Creating Bar Charts and Pie Charts
Excel 2010 Tutorial (small revisions 1/20/14)

Excel file for use with this tutorial	File Location
GraphTutorData.xlsx	http://faculty.ung.edu/kmelton/Data/GraphTutorData.xlsx

Introduction:

Purpose: Bar Charts provide a visual way to see how values compare. When we are looking at different levels of a variable over time (as in our example), some people use a Bar Chart while a Run Chart might be a better choice. When the measurement level would be considered nominal (categorical where order has no meaning) or ordinal (categorical where order has meaning) a Bar Chart would be appropriate.

Data for this example: The GraphTutorData file contains three sheets identified at the lower left as Enrollment, Majors, and Earned Hours.

The data on the Enrollment sheet relates to enrollment in the BBA program from Fall 2001 through 2012. The data on the Majors sheet shows the distribution of students across majors for Springs of 2007 through 2013. The data on the Earned Hours sheet provides a random sample of the number of earned hours for 250 BBA students in one (unspecified) semester. This would be the semester number of hours that have been "passed" prior to the current semester and have the possibility of counting toward a degree.

Suppose that we want to address two questions:

1. What is happening with enrollment on our two campuses (Dahlonega and Gainesville)?
2. How has enrollment changed by major?

For the first question, we will use some of the data on the Enrollment sheet. Column A provides the year, Column B provides the number of students who were declared in a major that leads to a BBA degree (labeled "Headcount"), and Columns C, D, and E provide information on the number of semester hours of instruction provided on the Dahlonega campus (Dah), the Gainesville campus (GN), and overall (Total UG SCH). [When a student takes a 3 semester hour course, they generate 3 Student Credit Hours (SCH)—10 students in a 3 semester hour course would generate 30 SCHs.] For this data, students enrolled in on-line classes were managed out of the Dahlonega campus and included as Dah hours. Although we might want to look at the number of students on each campus, the data have not been provided that way (and some students took classes on both campuses). Also, since one of the primary uses for the data is for scheduling classes, credit hours is probably a better predictor—since students taking 15 hours need more seats than students taking 6 hours).

For the second question, we will use the data on the Majors sheet.

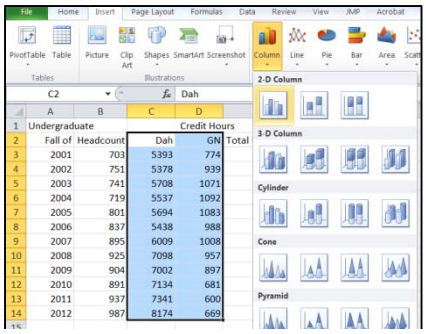
Initially, we will consider a Bar Chart (or what Excel calls a Column Chart) for each question.

Creating the Graph:

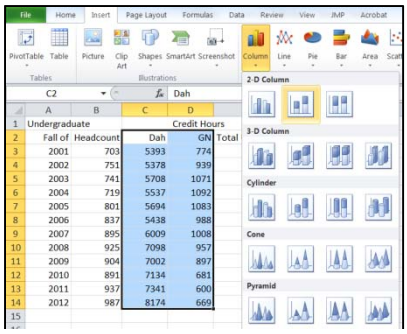
For Question 1 (related to enrollment by campus): Step 1: Select the data on the Enrollment sheet. Select the data and the column headings of Dah and GN since we will need a legend to let the viewer know which data is from each campus (cells C2 through D14).

Step 2: Click on the Insert Tab, to select the chart type. Select the 2-D Column. Then from the drop-down choices, select the one that is best suited for your situation—the first option in the first row will produce an "unstacked" chart; the second option in this row will produce a "stacked" chart; and the last option will produce a "stacked" chart that shows the percent of credit hours produced on each campus. Both the unstacked and stacked options are shown in the following.

