

WELCOME, GOALS, AND OBJECTIVES

Welcome to Physics laboratories. We in the physics department want to present you with the most modern physics laboratories as well as the best designed for learning.

If the physics labs are meeting their goals, they should help students to:

- 1. See examples of and gain insight into basic physics concepts.**
- 2. Use basic physics concepts to develop critical thinking, problem solving, and decision making skills.**
- 3. Develop specific skills, competencies, and points of view needed by professionals in the sciences including measurement and data analysis.**
- 4. Gain skill in discussing and writing about observations, inferences, and conclusions.**
- 5. Learn to work collaboratively.**

In the attempt to meet these goals, we are always looking for ways to improve all of our introductory physics labs. Please do not hesitate to suggest changes in the lab write-up, procedures, and topics (either to your Teaching Assistant or to me). We look forward to working with you and sincerely hope you have a rewarding semester in the physics labs.

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MTU ADA Statement

Michigan Technological University complies with all federal and state laws and regulations regarding discrimination, including the Americans with Disabilities Act of 1990. If you have a disability and need a reasonable accommodation for equal access to education or services at Michigan Tech, please call the Dean of Students Office, at [487-2212](tel:487-2212). For other concerns about discrimination, you may contact your advisor, Chair/Dean of your academic unit or the Affirmative Programs Office, at [487-3310](tel:487-3310).

RULES AND POLICIES

1. **Safety:** TA's reserve the right to remove students from lab for inappropriate conduct that could endanger themselves or others or damage laboratory equipment. You are expected to follow instructions and use reasonable caution in lab. If you wish to experiment beyond the scope of the lab, check with your TA to be sure what you are planning will not create a dangerous or destructive situation.

The greatest hazards in our PH1200 labs are that we often operate electrical equipment. Electricity and liquids can be a dangerous combination. Food and drink are not allowed on the table top at any time. We will be using various pieces of mechanical equipment such that the equipment will have moving parts. Be cautious of these moving parts. Be sure to place coats, book bags, etc. well out of traffic way so that you or others will not be likely to trip over them. Immediately report any injuries, no-matter how minor, to your lab instructor. Report any hazardous conditions immediately to your lab instructor.

2. **Attendance Policy:** All students should attend only the lab section for which they are registered. Credit will be given only for work done in the students' scheduled lab section unless special arrangements are made. Students are expected to attend all lab classes. Unexcused absences will be counted as zero. **Three or more unexcused absences will result in failure of the course.** Whether or not an absence is excused will be at the discretion of your TA. As a guide, excused absences are limited to serious situations beyond students' control such as extreme illness, family illness or death, university sanctioned absences, etc. Responsible communication prior to or immediately after a missed lab is a major consideration in excusing an absence. Students should contact their TA's as soon as possible once they know they will be absent from lab, and be prepared to provide appropriate documentation to their TA. If you are uncertain whether a planned activity will be excused, contact your TA at least one week prior to the activity to ask for a decision. If you would like to appeal the decision of your TA, contact the lab supervisor (mrmeyer@mtu.edu).
3. **Make-up Labs:** Up to two labs missed for absence reasons excused (in advance, when possible) by your TA may be made up. The lab calendar provides two weeks for makeup labs. Excused absences can generally be made up during regular class time in one of these weeks. Outside of this, responsibility for planning/arranging a make-up lab rests with the student. Because some labs require a group of students, make up labs may or may not be exactly the same as the missed lab.
4. **Cancellations:** Arrangement will be made as needed for rescheduling of classes which are missed due to weather cancellations. In some cases, this may result in the loss of one week of makeup lab.
5. **Expectations:** Students are expected to arrive for laboratory on time with their laboratory manual in hand, having read the "conceptual overview" for that day's session. Failure to arrive at the laboratory with your manual within 10 minutes of the start of the session may result in an unexcused absence or a 10 (out of 100) point reduction at the discretion of your TA. If your schedule makes arriving on time consistently difficult, discuss the situation with your TA before it becomes a problem.
6. **Lab Groupings:** Except in extreme circumstances, students will be asked to work in groups of no more than 3 persons. Groups will be randomly assigned each week, in order to encourage students to assume different roles from week to week so that they participate in all roles several times during the semester.
7. **Academic Dishonesty:** This manual, as sold in the bookstore, contains the packet of "Data and Questions" and "Summary" sections which are to be completed during each lab session only. Labs are written to allow completion within the 2 hour time block. In-lab possession of pre-completed lab handouts, notes from other lab sections, or any "scoop" from current or previous terms is not allowed. Students in possession of such information will receive a zero grade for that lab and be referred to the Dean of Students' office for academic dishonesty.
8. **Finishing on-time:** Any accommodation for equipment difficulties which cause delay will be at the discretion of your TA. Generally, late papers will not be accepted. The labs are designed to be completed only by students who stay on task with minimal diversions. You are responsible for being prepared and completing the lab work.

