Lab notebook guidelines

You will be using a lab notebook. We will be using the "National Brand 75 page-item 43648". These are currently running ~$13/each. Below there are two links where you can buy it. The ones with ring binder is also fine.

https://www.walmart.com/ip/National-Brand-Computation-Book-Quadrille-Rule-9-1-4-x-11-3-4-Green-75-Sheets-Pad/14915564

Or

https://www.amazon.com/National-Computation-Notebook-Inches-43648/dp/B00007LV4B/ref=sr_1_22_sspa?dchild=1&keywords=national+brand+laboratory+notebook+43648&qid=1607353829&sr=8-22-spons&psc=1&spLa=ZW5jcnlwdGVkUXVhbGlmaWVyPUEyN1BDTlFTRzRaRlpIJmVuY3J5cHRlZElkPUEwNTE3NzkyN1g3RkFQUDczWlI1JmVuY3J5cHRlZEFkSWQ9QTA1NDk3NTMxUUIwRUxQRUw0RFMwJndpZGdldE5hbWU9c3BfbXRmJmFjdGlvbj1jbGlja1JlZGlyZWN0JmRvTm90TG9nQ2xpY2s9dHJ1ZQ

Purchase at least one, though you may need a second before the end of the course. *I will not micromanage your lab notebooks, but state there are many philosophies on this*. Some believe that this must be maintained as a legal document, others believe that it is a guide to enable other readers (or you) to follow your work, or lastly that it is a document to assist you and you alone in keeping a record for yourself. My own philosophy falls into the latter two categories. However, if you work in industry, you will need to learn to keep a legal styled notebook.

Here is a good link on lab notebooks and lab report writing:
http://www.drjbloom.com/Public%20files/Laboratory%20Notebook%20Booklet.pdf

Your lab notebooks must include:

1. **General Formatting**
    a. **Table of contents** (leave 2-3 pages at the beginning so you can fit this for the labs).
    b. The table will refer to the lab title and page number
    c. Start each new lab on a new page with **title, your name, and date**.
        i. Start on a "right sided page" and you may want to leave a completely blank page between the end of last lab and next.
2. **Summary of the lab instructions/procedures**
    a. Continue with a new lab by writing up a **summary of lab notes and procedures** prior to entering lab.
    b. This summary should be sufficient description and instruction for you to complete lab
    c. You can have a lab handout with you in lab, but not taped in the lab notebook
        i. Lab instructions nor other general paper do not belong in your lab notebook. You may refer to such documents and where you have copies located.

ii. If it is clear that you are not prepared for lab, aka, not ready to do data collection, it may prompt a quick notebook check and comments in lab notebook.

d. I do not want you to keep a library of reference materials pasted or taped into your lab notebooks. What is in your lab book is of your creation, not mine, not APS, not AJP, no other journals. You should have sufficient information to understand how to get started in lab. More can be written later as needed.

3. **Include the collected data and other procedural comments and notes**
   a. Data includes noting any experimental conditions that may impact the experiment.
   b. Data includes any measurements taken along with uncertainty and sufficient description of equipment settings.
   c. Sketch experimental setup.
   d. You may take pictures and leave room for sketch and/or pictures later.
   e. For electronically recorded data points that number in the thousands, you may refer to your copy of electronic file (name and location)
   f. For smaller data sets, you must have all data in a table in your notebook.
   g. I should be able to find an **estimated uncertainty** with any directly measured quantity.
      i. A data table will typically include a + / - "number" to indicate uncertainty.
      ii. For many measurements the uncertainty is included along with symbol and units at the top of the column.
      iii. If your data set requires individual (point by point) uncertainty, then leave room to record that.
      iv. You may wait till later in your analysis section to explain how you are handling error /uncertainty propagation in your end result.
   h. If you need to retake data—note the time again, and any new conditions.
   i. In general data is not omitted. If you have a data set you are "throwing out", you should have written a reason for that in your lab notebook, for example, "bad data taken during active earthquake". You may cross out your data or other remarks in a lab notebook, but you are not permitted to erase it.

4. **Rough analysis**
   a. If there is a method of quick check on data analysis possible then you can do as you take data. Do so. This is the number that says "okay, my data looks good, and I have a functional experiment with reasonable results". If you left the lab without doing such a check, you may not catch a critical error.
   b. Most labs have such a "back of the envelope" numbers check available.
   c. The rough analysis is not part of your later handed in work or results but is a critical component of your lab notebooks.

5. **Results**
   a. You must write your final results (with uncerntainty). If used, you must include graphs created to determine your final result. Those must be affixed in your lab

notebook as a permanent taped or glued in item. No dangling pages. Likewise with any other graphs or figures produced externally.

b. You must describe a **methodology of analysis**: how did you get your end result from your data.
c. If you are comparing your results to a well-known standard, then you should have that standard in your lab notebook (speed of light) and the reference where you obtained that number/constant.
d. **References** are needed even in lab notebooks
    i. Since I forbid you to paste full copies of reference materials in lab notebooks, you must provide references to maintain integrity.
    ii. "Colbert's old Advanced lab handout from 1898", "Arthur Schawlow's AJP paper from…….".
    iii. If you include information without reference, I may call you in to re-derive or explain where that information comes from (no notes).
e. Regardless of having a plot/graph, you must include the primary **final results** of the experiment. You may want to leave space for this in your notebook.
f. The final result you have listed in your lab notebook should **agree with what is in your handed in analysis and your lab reports. This includes writing resulting numbers out properly with proper significant figures and uncertainties.**

6. In general,
    a. Use a pen to write your lab notebook. **Never erase, cross out only.**
    b. Do leave space to complete the lab work as you start on next lab.
    c. Never be late for lab time. This may be marked in your lab notebook with a penalty.

7. Notebook Collection
    a. I will generally not collect these, but you are permitted to have your lab notebooks for your oral review of lab.
    b. I may look at the lab notebook to see if it is sufficient during that oral review--- this will happen if you are unable to complete tasks (since you should have clear instructions in your lab notebook).

The list above is not comprehensive but should get you good lab notebook grades and a well-prepared lab notebook. Remember the purpose is to have a notebook which ultimately allows you to go back in five years and do the lab on your own, and also know the results of this lab.

Observations and data collection can only be made while you are doing the experiment!

You must estimate the experimental uncertainties in your equipment (how well can you read, and how reliable are the numbers from your equipment).

Rubric for lab notebooks Score/100 points _____

When grading I will look for general compliance or non-compliance with categories listed below.

1. General formatting issues (technical details):15 points

Table of contents up to date	
Lab title, name, date	
Overall notebook appearance/neatness	

Comments and other:

2. Summary instructions/procedure/method: 15 points

Completeness	

Comments and other:

3. Data: 20 points

Data presentation (clear indication of what data is/what it means) File location if needed	
Labels, units, in reporting of measurements and results	
Sketch of experiment with any needed labels (identify quantities measured if possible)	
Uncertainty included in reporting of data measurements and results	

Comments and other:

4. Rough Analysis: 20 points

Quick check if possible	
Quick comparison to “known-values”	

Comments and other:

5. Results: 20 points

Completed graphs/tables/other	
Method of analysis discussed	
Quantitative statement of result and comparison to standard	
References	
Does result match your lab write-up?	

Comments and other:

6. Other: 10 points

Violations of lab notebook rules (like erasures)	
Missing materials	
Other comments	

Comments and other: