00 pm** on the Tuesdays listed in the *Schedule of Classes* (**Feb. 18, Apr. 1** and **Apr. 22**). See the course website for the location where the exams will be given for your recitation section. The final exam is **10:00 am – 12:00 pm, Tuesday, May 13**. These four exams are worth 200 points each. Your lowest exam score (out of the three exams and the final) will be dropped.

Homework. Homework assignments will be found in the modules in the lecture course in Canvas. Students will submit solutions through their recitation course in Canvas. Six homework assignments will be graded. The lowest homework grade will be dropped.

Recitation. Your recitation instructor will collect and grade work that may include presentation of homework problems on the board and test-level problems. A maximum of 200 points will be given for recitation work. Your recitation instructor will provide additional grading details. [Note that there is not a universal number of recitation assignments. The final recitation average will be converted and reported relative to a 200 point maximum.]

Laboratory. There will be six laboratories during the semester. Your reports are to be turned in to your lab instructor according to the instructor's instructions. Lab reports will be graded on the basis of 100 points, and reports will be returned by your lab instructor. The lowest lab report score will be dropped. ***Each Physics 2135 student must purchase a lab manual. Students not purchasing a lab manual will receive a laboratory grade of 0.***

Late Work Policy. Late work is not generally accepted. If you have an extenuating circumstance, such as a university sponsored event or an emergency situation, you may make a request to your recitation instructor to make an exception.

Course Points:

Exams:	60%
Homework:	10%
Recitation:	15%
Laboratory:	15%

One exam and one homework score will be dropped. Your recitation instructor will describe how your recitation grade is determined. Grading is on an absolute scale.

The cut-offs for grades are:

A ($\geq 89.50\%$)

B ($\geq 79.50\%$)

C ($\geq 69.50\%$)

D ($\geq 59.50\%$)

F ($< 59.50\%$)

Grade Issues

Regrade policy. Requests for regrades must be submitted no later than the end of the second recitation meeting after the general return of the graded material, except that lab regrade requests must be submitted in accordance with the current lab policy. Regrade requests for the Final Exam must be submitted as soon as possible in order to complete the regrade before grades are due. Except for labs, all regrade requests must be submitted to your recitation instructor. Compose a detailed but **brief** written statement on a separate sheet of paper explaining why you are requesting a regrade. Attach the sheet to the front of the full assignment and submit it to your recitation instructor by the appropriate deadline.

There are occasional instances in which a score is not entered correctly in Canvas. In such an event, you must bring your recitation instructor the assignment that was incorrectly recorded, and the correction will be made. It may be necessary to bring **all** assignments of that type (e.g. homework, etc.) in order to have your scores correctly entered.

Attendance and Participation

Students with inadequate attendance may be dropped. Any student who has inadequate attendance, as evidenced by 5 confirmed absences or by missing a total of 5 graded assignments of any kind (exams, homework, recitation, and labs) are subject to being dropped if a subsequent class or assignment is missed.

Those participating in a major university or intercollegiate event on the day of an exam may make arrangements with Dr. Musser to take the exam if they submit a written request for an excused absence. The student must submit a written request

(email is acceptable) to Dr. Musser, acknowledged in writing (email is acceptable) by the event's Missouri S&T Faculty Sponsor, *no later than the end of the last Wednesday lecture the week before the exam.*

Students who are ill, quarantined or otherwise unable to attend are encouraged to contact Care Management (cm@mst.edu). In addition, students who are unable to attend will need to contact their recitation instructor to make arrangements to complete and submit course work.

Complaints About the Course

Unresolved complaints about a laboratory or recitation instructor: Occasionally, a student has a conflict with a laboratory or recitation instructor. It is hoped that any complaints can be resolved in a collegial manner through discussions between student and instructor. However, if such a situation continues or remains unresolved, please feel free to discuss it with Dr. Musser.

Unresolved complaints about the course: It is hoped that any complaints about the course can be resolved in a collegial manner through discussions with Dr. Musser. However, if there are any complaints that cannot be resolved, you may take them up with Dr. Thomas Vojta, Physics Department Chairperson.

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/>)

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>)

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.

January				2025
Monday Lecture	Tuesday Recitation/Exam	Wednesday Lecture	Thursday Recitation	Throughout Week Lab
20 Martin Luther King, Jr. Day No Class	21 Recitation Introduction	22 L1 5:1-4 Electric forces and fields due to point charges	23 HW1	20-24 No Labs
27 L2 5:6 6:1-3 Field lines and Gauss's Law	28 HW2	29 L3 6:4 Gauss's Law with conductors	30 HW3	27-31 Coulomb (Odd)

February				2025
Monday Lecture	Tuesday Recitation/Exam	Wednesday Lecture	Thursday Recitation	Throughout Week Lab
3 L4 5:7 7:1-3 Potential energy, electric potential and electric dipoles	4 HW4	5 L5 5:5 Force, field, energy and potential due to lines of charge	6 HW5	3-7 Coulomb (Even)
10 L6 Force, field, energy and potential due to arcs of charge	11 HW6	12 L7 Potential difference from integrating along path	13 HW7	10-14 Capacitors (Odd)
17 Exam I Review	18 HW E1 Review Exam I 5:00 – 6:00 pm (L1-L7) (Career Fair)	19 L8 Capacitors: capacitance, energy and dielectrics	20 HW8	17-21 Capacitors (Even)
24 L9 Capacitor circuits	25 HW9	26 L10 Current, current density, resistivity, resistance and Ohm's Law	27 HW10	24-28 RC Circuits (Odd)

March				2025
Monday Lecture	Tuesday Recitation/Exam	Wednesday Lecture	Thursday Recitation	Throughout Week Lab
3 L11 Resistor circuits and real batteries	4 HW11	5 L12 Electrical instruments and RC circuits	6 HW12	3-7 RC Circuits (Even)
10 L13 Lorentz force and trajectories	11 HW13	12 LSpecial	13 Spring Recess No Labs	10-14 Spring Recess No Labs
17 L14 Magnetic force on current-carrying wire	18 HW14	19 L15 Magnetic field due to moving charge	20 HW15	17-21 Current Balance (Odd)
25 Spring Break No Class	26 Spring Break No Class	27 Spring Break No Class	28 Spring Break No Class	25-29 Spring Break No Labs
31 Exam II Review				

April				2025
Monday Lecture	Tuesday Recitation/Exam	Wednesday Lecture	Thursday Recitation	Throughout Week Lab
	1 HW E2 Review Exam II 5:00 – 6:00 pm (L8-L12)	2 L16 Biot-Savart Law	3 HW16	31-4 Current Balance (Even)
7 L17 Ampere's Law	8 HW17	9 L18 Faraday's Law and magnetic dipoles	10 HW18	7-11 Generator (Odd)
14 L19 Electromagnetic waves	15 HW19	16 L20 Light, reflection, refraction and dispersion	17 HW20	14-18 Generator (Even)
21 Exam III Review	22 HW E3 Review Exam III 5:00 – 6:00 pm (L13-L18)	23 L21 Mirrors	24 HW21	21-25 Dispersion (Odd and Even)
28 L22 Thin lenses	29 HW22	30 L23 Double slit interference and diffraction gratings		No Labs

May				2025
Monday Lecture	Tuesday Recitation/Exam	Wednesday Lecture	Thursday Recitation	Throughout Week Lab
			1 HW23	28-2 No Labs
5 L24 Thin films	6 HW24	7 Exam IV Review	8 HW E4 Review	5-9 No Labs
12	13 Exam IV 10:00 am – 12:00 pm (L19-24)	14	15	12-16 No Labs