How to Make a Histogram Using Excel 2007
By Jon D. Howe and Emily W. Clark, Ph.D., Department of Psychology, University of Washington

Creating a Histogram

1. Suppose you were comparing the exams received by 10 students from two different professors in order to decide which professor might be either an easier grader or a better professor. You enter your data on a spreadsheet as follows:

2. Now you will need to enter the "bin" values that Excel will use to create the histogram. Bins represent the entire range of values in your data set, and entering bins creates a "slot" to show how many times each value appears within your set. This may not make sense to you right now, but hopefully you will understand it after we go through the example.

First, let's consider our variable: GPA is measured on a scale of 0.0 through 4.0, so we could potentially create bins for each grade (0.0, 0.1, 0.2 …. 3.9, 4.0).

However, the scores (i.e., grade values) only range from 2.4 through 4.0. If we included bins for 0.0-4.0, we would have a lot of empty bins on the left side of our figure (since there are no scores of 0.0, 0.1, etc., represented in the data set.

Since we want to make a histogram to show the distribution of grades for **Instructor 1**, we will use a bin range of 2.6 through 3.4 (the lowest grade for Instructor 1 is 2.7 and the highest grade is 3.3, so this will give us an empty bin on either end of our figure). Using an empty column in Excel, enter the title "Bins" (or perhaps "Bins for Instructor 1" so that you know what variable this corresponds to) and then enter the numbers 2.6 through 3.4.

Precede each value with a single quote (') when entering them into the bin list, as in '2.6, '2.7, etc. Trickery is often useful in Excel to get things done right. The trick illustrated here can be used with any version of Excel (or OpenOffice)! Ignore any green triangles or caution signs. These indicate warnings but will not affect future calculations. The single quote lets Excel store a number as text for purposes of chart creation but lets that text be interpreted as numeric values in formula calculations. This concept may be confusing, but using this trick saves a couple of complicated steps in the chart cleanup process.

NOTE: If you were creating a histogram for Instructor 2 instead, you would need to use a bin range of 2.3 through 4.0 to include all of the grades in that data set. Even though Instructor 2 gave no grades of 2.9, 3.2, 3.3, etc., you would still need to create bins for these values since they fall within the range of 2.3 to 4.0. **Remember that your bin range must include ALL consecutive values between the lowest and highest score in a data set!!**

3. Histograms depict counts or frequencies of occurrences for specific data values. One way to count specific frequencies in Excel is to use the function COUNTIF(range,condition). Create a label in cell E1 named "Frequency." In cell E2 enter your function: **=COUNTIF(B2:B11,D2)**. **Don't press [Enter] yet!!**

B2:B11 is the data range we wish to count
D2 is the cell that contains the value we are interested in counting

In plain English this function says: Count all values in our list of grades for Instructor 1 that are equal to 2.6.

4. Next the formula must be copied for each of the other bins. When formulas are copied in Excel, cell addresses get updated or changed automatically depending on the location to which the formula was copied. This is not good when there is a fixed data range, as with the list of class grades. To prevent the range of grades from changing, add a **$** before each column letter and row number as illustrated:

It is okay to leave D2 unchanged. Remember that D2 contains the criteria that tells the COUNTIF(range,criteria) what to count. We want that to be different for each bin that is going to be counted. This $ trick has many different and useful applications!

Now press [Enter] to store your formula. Cell E2 should show a 0 corresponding to no occurrences of that grade (2.6) in the list of class grades for Instructor 1.

5. Copy the COUNTIF formula from cell E2 through all the cells in column E down to cell E10. A quick way to do this is to:

1. Make sure that cell E2 is selected,

2. Move the mouse cursor close to the little square in the lower right hand corner of the selected cell,

3. Press and hold the left mouse button while dragging downward to the bottom of cell E10. Release the left mouse button once the correct range has been selected.


Notice how this action formed a frequency table! Click on different cells in the Frequency column. Notice how the range specifying the grades to be counted does not change but the cell containing the criteria changes depending on the row.
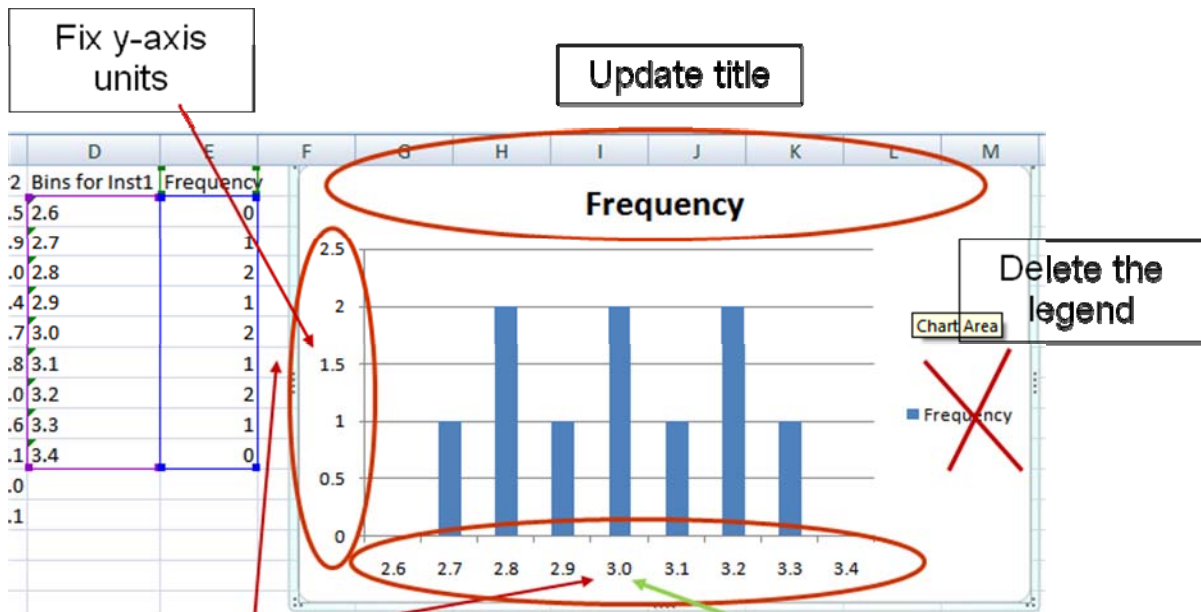
6. Now you are ready to create your histogram. First, click on the 'Insert' tab at the top of the screen, then select 'Column Chart.'