9. **Pre/Post labs (PPE's):** Each student **must complete a pre-lab exercise** posted in BlackBoard (courses.mtu.edu) before 8:00 AM on the day of your scheduled lab. This activity will consist of reading the 1-2 page Conceptual Overview (in the manual or online) and three multiple choice questions based on the reading. 1 point will be awarded each correct answer on these questions. Several other optional pre-lab activities will also be available. A post-lab activity must also be completed within 24 hours after finishing lab. This activity will consist of 4 survey questions about the lab, and 3 multiple choice post-quiz questions checking your understanding of concepts covered during the lab. 1 point will be awarded for each correct answer on these questions. Each lab will therefore have 10 points pre/post. There are 11 labs, so there are 110 points possible, but we will treat it as though there are 100 to allow for technical difficulties, etc. Pre-post-eval (PPE) scores for the full semester will be capped at 100 points.
10. **Scoring of labs:** Each student must turn in a lab worksheet together with all the required graphs and materials to receive credit. The use of pencils (rather than pens) is strongly encouraged since neatness and clarity will affect your grade. Labs will be returned during the next lab session graded on a 100 point scale as follows:
- Data and Questions Section: 70 pts**
While working through the procedure, you will be directed to record data and answer questions about the lab in the data and questions section. If you run into difficulties, feel free to seek help from your TA with this section. This section is a measure of your lab participation. If you attend, actively participate in lab, and answer questions in clear, complete sentences with full explanations, you can expect full credit.
- Summary Section: 30 pts**
At the end of each lab, you'll be expected to complete the summary section as a group. The summary section is designed to test whether you understood and can apply the concepts learned in lab during that session. As such, your TA will generally not answer questions about this section. Students should use the materials given and data collected in lab, and should feel free to go back and experiment further in the attempt to find answers. The summary will usually consist of 4-5 questions of varying difficulty. Generally speaking, at least one of these questions will provide a challenge even to students with a good understanding of the concepts.
11. **Grades:** Your final lab grade will be based on the numerical scores you receive for all labs and PPE's. Each of 11 labs counts for 100 points, with an additional 100 points based on PPE scores throughout the term. (1200 points total). Your lab grade can be determined from the scale below. These numbers will not be curved. If everyone in the course gets 1100 points or more, everyone gets an A.

Grade Scale

Points Earned	Average per Lab	Grade
1100	92	A
1020	85	AB
960	80	B
900	75	BC
840	70	C
780	65	CD
720	60	D
< 720	<60	F

Table of Contents/General Lab Order

Lab Number	Lab Name	Lab Number	Lab Name
1	Charges and the Electric Field	7	Magnetic Forces
2	Current and Voltage	8	Electromagnetic Induction
3	Resistance	9	Optics: Reflection and Refraction
4	Series and Parallel Circuits	10	Optics: Images with Mirrors/Lenses
5	Capacitance	11	Optics: Diffraction, Interference, and Polarization
6	Energy and Power		
	<Make-up lab session>		<Make up lab session>

You will receive a separate copy of a semester-specific lab schedule from your TA which may differ slightly.

Frequently Asked Questions

I don't have a lab manual, can I do the lab anyway?

Only at the first lab of the semester.

I am late for lab, what can I do?

If you are 10 minutes or less late - attend your lab. If you are more than 10 minutes late - you have missed your lab. If your tardiness was out of your control, come to lab, explain to the TA why you were late, and ask for your absence to be excused. If your TA excuses your absence, plan to attend the next makeup session.

I'm sick or know I won't be able to attend my lab. What should I do?

E-mail or otherwise contact either of your TA's and let them know why you will miss lab as soon as possible. Prepare to provide documentation if your TA asks for it. Once you've been excused from that day's lab, plan to attend the next makeup session.

I missed my lab due to a last minute emergency. What should I do?

Obtain documentation such as doctors or councilors notes, plane boarding pass and ticket receipt for late and canceled flights, car repair/tow bills, etc. If you are ill and you choose not to seek medical help, make sure someone other than a friend (an instructor, advisor, coach, parent, etc.) can verify that you were ill. If you have car trouble and you repair it yourself, produce some documenting evidence of the trouble, which includes the time, day, and type of trouble. Present this documentation to your TA and discuss the possibility of a makeup.

I missed my lab can I attend another lab section?

Not except in extraordinary circumstances and by special arrangement. Students must attend their own lab sections to avoid overcrowding and ensure accurate grading.

I missed a third (or more) lab - What can I do?

Provide sufficient documentation regarding all but two absences to receive a grade of incomplete for the course. (You can then make it up next semester.) If you cannot provide sufficient documentation you will have the option of dropping the course or receive a failing grade for the course.

What should my lab worksheets look like?

Neatness Counts: You are writing to convey information to others. If others have difficulty reading what you have written - you have not communicated the information and will not receive full credit. Yes and No answers are generally not adequate answers to questions. Explain by referring to your observations. (e.g. "Yes, this is correct because when we performed We saw" or "No, This is not correct because from our observations we saw that ..." or "No, this is not what we expected because we thought that"

Answer all questions and fill in all blanks. Read lab materials carefully and follow directions. Make sure what you write really answers the question, and be as concise as possible. Writing a large amount of irrelevant prose will just tire you and take up time, without helping your grade.

Graphs should always be carefully and neatly drawn and labeled including labeling important features of graphs. Graphs should be faithfully rendered from those displayed from actual data.

I'm not happy with my score on a lab. What can I do?

Talk first with your TA. Your lab report is evaluated based on the completeness, thoroughness, and clarity of your presentation. Did you give reasons for your predictions? Did you label graphs well? Is your answer to the point and with a reasonable explanation? Do your conclusions logically follow from your observations? If after talking with your TA, you still believe there was a mistake made in grading your paper, you can arrange to submit your paper to the Lab Supervisor (mrmeyer@mtu.edu) for re-grading within one week after it has been returned to you.