Unstacked



Stacked

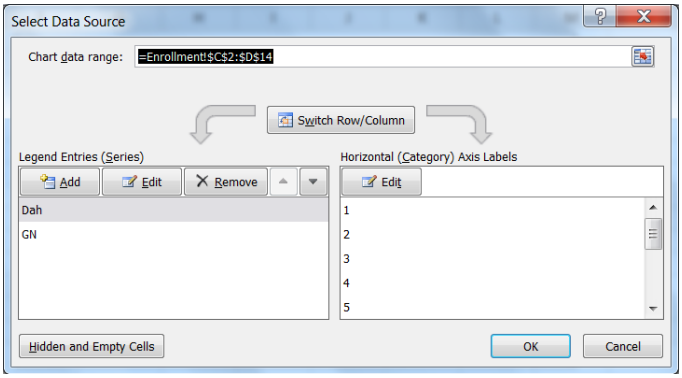


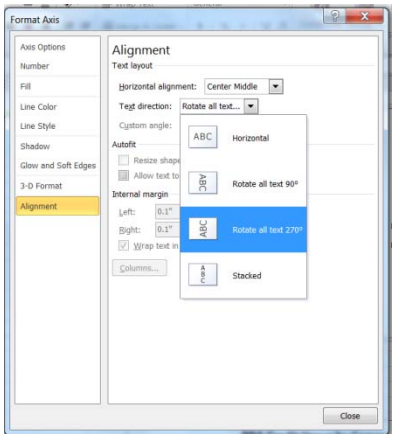
The unstacked chart will allow us to look at credit hours from each campus separately, but will not allow us to see change in total credit hours. The stacked chart will allow us to see change in total credit hours and let us look at change in the credit hours for Dahlonega (the first variable in the selected data), but makes it difficult to see changes in the credit hours on the Gainesville campus.

Steps 3: Remove the chartjunk. Chartjunk is any redundant ink on the page (this can be extra lines, legends where they aren't needed, unnecessary color, adding "depth" to a chart that does not need it…). For this example, the legend is not chartjunk since we need to be able to distinguish between the campuses. Get rid of the gridlines by clicking on one of the lines and hitting the delete key.

Step 4: Add the needed titles and labels. To add axis labels and a chart title, click on the graph and then select Layout tab at the top of the screen. From the Chart Title option on the Ribbon, select "Above Chart" and type in a title. Then use the Axis Titles option on the Ribbon to add Primary Horizontal and Vertical Axis Titles. The resulting charts are shown below—unstacked on the left and stacked on the right. To change the scale along the horizontal axis to show the years, click on the chart and then on the Design tab at the top. Choose Select Data from the ribbon. In the resulting dialogue box click on Edit below Horizontal (Category) Axis Labels; then in the next box, drag over cells A3 through A14 to select the years; finally click OK on each box to return to the graph. If you want to rotate the years to make them easier to read, right click

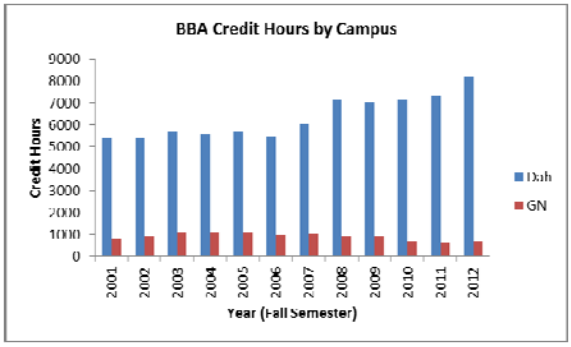
on the years, and select Format Axis; for the next box, select Alignment from the bottom of the list on the left, then select the Text direction on the right.



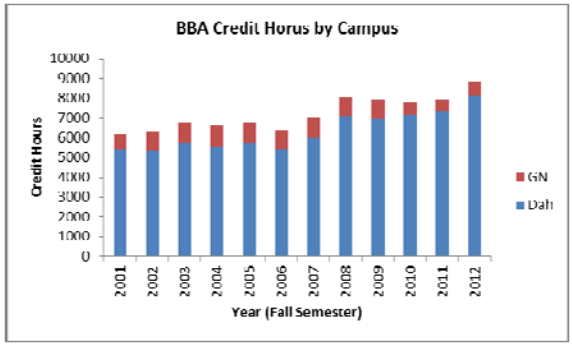


The finished graphs are shown below:

