

There are certain laboratory skills that are fundamental to nearly all work in experimental physics. We want you to master them so that we can assume in future labs that you know them. You will be asked to perform a series of “mini” experiments, in which you will collect data and calculate the final result. No discussion will be required, however you must briefly describe what you are measuring or calculating. Notes will not be allowed during the practical (including a formula sheet), and you cannot use your smart phone as a calculator! Equipment will be available in the labs for you to practice, and you can use KaleidaGraph any time the labs are open. *The lab practical will count as 25% of your final lab grade.* You will be tested on the following skills:

Measuring Length: meter and two-meter stick, plastic rule, vernier calipers

- Placing rule so that the scale is adjacent to the object measured
- Measuring the positions of each end of the object and finding the difference
- Reading to the proper number of significant figures
- Using the vernier calipers

Measuring Time with a Photogate

- Setting a photogate in the proper mode and position
- Taking enough readings to get a reliable average

Significant Figures and Units

- Expressing an experimental result (*including uncertainty*) in standard scientific notation with the proper number of significant figures and with the correct units
- Conversion of units: knowing what units to use, and when they need to be converted

Percent Difference

- Calculate the percent difference between two measured values, or a measured and theoretical value

Using KaleidaGraph to fit data

- Entering data
- Plotting, with correct labeling
- Determining the correct fit function
- Finding the fitting coefficients, their uncertainties, and their units
- Connecting the coefficients with parameters in the model equation
- Creating a user-defined fit for a set of data

Journal skills:

- Clearly labeled sketch
- Neat data tables
- Units, significant figures
- Neat and organized presentation of calculations and results
- A brief description of what you are measuring or calculating.
- Proper usage of terminology (e.g. “mass” vs. “weight”)