No template is provided on purpose: there is one set way to write a formal lab report (i.e. a scientific paper/manuscript). You’ve had good exposure in PH411; their guideline generally hold well in 424,

<http://physics.oregonstate.edu/~mcintyre/COURSES/ph411/ph411labwriteup.pdf>. But please also read this guide AND <http://physics.oregonstate.edu/~grahamat/COURSES/ph424/writing.html> and ask questions early! The rubric does not imply you need to use the headings listed, be creative; we are searching for an intelligent scientific story. You can chose your favorite way to organize***.
A good report is like an essay with sub-headings with insightful figures & equations added in. Declare victory and discuss the significance at the end.
Afterwards, imagine you had to hand this report to your boss; would they appreciate and understand the discoveries and conclusions of your experiments.***

You need to write good prose, valid (numbered) equations, and to pay attention to clarity. Be succinct, but make sure you explain clearly and demonstrate steps in important derivations. Your audience is incoming juniors majoring in physics who do not know the experiment or the model, not instructors. If there are parts of the experiment you rushed through, or you were not the oscilloscope “driver”, spend a few minutes setting up the experiment again. It will take only 20 minutes the second time through!

Some things to consider:

1. **Thoughtful title! What did you find out? What’s new?**
2. **Abstract**
3. **Introduction:** State the goal of your experiments. What is it that you are trying to establish with your measurements? Why is this experiment important? Applications, who will care?
4. **Theoretical model:** discuss and present your theoretical model. Do no re-derive, be selective, what are the critical steps?
5. **Methods:** Briefly describe the experiment you did, including an informative circuit diagram. Include separate sketches of the oscilloscope trace. [Points are assigned for correct results and for your ability to put your discussion in a sensible, clear and logical fashion.] Only mention critical steps and constants, be selective. Explain important step of what you did. Methods should never read like a lab manual.
6. **Presentation of results:** You’ll at least 3 data figures; possible more. The quality of your captioned figures is absolutely critical.
7. **Interpret & describe your results and observation.**
8. **Discussion & assessment;**  How do your model and theory agree?
 Why are your results important in a grander scheme? What physics was learned?
9. **Conclusions/summary (be positive, what was the main message, declare victory!)**

 Write a short summary (<200 words) that summarizes the results of the experiment, the modeling that you did, and the validity of the model.

1. **References & Acknowledgements** (textbooks, sci. literature papers) at least 2+, avoid Wikipedia, go to the source.

*(ONE OF MANY POSSIBLE TEMPLATES TO CONSIDER your organization method is your choice! Note: good titles, Abstracts, References & Acknowledgements are needed in all reports)*

*Title (make it informative)*

by

Albert Einstein \*

*Princeton University, Princeton N.J.*

Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *(you'd be surprised how many forget this!)*

ABSTRACT

*Write an abstract of about 100 words that states succinctly what you investigated and THE RESULTS of your experiment. (You are not writing a novel, but if you were, the abstract would tell you who the thief was.) You should include words that colleagues might use in a search.*

The abstract goes here ……………

\* *When you put your name on a piece of scientific work, you are implicitly making the following affirmation:*

***I promise that what is reported here is a true account of the results obtained in my experiment. I have upheld the highest standards of scientific integrity in recording and reporting the truth. I further promise that this is my own work, except as explicitly stated in the acknowledgment section. I have not included the work of any others without proper attribution. Any sources such as texts or internet articles are explicitly quoted in the reference/bibliography section. Any information I have gained from these acknowledged sources has been studied carefully and internalized and reported in my own words so that it reflects my own understanding and interpretation.***

*This is just as important an issue as it ever has been, and the scientific community has recently been plagued with instances of serious fraud, and many more of plagiarism, piracy, and unintended theft of intellectual property. As scientists, you must be aware of this issue and think about it constantly in your own work.*

 MOTIVATION FOR THE EXPERIMENT

 *One should always explain why the experiment was done. This motivation might be an explicit hypothesis that is to be tested, or the formulation of models whose accuracy is to be assessed, or an exploratory study. It is generally best not to go into mathematical details at this juncture, but to give the reader a good indication of what is to be tested or discovered. Here's an example – finish it, edit it, make it better!*

 EXPERIMENT

 DIAGRAM OF APPARATUS

*No report is complete without a detailed, clear drawing or diagram. Decide what information is best delivered in this picture.*

DESCRIPTION OF APPARATUS

*A brief description, including any written comments that don't fit well into a diagram. (about half a page?)* DATA ACQUISITION PROCEDURE

 *Describe how the measurements were made. Focus on clarity and ease of finding information. You'll be measuring the angular position as a function of time, making sure you have many different amplitudes of motion represented. You'll also need to measure some physical properties of the pendulum in order to predict the amplitude of oscillation predicated by your model.*

GRAPH(S) OF OSCILLSCOPE OUTPUTS (captioned & numbered)

RESULTS/ANALYSIS/DICSUSSION

***Tables, What figures will you need??***

***Check significant figures on recorded and calculated quantities****.*

Be descriptive!

 ASSESSMENT/DISCUSSION

*In this section you should describe the results of your experiment and make any preliminary assessment on the agreement with postulated models. In this particular lab, it is particularly powerful to present your assessment graphically as well as verbally. You can comment on the accuracy of the measurements, and so on.*

 SUMMARY AND CONCLUSIONS

*Many statements in the summary will have been made in previous parts of the report, particularly in the assessment. Your job in the summary is to provide an overview and a strong conclusion. We look for consequences of our successes, and note loose ends that may need further work.*

*This is a good time to reassess your abstract and see whether the results of the experiment are reported in the abstract.*

 ACKNOWLEDGEMENTS

The measurements were taken in a group including Jane Smith, José Sanchez, and Dr. Wei-Min Wu. *Note how full names are given. Professional courtesy demands that you identify your colleagues appropriately.*

Helpful comments were provided in conversations with Jane Smith, who suggested the particular style of presenting the data. The photograph on page x was taken by José Sanchez.Prof. Bohr's help improved my understanding of how to manipulate power series.

*Other acknowledgements may also be appropriate.*

*Note that all you present in this report is assumed to be entirely your own work unless you state otherwise here. Be sure to honestly credit others. Your raw data is certain to be identical to that of others in your group, but all analysis MUST be independent, including, and especially including, computer analysis. Discuss your analysis with others, and exchange ideas, but do not work together to produce the same graphs.*

REFERENCE

*References may contain general sources, including lecture notes and texts, but be specific about the pages you consulted. If very specific information is referenced, make sure that is indicated at the relevant place in the report.*

*In general, do not reference lecture notes, texts, or homework for specific derivations that should be included in this report. You may photocopy or paste in your* ***own*** *homework to include in an appendix, but you should synthesize material from the notes and texts for inclusion in the report.*

Appendix A: if needed