

Laboratory Report Template and Marking Scheme

1.1 Lab Report Rationale

This section defines the format for all lab reports. The basic idea of the lab report is to:

- Prove that you did the lab.
- Prove that you understood what you did and why you did it.
- Provide some feedback as to what you learned and what you thought was good or bad about the activity.
- Get you in the habit of documenting your work clearly enough so that you (or co-workers) could repeat the work using only the information recorded in your report. You don't have to repeat your lab for the course, but you might have to on the job.

You are asked to provide reports for each laboratory assignment using the format provided below. Each report **should not** be viewed as a major project, like a term paper, but as a short progress report.

1.2 General Format Guidelines

In completing each lab report, make certain to adhere to the following guidelines:

- It should not be lengthy, but should contain enough information to meet the goals stated above. As a guide, depending on the complexity of the lab, roughly 5-10 pages of text, excluding figures and other attachments, should be sufficient.
- Figures, photos, plots, and tables should be clearly identified. Be sure to label all axes and highlight points of special interest, including critical component parts and interconnections. We encourage you to use visual explanations when possible, but caution you that such visual aids are not self-explanatory and still need to be discussed in the text. Also, do not simply attach plots of all the results that you generated. Be selective: include only those figures that best illustrate your main points.
- As part of your text, include answers to the questions posed in the assigned laboratory problems. Be sure that the correspondence between the assigned tasks and questions and your answers is clearly evident from the text.
- You should submit a Jupyter Notebook you created for the lab. The preferred format is to “print out” (convert) the Notebook into a static pdf or html (with associated image or photo files). The pdf format is preferred because feedback can be inserted directly into the file.

- Attach your final, corrected solutions to assigned lab problems (if any). In explaining your results, you should reference these solutions as required.

1.3 Report Format (Total: 20 marks)

1.3.1 Title

Should include:

- Your name, student number
- Laboratory title and assignment number
- Course and section numbers
- Date

1.3.2 Introduction (2 marks)

- Approximately one or two paragraphs depending on the lab.
- ‘Express the goals and assigned tasks for the laboratory using your own words. What are you given? What are you to find?’
- What are the applicable analytical representations, concepts, operations, and tools you have learned from the text and lectures?
- ‘What did you learn from this assignment?’

1.3.3 Preparation (5 marks)

- Approximately 1 page of text, providing answers to Laboratory Prep Problems if any. Note that Lab 1 is an introduction to Python/Jupyter Notebooks and has no Prep section.
- Often performing the lab activity is facilitated by using your Lab Prep Problem solutions. How do these solutions relate to the laboratory goals, tasks, and expected results?

1.3.4 Procedure and Results (6 marks)

- Approximately 1-2 pages of text, with references to diagrams as necessary
- First - identify the hardware systems or components that you used. Be specific; e.g., what specific functionality of the sound card was used? Document how the hardware was interconnected to perform the assigned tasks (should use a labeled photo or diagram of this), and identify hardware settings that must be selected as

- part of the data measurement or acquisition process. Which components, settings and operations will be most critical? Most sensitive?
- Second – in your own words describe the steps that you took and the results that you obtained for each step. Document your observations in as much detail as possible. Include Python code (comments should be included to aid in understanding your code) and output, screenshots or photos as necessary.

1.3.5 Discussion (5 marks)

- Answer any specific questions required in the lab.
- How good were your experimental results? In what ways did they match your expectations? Explain your answers. Suggest ways to improve your results.
- You should comment on the interplay between the mathematical analysis and observed physical properties. Use the questions in the laboratory as guidelines in your discussion, but do not limit yourself to asking only these questions.
- Which Python modules, functions and commands did you use? What function do they perform? Identify how variables that you defined in the Preparation section correspond to parameters and signals that were passed to and returned from these Python functions.
- What difficulties did you encounter, if any? Be sure to document how you overcame these. Even difficulties that seem to have trivial solutions, e.g., Python syntax errors, should be documented so that you do not continue to repeat them in future labs.
- ‘Which tasks were easiest to analyze, understand, and execute? Most difficult? Why? If some major difficulty occurred that did not allow you to complete the assigned task in the allotted time, analyze what went wrong and indicate how you expect to avoid similar difficulties in future labs.
- What extensions come to mind? What else might you like to try, given the time and resources?

1.3.6 Conclusions (2 marks)

- Summarize your findings and discussion in 1 – 2 paragraphs.