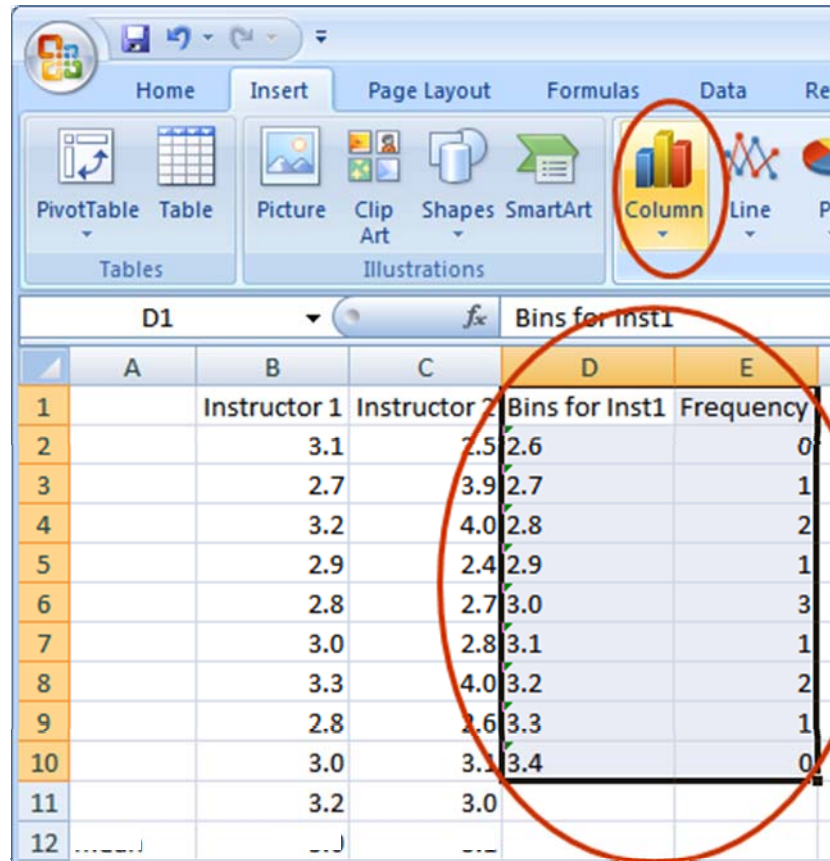
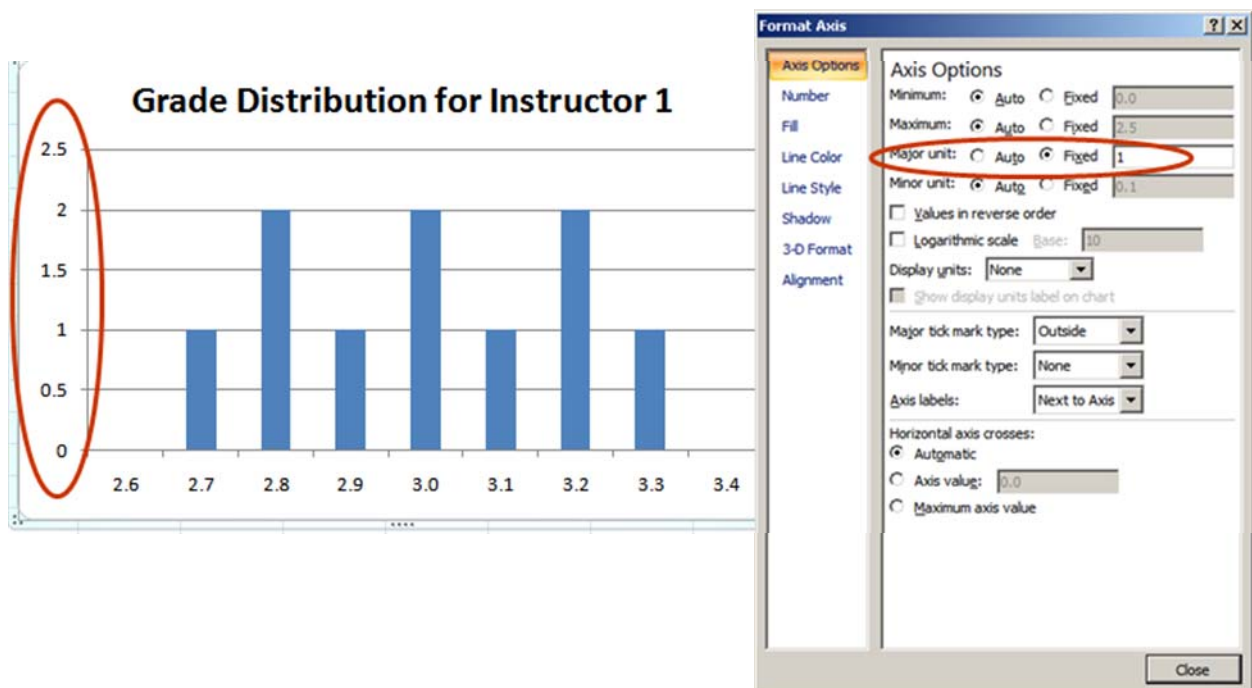When the 'Column Chart' side menu appears, choose the left most chart type under 2-D Columns.
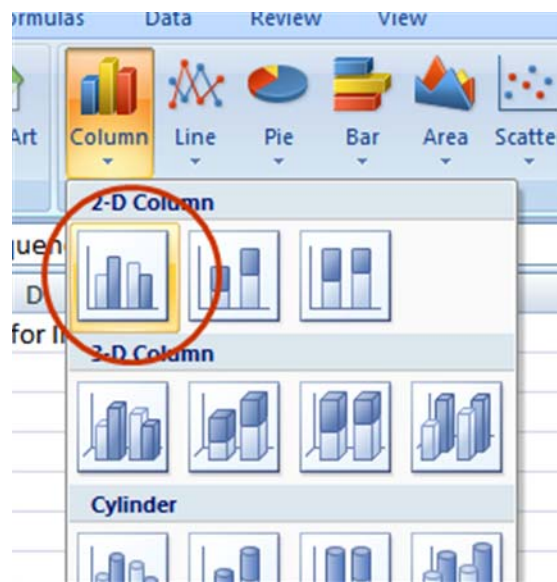
A future histogram is born! But it requires some clean-up. Notice the x-axis value labels and the results of the trick done in step 1!

