Biology 101: Introductory Biology I
Laboratory Report Guidelines:

Lab reports should consist of 5 sections: Introduction, Materials and Methods, Results, Discussion and Literature Cited. The lab reports should be no more than 4 pages long, 12 point font with 1.5 spacing.

The **introduction** section must briefly present any background information essential for understanding and interpreting the data collected. The hypotheses that you are going to test during the lab should be clearly stated as well.

The **materials and methods** section contains the instructions on how to perform the actual procedures used in the lab. Summarize the methods that are given in your hand out, but DO NOT copy them verbatim. It is also important to state what the sample size is.

The **results** section contains all of the data and observations from the experiments. Each variable measured should be presented in a figure, table or mentioned in the text. Statistical analysis should also be included. Remember that the results section is not where you interpret the results.

The **discussion** section explains the meaning of your results, relates them to your original hypothesis, and states any new hypotheses that arise from the exercise. The discussion section should;
1. State the general conclusions (patterns observed, hypotheses confirmed or rejected).
2. Explain possible reasons and mechanisms behind the results
3. Discuss your results in relation to other studies. For the most part your text, lecture and laboratory notes, and any references given in the lab hand out will suffice.

Literature cited includes formal citations of any sources of external information for your report in the introduction or discussion sections. Citations in the text should include author and date, or you may use numbered footnotes. There are many styles for in text citations and for full scientific bibliography, which ever style you choose it is very important to be consistent.

An Excellent Lab Report Will Have

A **Title** that is concise, conveys the main point of the experiment, and includes key components, such as: study system, variables, result and direction (2 points)

An **Introduction** that clearly, concisely and logically presents all key components; relevant and correctly cited background information, questions, biological rationale (including biological assumptions about how the system works), hypothesis, and approach (5 points)

The **Materials and Methods** concisely, clearly and chronologically describes procedure used so that a knowledgeable reader could replicate the experiment. Methods used are appropriate for the study. And clearly defines controls and how they will inform the experiment. (5 points)

The **Results** section contains a concise, well-organized narrative text and tables/figures that highlight key trends/patterns/output from statistical tests without biological interpretation. Tables and figures have appropriate legends and labels, and can stand on their own. (5 points)

The **Discussion** section will clearly, concisely and logically present all key components: supports or rejects hypothesis, formulates argument for conclusions referring back to biological rationale and by comparing with relevant findings in literature, evaluates experimental design, evaluates reliability of data, states implications of results, and ends paper with final conclusion. (5 points)

The **Literature Cited** will have references within the body of the paper that are cited appropriately, and consistently. You may use footnotes, or "(Author, Year)" style citations within the text. References in the final citation list are formatted appropriately and listed in alphabetical order. There are many online style guides, for example:

http://library.osu.edu/sites/guides/csegd.php#booksone

(3 points).

Statistics and Graphing in Excel

1. *Basic Statistics:*

Excel allows you to do some basic statistical procedures easily. Since we are interested in averages:

a) First, begin with typing into Excel the class results for percent weight changes for solution A at 10, 20, and 30 minutes. Create a row below the class percent weight changes for averages.
b) Next, highlight the first column (the column containing percents at 10 minutes) with your mouse. Then, go to "insert" and click on "insert function." A window will open showing you a list of possible functions you can use. Since we are interested in averages, click the function "average" and press "OK."
c) The average will appear under the AVERAGE column you created.
d) Repeat the same procedure until the average percent weight change data of the 3 times for each of the 3 solutions has been calculated

2. *Converting statistics into graphs.*

a) Highlight the cells containing the averages at one time point for the three different solutions.
b) Go to Insert, and click on Chart.
c) For the purpose of today's lab, a simple column chart will do nicely.   We will use the Column chart for this example. Click on Column, and then NEXT (Excel will automatically suggest to use the clustered column chart sub-type).
d) In the dialogue box that appears, you'll see a crude graph that you'll want to refine. Click on the SERIES tab, if you click on 'Series2, Series2 etc you'll get to name the series appropriately (solution names). Also, if you click in the box next to 'Category (X) axis labels', you can select the names to be used on the x axis from the spreadsheet.
e) Next, type in your chart title in the appropriate box. You must have values for the X and Y axes (i.e. titles for both with UNITS when needed).
f) Click NEXT, and choose where you want your chart to be displayed.
g) Repeat these steps to make two more graphs for solutions B and C, OR, better yet you can make one chart for all three time points. Charts may be copied and pasted back into your lab report.

There are many ways to present data, if you don't like this format and wish to use an alternative that shows the results clearly, you may do so. Experiment with different arrangements of data on the spreadsheet, alternative programs, etc.

NB: MS Vista works differently. For example, when you choose 'Insert' you have the option to choose the graph type immediately, you don't go through the dialogue box. Don't be afraid to explore!