Graphing *"Myers standards"*

When you have completed your graph (Instructions for using Excel follow), look at it and make sure that it meets all the criteria below:

       Graph should have Figure caption. (Caption preferred for advanced courses.)
            Regardless it should start: Figure 1.
            It should include the identity of the technique, analyte and sample, if known
            It should not repeat the axes labels.
            Titles are on the top; captions are on the bottom
            Should be proportionate with the graph size
       Label the axes
            Include the unit in parenthesis.
            The unit itself is not the complete label, what does the unit measure?
            Should be proportional with graph size
       Use gridlines
            Both horizontal and vertical
            Both major and minor are preferred, but at least major
       Label major gridlines (and/or use tick marks)
            Be sure the decimal places are the same as the decimal places in your data
       Use visible appropriately sized data points
            The points should reflect actual data
            Point should not be so small you can't see them; nor so large they obscure the rest of the graph
       Show the appropriate trend
            A smooth curve or a line as appropriate to the data
            If the trend can be mathematically described, do so with an equation
                 either on the graph or as part of the Figure caption (but not as part of the title)
       If more than one set of data is used on the same graph
            Use different styles of markers and line for each data set
            Use a legend to say which is which. This may be separate of part of your figure caption

Using Excel 2013

1) Input your data in columns (NOT ROWS)

  Typically x data is in column A; y data is in column B

Creating a High Quality Graph

2a) If x and y data are in adjacent columns

  Highlight the entire data set

  Choose "insert" tab

  Under "insert charts", choose "scatter" or "xy" or "bubble" chart

    It is the last one on the list that looks like a bunch of dots

    WARNING!! Do not choose "line graph" it is wrong and will frustrate you to no end!

    Click on the arrow to see your choices:

      •Never choose a graph without the dots

      •Normally, you want to choose dots only (e.g., linear graphs), but if your graph is going to be too complex to use curve fitting, you can use the smooth curve connecting points (e.g., a titration curve)

Chart will pop up on spreadsheet. Move it someplace convenient.

  One option is to choose "Move chart" from the menu bar and make it its own sheet

2b) If x and y data are <u>not</u> in adjacent columns

  Highlight your y data

  Choose "insert" tab

  Under "insert charts", choose "scatter" or "xy" or "bubble" chart

    It is the last one on the list that looks like a bunch of dots

    WARNING!! Do not choose "line graph" it is wrong and will frustrate you to no end!

    Click on the arrow to see your choices:

      •Never choose a graph without the dots

      •Normally, you do not want to choose dots only (e.g., linear graphs), but if your graph is going to be too complex to use curve fitting, you can use the smooth curve connecting points (e.g., a titration curve)

Chart will pop up on spreadsheet. Move it someplace convenient. Now let's fix the data:

    Click on the chart. (You should be under the "design" tab of "chart tools")

    Click on "select" data (icon on ribbon bar, toward the right)

    In the left side of the pop up window, click on "edit" then "series 1"

    Click in the window for x data, highlight data that you wish to use for "x" from the spreadsheet.

    Check to be sure it found the y data

    If correct, click ok.

  3) Adjust the chart for your convenience

    Move with the "four arrow" symbol; adjust size with the single arrow or

    Use the "move chart" icon from the ribbon bar to give its own "sheet"

Now let's make it pretty….

Gridlines

4) Click on the plus sign on the right side of the chart

        Click on the little triangle/arrow to the right of gridlines.

        Make sure major gridlines for both horizontal and vertical axes are checked.

        You can check the minor gridlines too. It's usually a good idea

Axes

5) Click on the plus sign next to the chart

        Put a check mark next to "axes titles"

        There should appear boxes under each axis

        Click in box and type appropriate title

6) Double click on an axis (or choose "more options from the "axes" list under the plus sign)

        A "format axis" box should pop up. You want the option with the bar graph.

        Under "Number"

                Go to the "category" section and choose number

                Input the number of decimal places appropriate to your measuring device

                If you need scientific notation for your values, choose "scientific"

OPTIONAL

        Under "tick marks"

        You can add tick marks, this is nice but generally not necessary, especially if you have gridlines

        Under "axes options" you can change

                •The spacing of your gridlines and numbers

                •Where the axes meet

                        In general, the axes of scientific graphs should look like an "L"

                        If your graph does not have the axes at the edges:

                                To move the y-axis, double click on the x-axis

                                Determine what x value you want the y-axis to be at

                                Toward the middle of that menu it says

                                      "vertical axis crosses at"

                                Choose "axes value" and fill in value.

                        Do the same (but clicking on the y-axis) to move the x-axis

Titles/Captions

        7) Click on "+" next to chart

                Click to make check on chart title

                Fill in the appropriate information.

                If you are doing a Figure title, leave at the top of graph

                If you are doing a figure caption (preferred), move to the bottom of the graph.   You may have to adjust other features on the graph to make everything fit and look nice. Captions are generally about 12 point font, not larger as titles typically are.

Adding a trend line

    8) Adding a line or mathematically calculated trend.

        Click on "+" next to chart

        Click on check to add trendline.

            The default is "linear" but you can use the triangle to the right to get other functions

To include the equation of the line on your graph

    9a) Simple version

        Double click on the line to

            Include the equation on your graph

            Change the style

    9b) To include error, etc. in your line

        First determine your equation with error.

        Highlight 6 blank cells in a 2 column by 3 row grid

        Click in the function (fx) line and type

            =linest(

        Then highlight your y data and type a comma

        Highlight your x data and type a comma

        Finish typing with: true, true)

            The overall function line should look something like: =LINEST(B3:B10,A3:A10,TRUE,TRUE)

        Then for PC press CONTROL+SHIFT+ENTER

            Or for Mac press "COMMAND+RETURN"

        Your highlighted cells will get values that represent:

m	b
u_m	u_b
R^2	s_y

On the ribbon at the top, go to "insert" then choose the text box icon at the top.

        Draw the text box where you want to put in the equation and (using the numbers from before) type:

            $y = (m \pm u_m)x + (b \pm u_b)$

        Or you can put this information in the figure caption.

        Sneaky trick: You can make a $\pm$ by underlining a "+" sign! Otherwise you can find it in the "insert→symbol" section.