Fix y-axis units

Update title

Delete the legend

Frequency

Chart Area

Frequency

| 2.6 | 2.7 | 2.8 | 2.9 | 3.0 | 3.1 | 3.2 | 3.3 | 3.4 |

| D	E	F
2 Bins for Inst1	Frequency	
.5 2.6	0	
.9 2.7	1	
.0 2.8	2	
.4 2.9	1	
.7 3.0	2	
.8 3.1	1	
.0 3.2	2	
.6 3.3	1	
.1 3.4	0	
.0		
.1		

Provide missing axis titles

Cool! The trick we did in step one, preceding each Bin value with a single quote, saved us several steps here! Excel automatically assigned the bin values as axis unit labels! It would not have done so if we had just entered the bin values as plain numbers! This trick works with many types of charts and many different spreadsheet programs!

7. Remove the legend by highlighting it and pressing Delete.

8. Double-click on the chart title to activate it and change it to something more understandable as shown in the illustration.

Grade Distribution for Instructor 1

| 2.6 | 2.7 | 2.8 | 2.9 | 3.0 | 3.1 | 3.2 | 3.3 | 3.4 |

Format Axis

Axis Options

Number
Fill
Line Color
Line Style
Shadow
3-D Format
Alignment

Axis Options

Minimum: ⦿ Auto ○ Fixed 0.0
Maximum: ⦿ Auto ○ Fixed 2.5
Major unit: ○ Auto ⦿ Fixed 1
Minor unit: ⦿ Auto ○ Fixed 0.1

☐ Values in reverse order
☐ Logarithmic scale Base: 10
Display units: None
☐ Show display units label on chart

Major tick mark type: Outside
Minor tick mark type: None
Axis labels: Next to Axis

Horizontal axis crosses:
⦿ Automatic
○ Axis value: 0.0
○ Maximum axis value

Close

9. The scale of your y-axis should NEVER include numbers with decimal places, since it is impossible for a value to appear in a data set 2.5 times or 1.7 times (anything other than 0 times or 1 time or 2 times, etc.). Change your y-axis scale by right-clicking on the numbers and selecting 'Format Axis…' Change 'Major unit' from 0.5 to 1 as illustrated above.

