

Biology 3A Laboratory 1
Statistical Analysis and Graphing For Excel 2007

Adding Analysis ToolPak for Excel 2007:

Click on the Microsoft logo in the top LEFT corner → click on the button “Excel Options” → Click “Add In” → Highlight the Analysis Tool Pack (analys32.xll) → Click “GO” → check the Analysis ToolPak box and Click “OK” → Click “YES” → the tool pack should start to configure, afterwards, you MAY or MAYNOT need to restart

To Begin Data Analysis:

- Enter you data into columns and sort them according to groups (see below)
- To sort your data, go under the DATA tab and select sort. You then will have options on how you would like to sort your data (by which category). Make sure that you do not sort apart your paired data (make sure the correct right and left finger measurements are paired).

Table 1: Example data sheet for male and female little finger lengths:

Sex	Right (cm)	Left (cm)
F	5.2	4.9
F	5	5
F	5.3	5
F	4.2	4.1
F	5.1	5.1
F	5.2	5.1
F	6.1	6.0
M	6.3	6.4
M	6.5	6.4
M	5.9	5.8
M	5.7	5.8
M	7.4	7.8
M	5.8	5.8
M	8.1	8.0
M	5.9	5.9

- Here’s where Excel 2007 is different → click on the DATA TAB
- On the far Right side you should see “Data Analysis”
- Now you can do everything like you were shown in class
- Click on it and the Descriptive Statistics table should appear
 - Highlight your “raw” data
 - Check: Summary statistics & 95% confidence
 - There will be a new Excel worksheet that will open for you with the descriptive stats OR select the cell in which you want the table to appear (do the last one as you will not have to flip back and forth between sheets).

To calculate an unpaired t-test in Excel 2007:

- If you were **ABLE** to load the DATA ANALYSIS package:
- Click on Data Analysis button on the far right handside
- t-test for unequal variances & click “OK”
 - Select variable 1 Range (highlight the raw data group)
 - Select variable 2 Range (click in the box first & then highlight the raw data group)
 - Alpha = 0.05 or change to desired value
 - Click “OK”

If you were **NOT ABLE** to load the DATA ANALYSIS package:

- Select the location for where Excel will place the calculated p-value
- Click on the FORMULA TAB → click more functions → Highlight Statistical → on the dropdown menu → find TTEST
 - ARRAY 1 will be ALL the data for the raw data for group 1
 - ARRAY 2 will be ALL the data for the raw data for group 2
 - TAILS = you will need to know if you are running a 1 or 2 tailed test
 - Enter 1 for one-tailed and 2 for two-tailed
 - TYPE = enter 1 for PAIRED, 2 for homoscedastic or 3 for unequal
 - Click “OK”
 - The p-value will appear in the box that you select in the first bullet

Constructing a histogram in Excel 2007:

- Determine the category intervals (called BIN in Excel) for each group on the same worksheet as your raw data.
 - For example: in the above data set (Table 1), look at the minimum (4.1) and maximum (8.1) data points and determine the intervals (4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, and 8.5)
- Click on the DATA TAB → Data Analysis (Far Right) → histogram & click “OK” (Just like how I showed you in lab)
 - Input Range → selected from your raw data for one of the variables.
 - BIN Range → selected from the BIN category that **YOU** generated
 - Check the chart output box (very last one in the output section) and click “OK.”
 - This will generated a BIN and frequencies table along with the histogram.
 - Highlight and copy the frequencies from the table and paste it next to your BIN values on your raw data sheet.
 - Do the same with the other variable.

Table 2: Example BIN and frequency table for little finger length data

Categories (or BIN)	Male	Female
4.5	0	3

5.	2	6
5.5	5	4

To graph both histograms on the same graph in Excel 2007:

- You'll need to have the BIN values and the frequencies for both variables.
- Highlight the DATA you want graphed
 - Click the INSERT TAB → click on Column → 2D Cluster Column (top left side)
 - If you need to adjust anything on the graph, you can click on the objects on the graph itself.

Excel 2007 TABS

- BAR graph (columns as Bill Gates calls them) → select only one data point, click INSERT column 2D, then see the DESIGN TAB to add any additional data you want in your column graph. Each bar should be a different color.
 - IF the bars are the same color, you will need to go under the DESIGN TAB and edit the data by selecting only on value. If you do not, this will affect the error bars.
- LINE graph → select the all the data → click INSERT line 2D, then see the DESIGN TAB to add any additional data you want in your column graph
- XY SCATTER graph → select the all the data → click INSERT scatter with only markers, then see the DESIGN TAB to add any additional data you want in your column graph

Design TAB:

SELECT DATA radio button for

- Edit and existing series – highlight the series → click EDIT
 - EDIT SERIES →
 - Series name → type the name of the series
 - Series values → if you need to alter or change anything, select the data range on the worksheet
- Adding new series – click on the add series button
 - EDIT SERIES →
 - Series name → type the name of the series
 - Series values → before you select the data range on the worksheet, delete the = {1}, then select the data range (If you do not, you could potentially have an error (= {1} + Sheet1!\$A\$1:\$A\$6)
- X-AXIS LABELS → to add in the correct X-axis labels, click on the EDIT radio button under Horizontal (Category) Axis Label
 - Axis label range: → select the range of data that you want under the values instead of 1, 2, 3, etc.

LAYOUT TAB:

Once you data have been plotted you will need to add the axes labels, units, error bars, trendlines, R² values, etc

Under the Labels Area

- **Chart Title** → if you have a chart title → DELETE IT!!!!!!
- **Axis Titles**
 - Primary Horizontal Axis Title → Title below axis → then type in the Axis label and units {ie. Body Mass (g)}
 - Primary Vertical Axis Title → select Rotated Title → then type in the Axis label and units {ie. Metabolic Rate (mL O₂ • g • min)}

Under the Axes Area

- **Axes**
 - Click on the Axes radio button to scale the Y-axis → select Primary vertical axis → select more primary vertical axis options → Axis options tab → select Minimum Fixed → enter minimum value
 - You can also alter the Maximum, Major and Minor unit values as well
- **Gridlines**
 - Click on the Gridlines radio button → Primary Horizontal Gridlines → none

Under the Analysis Area

- **Trendline radio button** → More Trendline Options
 - Select Liner
 - Check Display Equation on chart
 - Check display R-squared value on chart
- **Error Bars radio button** → More Error Bars Options
 - Direction → both
 - Error Amount:
 - Custom → Specify Value
 - Enter the error bar values for the Positive & Negative Values → OK → Close

CHANGE THE BAR COLORS SO THAT THEY WILL REPRODUCE NICELY WHEN PHOTO COPIED

FORMAT TAB

Select the bar that you want to change

- Shape Fill → change the fill color