Unstacked

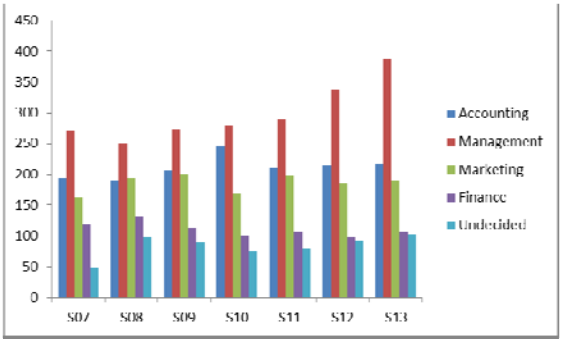


Stacked



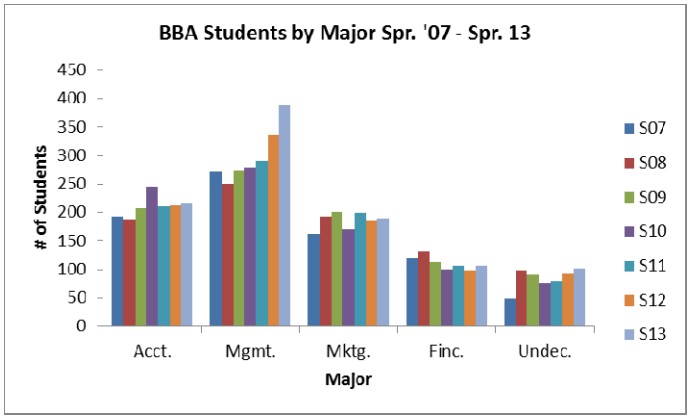
<u>For Question 2 (related to enrollment by major)</u>: Step 1: Select all of the data on the Majors sheet (cells A1 through H6).

Step 2: Select the Column Chart from the Insert Tab and the option for unstacked columns. Once the gridlines are removed you will have the following start for a chart. Unfortunately, it is hard to look at changes in enrollment for specific majors over time without some "mental gymnastics."



Step 3: Change the horizontal axis to represent the majors by clicking on the chart, selecting the Design tab and then selecting Switch Row/Column on the Ribbon.

Step 4: Once you have added titles and shortened the names used for the majors (by changing the way they are written in column A) you will have the following graph. This one allows you to look at each major separately.



Communicating the Results:

For Question 1: From the unstacked chart on the left, we can see that Dahlonega has experience an increase in student credit hours while Gainesville has remained fairly flat. From the stacked chart on the right, we can see that overall student credit hours have increase; and by focusing on the top of the blue bars, we can see that Dahlonega credit hours have increased; but it is difficult to see what has happened to enrollment at Gainesville.

For Question 2: From the unstacked chart we can see that Accounting had a spike in enrollment in 2010 and has had a slight increase over the seven year period. Management has remained the largest major and has seen the most growth in the last two years plotted. Marketing has had some ups and downs but remained fairly stable. Finance seems to have decreased in enrollment slightly. Other than the first year plotted, the number of students declared as a business major but without specifying which major has remained fairly constant.

Checklist:

- Make sure that you have the data arranged in appropriate rows or columns.
- Select the data to be used for the chart
- Select the Column Chart that will display the data in a way that best tells your story (with as little chartjunk as possible and grouped to reduce the requirement for mental gymnastics).
- Clean up any chartjunk that still exists
- Include a legend if one is needed (and do not include one if it is redundant)
- Add axis titles
- Add a title on the chart
- Position your chart on the page so that it will print on a single page (without page breaks in the middle of the chart).

Pie Chart

Introduction:

Purpose: A Pie Chart is used to show the proportion of the whole that each category occupies. [Note: Pie Charts are seldom the best choice of graph/chart.]

