

# Physics 1135 Laboratory

## General Information

### **Laboratory Objectives:**

There are many goals for the laboratory. Among them are

1. Developing Experimental and Data Analysis Skills
2. Conceptual Learning – mastering the basic physics you learn in lecture and recitation
3. Developing Collaborative Learning Skills – learning to work effectively in groups
4. Developing Scientific Communication Skills

### **Laboratory Rules and Guidelines:**

#### **Schedule:**

Physics 1135 laboratories meet every other week during the semester for a total of six laboratories. *There are no laboratories the first week of classes.* For a detailed schedule see <http://campus.mst.edu/physics/courses/1135lab/>

#### **Attendance:**

You are expected to attend all six laboratories and submit a written report for each. Attendance will be taken at each meeting and it is part of your responsibility to assure your attendance is recorded by your laboratory instructor. Laboratory absences are to be handled by dropping your lowest lab score. *There will be no make-up labs.*

#### **Grading:**

Your lowest lab score will be dropped. Your total lab score will be determined by the average of your five highest lab grades. You will be informed by Prof. Vojta how these points contribute to your Physics 1135 course grade. There is no separate grade for the laboratory part of Physics 1135. The laboratory exercises are designed to be completed during the two-hour laboratory session. You will turn in your laboratory report at the end of the laboratory period. Each person will complete and turn in every lab report. This will be accomplished by completing the lab write-ups in this manual and submitting the manual to your lab TA at the end of each lab session. Your lab TA will return laboratory reports to you. It is your responsibility to keep the reports returned to you in case of an error in recording your grade. If you wish to dispute the grading of a laboratory report, you must state your question or complaint in writing and return it to your lab instructor the day of the report's return to you. Regrade request forms may be found at the lab website <http://campus.mst.edu/physics/courses/1135lab/>.

#### **Preparation:**

You are expected to have read through the laboratory description in this manual prior to coming to lab. Additional materials to assist in preparation for and completion of the labs may be found at <http://campus.mst.edu/physics/courses/1135lab/>

#### **Promptness:**

It is necessary for you to be in lab on time. Failure to do so is unfair to your lab partners, and repeated violations can result in reduced lab scores.

**Conduct:**

No eating or drinking is allowed in the lab. In addition, disruptive behavior will not be tolerated.

**Partners:**

You will usually work on the lab with one partner, but at times it may be necessary to work in larger groups. It is expected that each member of the group participate in the lab procedures and it is strongly suggested that each member participate in all aspects of the lab process. Each member of the group will submit a separate lab report.

**Lab Reports:**

Each student in each group will submit a lab report. The submission will consist of the lab write-up together with a cover page. The cover page will indicate all members of the group that worked on the report. The lab write-up is completed by adding additional elements to the lab description and answering the questions asked in that document. Proper grammar and spelling are expected, as well as clarity and good organization. Points will be deducted for poor grammar, spelling, organization and lack of clarity. As you proceed, make sure you save files (*Capstone*, Word, or Excel) to your account. This will allow you to recover them in the event of a crash or network failure.

**Format:****Cover Sheet:**

Fill out all information required. *Each group member is to be listed on the cover sheet.* The cover page with all fields correctly completed is worth 10 points.

**Objectives:**

This section will be supplied, and it is intended to convey the intent of the lab.

**Introduction:**

A brief summary of the concepts needed, and how the measurements were performed and analyzed. This section should probably be written after performing the measurements and analysis. The introduction should allow someone who has not performed the lab to understand what you have done and why you did it. **You supply this section.**

**Diagram:**

List equipment used, including any software required. There should be a schematic diagram (which may be hand drawn) of the apparatus. From this drawing, someone who has not performed the lab should be able to successfully set it up and perform the same measurements you did. **You supply this section.**

**Procedure:**

Generally provided in the lab description. If you do anything that is not specifically described in the lab description it should also be included.

**Measurements:**

This section should include the data you collect, often in tabular and/or graphical form. The

table should contain appropriately named headers with units, and the difference between headers and data must be clear. Each table must have a title indicating what data is included. Graphs must also have a title and labeled axes (with units). Your lab TA can provide you with examples of appropriate tables and graphs.

**Analysis:**

This section should describe what you did with your data to fulfill the objectives of the lab. For example, if the objective is to measure some physical quantity such as  $g$ , the acceleration due to gravity, your analysis should indicate how you used your data to determine  $g$  and any error associated with that determination. Show any equations you used together with the required algebraic manipulations to determine what was asked. You must do all algebra prior to plugging in numbers.

**Conclusions:**

Include a brief summary of your procedure and analysis. Comment on your error analysis. For example, does the measured value of  $g$  agree with the accepted value within your experimental error? If not, why? If there are multiple sources of error, which is most important? Which are less important? How might you improve your procedures to reduce your measurement errors? Also answer all questions posed in the lab.

**Resources:**

1. Your primary resource is your laboratory instructor. At the first laboratory meeting he or she will provide you with his or her office hours.
2. Dr. Dan Waddill, 203 Physics, [waddill@mst.edu](mailto:waddill@mst.edu).
3. The Physics 1135 Learning Center can also provide help with the laboratory. PLC hours are Tuesdays and Thursdays, 2:00-4:30pm and 6:00-8:30pm.
4. Your recitation instructor or Dr. Vojta can also help with laboratory questions.

**Contact Persons:**

If you are unable to resolve a problem by talking with your laboratory assistant, contact Dr. Thomas Vojta, Chairman, Physics, 101 Physics, 341-4793, [vojtat@mst.edu](mailto:vojtat@mst.edu)

## 1135 Laboratory Schedule Fall 2019

Week of ...	ODD Sections L01, L03,...	EVEN L02, L04, ...
Aug 19 – 23	<b>NO LAB</b>	<b>NO LAB</b>
Aug 26 – 30	<b>O1:</b> Measurement, Errors, and <i>Capstone</i>	<b>NO LAB</b>
Sept 2 – 6	<b>NO LAB</b>	<b>NO LAB</b>
Sept 9 -13	<b>NO LAB</b>	<b>E1:</b> Measurement, Errors, and Free Fall
Sept 16 – 20	<b>O2:</b> Projectile Motion	<b>NO LAB</b>
Sept 23 – 27	<b>NO LAB</b>	<b>E2:</b> Motion with Constant Acceleration
Sept 30 – Oct 4	<b>O3:</b> Coefficient of Friction	<b>NO LAB</b>
Oct 7 – 11	<b>NO LAB</b>	<b>E3:</b> Conservation of Energy
Oct 14 – 18	<b>O4:</b> Impulse and Collisions	<b>NO LAB</b>
Oct 21 – 25	<b>NO LAB</b>	<b>E4:</b> Archimedes' Principle
Oct 28 – Nov 1	<b>O5:</b> Rotation with Constant Angular Acceleration	<b>NO LAB</b>
Nov 4 - 8	<b>NO LAB</b>	<b>E5:</b> Rotational Collisions
Nov 11 – 15	<b>O6:</b> Oscillatory Motion: The Pendulum	<b>NO LAB</b>
Nov 18 - 22	<b>NO LAB</b>	<b>E6:</b> Standing Waves
Nov 25 – 29	<b>NO LABS – Thanksgiving</b>	<b>NO LABS – Thanksgiving</b>
Dec 3 – 7	<b>NO LAB - Last week of classes</b>	<b>NO LAB - Last week of classes</b>