PHYS 212 Lab Practicum 2: Information and Guidelines

You will have **1 hour and 15 minutes** to formulate and execute a plan, and prepare a report in response to the **prompt** you are assigned from the list of three shown below. Use any tools and resources available in the lab to assist you. On the lab bench you will be provided with the prompt assigned to you, all necessary equipment, the Core Elements, and the lab manual. You will also be provided with paper for the written lab report. Bring your lab notebook, a pen, and a calculator with you to the practicum.

Throughout the practicum, **you *must* keep a log of your experimental procedure and reasoning** to be handed in as a final report for the lab practicum grade:

- Use the Core Elements for a lab notebook entry to guide your write-up. The write-up should include appropriate elements such as a lab header, purpose, apparatus, procedural details, data, graphs, analysis, and a conclusion. At the end of this document, you will find a description of the Assessment Criteria.

- We will scan up to 5 pages (front and back) of your submission, including the cover page. Ideally, your written description should be 1-2 pages, with any Excel or other printouts included as separate sheets, labeled, and referred to in your write-up. **Do NOT cut-and-paste print-outs into your report pages; simply add them as additional pages at the end of your submitted report**. Do not staple.

- Include your name on each page of your report.

Note that you will not repeat one of the previous labs. Instead, you will be assigned one of the below prompts.

You may practice any and all of these prompts during Open Lab. The specific data you will take during your actual practicum time **will** differ from what you would take for the prompts below.

Prompt A: Use the protractor-laser assembly and the plastic semicircle to determine the refractive index of plastic (and its uncertainty). To do so, take four measurements of the refraction of light from air to plastic (θ_{air} and $\theta_{plastic}$). Write a conclusion including your experimental value for the refraction index and its uncertainty, and whether or not your value is consistent with the accepted value of 1.5.

OR

Prompt B: Using the optical bench setup at your table, make four different measurements to determine the focal length of the given lens (and its uncertainty). Each of the four measurements consists of an object distance and a corresponding image distance resulting in a sharply focused image. Write a conclusion including your experimental value for the focal length and its uncertainty, and whether or not your value is consistent with the accepted value of 5.3 cm.

OR

Prompt C: Using the discharge tube, spectrometer, and LoggerPro/computer setup on your desk, determine the wavelengths (and their uncertainties) for the three most intense emission lines of the CO_2 spectrum. Write a conclusion including your measured wavelengths and their uncertainties, and whether or not each of your measured wavelengths are consistent with the accepted wavelengths of 562.6 nm, 516.5 nm, and 483.5 nm.

Assessment Criteria

Practicum reports will be assessed according to the following five criteria, each given equal weight (maximum 6 points each for a maximum of 30 points total). Of greatest importance is the student's ability to clearly communicate their experiment and interpret their results.

1. A clear, concise statement of the experimental goal. (Core Elements: Lab Header and Purpose)

2. A clear, complete sketch of the apparatus and description of the experimental details, including the procedure used, choices made concerning data collection (equipment used, number of trials, etc.). It should contain enough detail to allow someone else to reproduce the experiment accurately. Where applicable the report should also include a description of uncertainties in the measurement process. (Core Elements: Apparatus and Data)

3. A complete record of data collection and presentation. This section may include tables and graphs appropriately labeled and annotated. Since any printouts will be handed in on a separate sheet of paper, figures and tables should be labeled (Fig. 1, Fig. 2, Table 1, Table 2, etc.) and referenced in the report. (Core Elements: Data, Graphs, Computer Files)

4. A clear, concise description of the analysis undertaken to achieve the experiment's goal. This description should include all analysis of uncertainties. Any calculations using the measured data should be clearly documented. If repetitive, then show one representative calculation. If Excel is used, include a printout of the sheet and annotate representative examples for what you typed into the cells. (Core Element: Analysis)

5. A final statement that summarizes the result of the experiment (quoted in correct scientific format) and the conclusions that can be drawn. If appropriate, this statement should also include comparisons between experimental measurements and theoretical predictions. (Core Element: Conclusion)