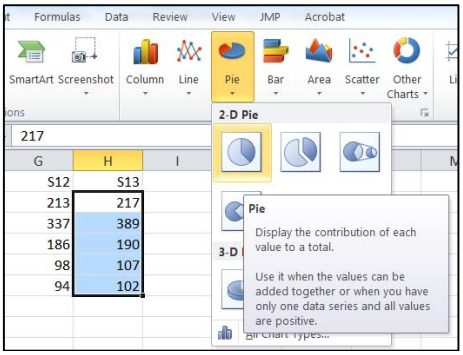
Data for this example: The Majors sheet of the GraphTutorData file

Suppose that we want to address: How do BBA students cluster in terms of majors? In this case, a Pie Chart will provide a snap shot of a point in time. Each major will be depicted with a wedge of the pie. The size of the wedge will represent the proportion of all BBA students are in that major.

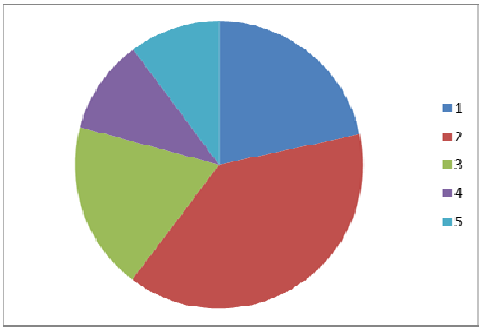
Creating the Graph:

Step 1: Select the data (without the heading) that shows the number of students in each major for one semester. This example uses Spring 2013 (H2 through H6).

Step 2: Select the Pie chart from the Insert tab and sub-choice 2-D Pie.

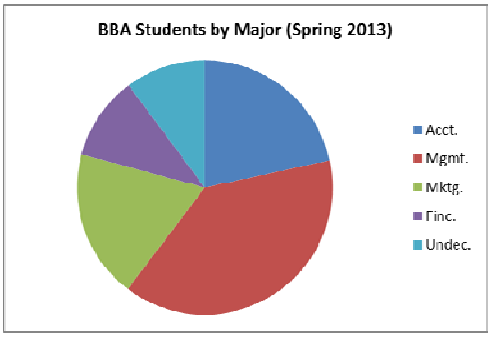


The result will be the following chart.



Step 3: Add the names of the majors in the legend, using the same approach that you used when you added the years on the Bar Chart—from the Design Tab, click on Select Data. Then in the dialogue box, click on Edit in the lower right box identified as Horizontal (Category) Axis Labels. Finally, select the cells with the names of the majors. Then add a title to the chart.

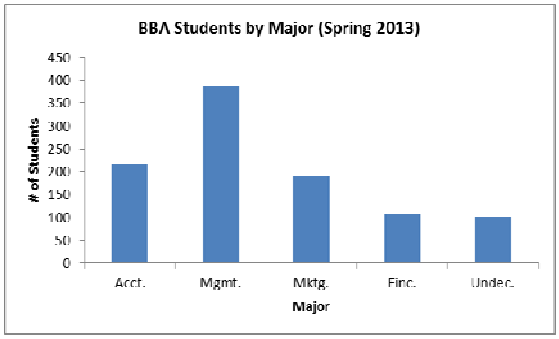
The following chart will appear.



NOTE: In Step 1, you could have selected the data for the major and the number of students in the major before you selected the Pie Chart from the Insert tab. To select non-consecutive columns, drag over the data in one column; then while holding down the control key, drag over the data in the other column. By selecting both columns before inserting the chart, you can avoid having to do Step 3.

Communicating results: Each wedge represents the proportion (or percent) of students in each major—you cannot tell how many majors there are. From this chart it is difficult to tell the difference in the size of some of the wedges. Careful examination leads to a conclusion that in Spring 2013, the largest major was Management followed by Accounting, Marketing, Finance, and undecided Business.

NOTE: The same data could have been displayed in a Bar Chart—see below. Notice how this provides more information than the Pie Chart since you can see how the number of students in each major relate to the other majors and can tell how many students are in each major.



Checklist:

- Make sure a Pie Chart will provide the best information for the situation. Hint: I can't recall a situation where I think the answer to this was "Yes, this is the best choice."
- If you do continue:
- Select the data to be used for the chart
- Select the Pie Chart that will display the data in a way that best tells your story (with as little chartjunk as possible).
- Clean up any chartjunk that still exists
- Include a legend that identifies each wedge.
- Add a title on the chart
- Position your chart on the page so that it will print on a single page (without page breaks in the middle of the chart).