10. Add axis titles for both the x- and y-axes by selecting the 'Layout' tab on the command bar, clicking on 'Axis Titles', and selecting the desired title style, as shown in the following pictures. Double-click on each axis title to activate and change it. Note that the y-axis title should always be "Frequency".
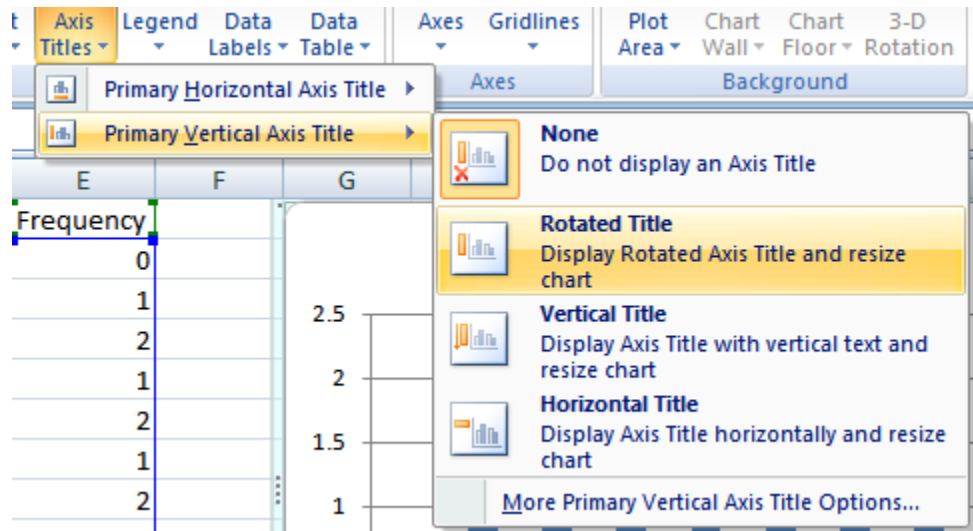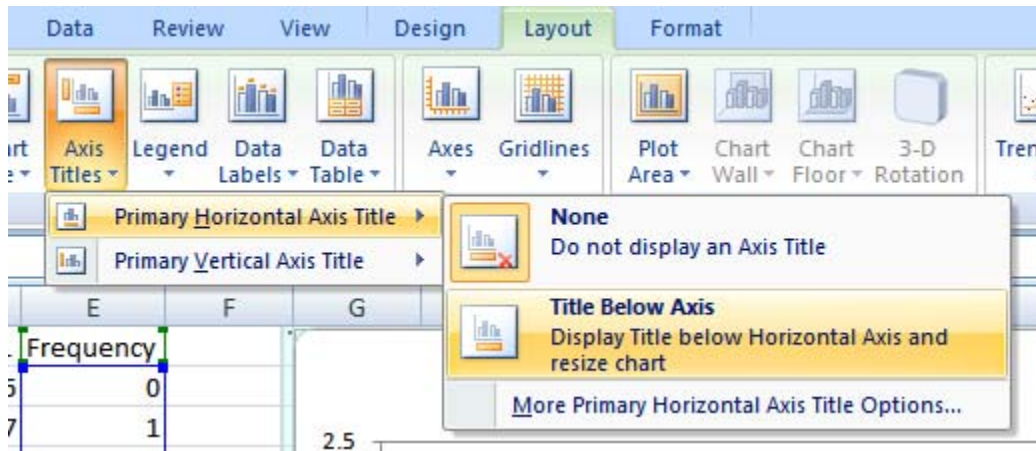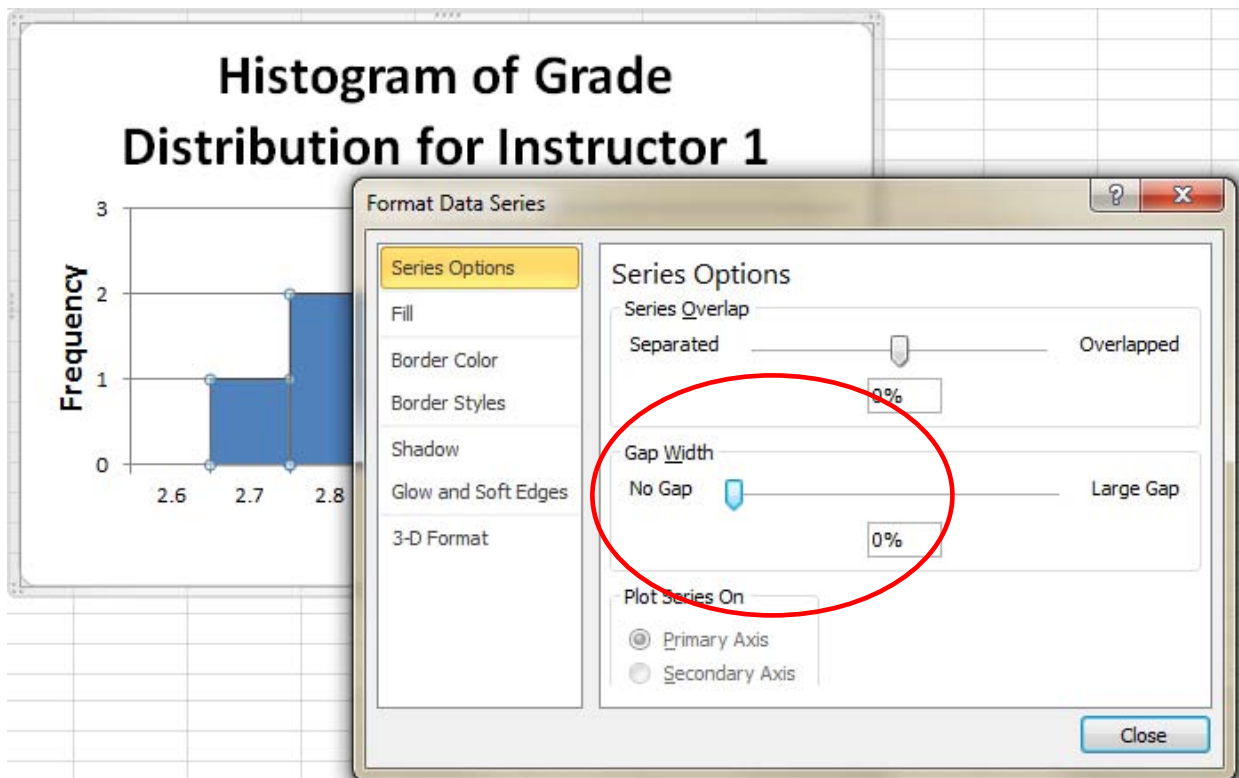
Your histogram should now look like this and is almost complete:
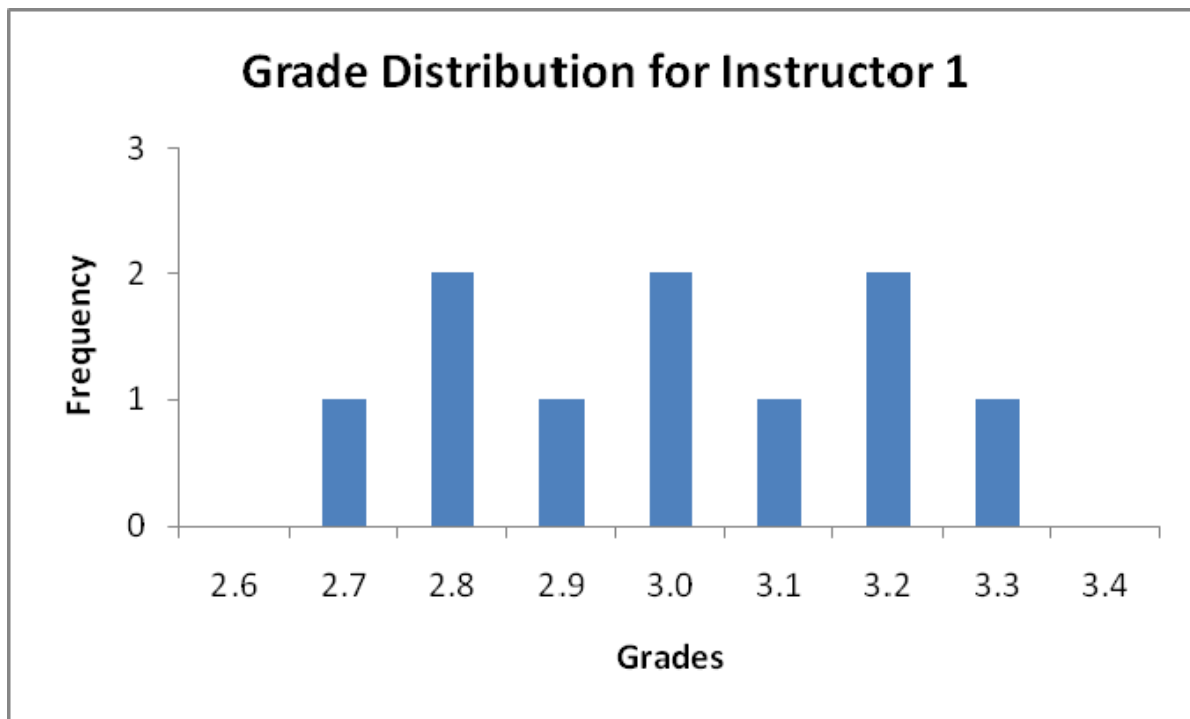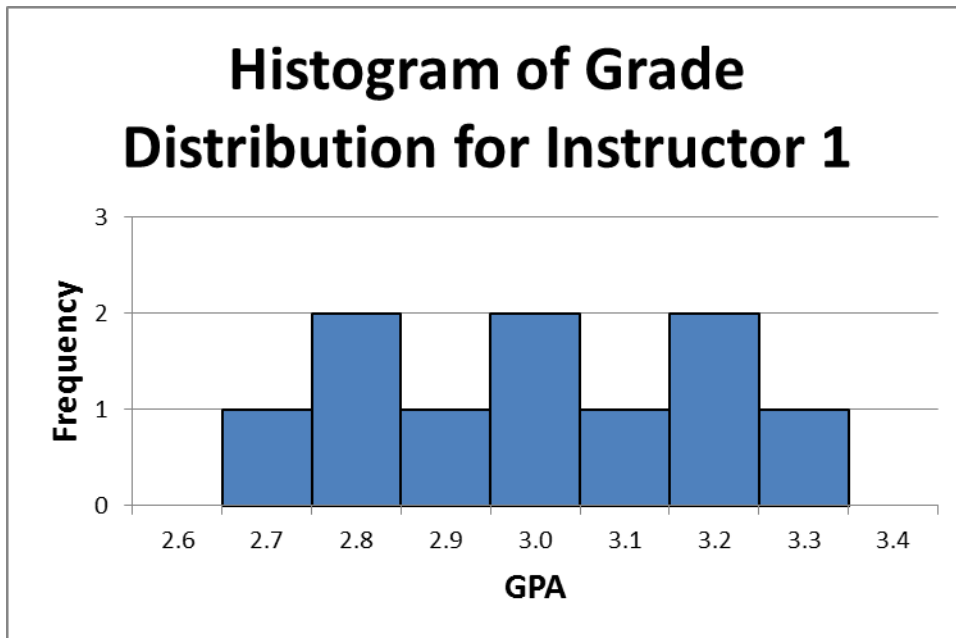

In a histogram, the bars should be touching.

Left click on one of the bars so they all highlight. Now right click the selection and choose "Format Data Series…". Under the "Series Options" Menu, set the Gap Width to 0% by sliding the bar to the left.

Your Histogram is now complete!

Additional Information:

- The Excel Help function is the blue question mark located in the upper-right corner of the screen:

- Chart and axis titles may be altered (e.g., font, size, style, etc.) by right-clicking on them.