Excel Advanced

Using a Computer for Numerical Calculations

Microsoft Office 2016

Contents:

These notes are designed for you to work through at your own pace.

These notes do not explain every feature of the application therefore you are expected to make use of the Help facility.

If you have any comments or queries, please contact:

The ICT Skills tutor within your Learning Development Centre.
Glasgow School for Business and Society – 0141 331 3300
School of Health and Life Sciences – 0141 331 3456
School of Engineering and Built Environment – 0141 273 1230

Note: A basic knowledge of Excel is expected prior to beginning this booklet. This booklet is aimed at students who are already familiar with the contents of the MS Excel 2016 booklet.

When you have completed these notes you should be able to:

- **Sort and Filter Data**
- **Parse Data**
- **Use Functions and formula**
  - **IF**
  - **Countif**
  - **Look Up**
  - **Subtotals**
- **Insert PivotTables**

When/If Things Go Wrong

Before you start using Excel, remember that when/if an error occurs try the following to rectify the situation:

To rectify problems such as a wrongly entered menu command:

Use the Undo option by clicking on the **Undo** command in the Quick Access Toolbar.

To close a window/dialogue box:

Click on the close command at the top right-hand side of the window or dialogue box.

If all else fails, exit from Excel (select the **File tab** and click on the **Exit** option) and start again.

Using Help

If there is a command or feature of Excel you would like to use but do not know how, use the help facility within the software. This provides instructions on using all features of the software. To use **Help** click on the **Tell me what you want to do** entry field, Figure 1:, in the middle of the ribbon. Some help options will be provided, or choose the **Get Help** option from the menu to type a phrase to search by in the search box.

Tell me what you want to do text entry field.

Suggestions menu with Get Help option
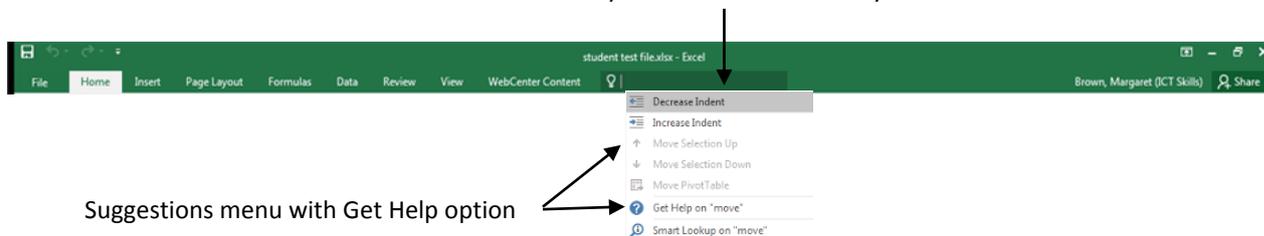
Figure 1: Tell me what you want to do text entry field

Starting Excel and Entering Data

Excel is opened from the **Start** menu (displayed on the Taskbar at the bottom of the screen). After clicking the **Start** button, select **All Programs** then **Microsoft Office** then **Microsoft Office Excel 2016**. This should open and display **MS Excel** options, choose the **Blank workbook** to open a blank worksheet ready for data to be entered, **Figure 2**.

To enter data, select the appropriate cell (using the mouse or arrow keys), and type the data. Then press the **ENTER↵** key, or any arrow key (to move to a cell in a new column or row), or click on the Enter icon ✔ in the Formula Bar (which appears once you start typing in a cell).
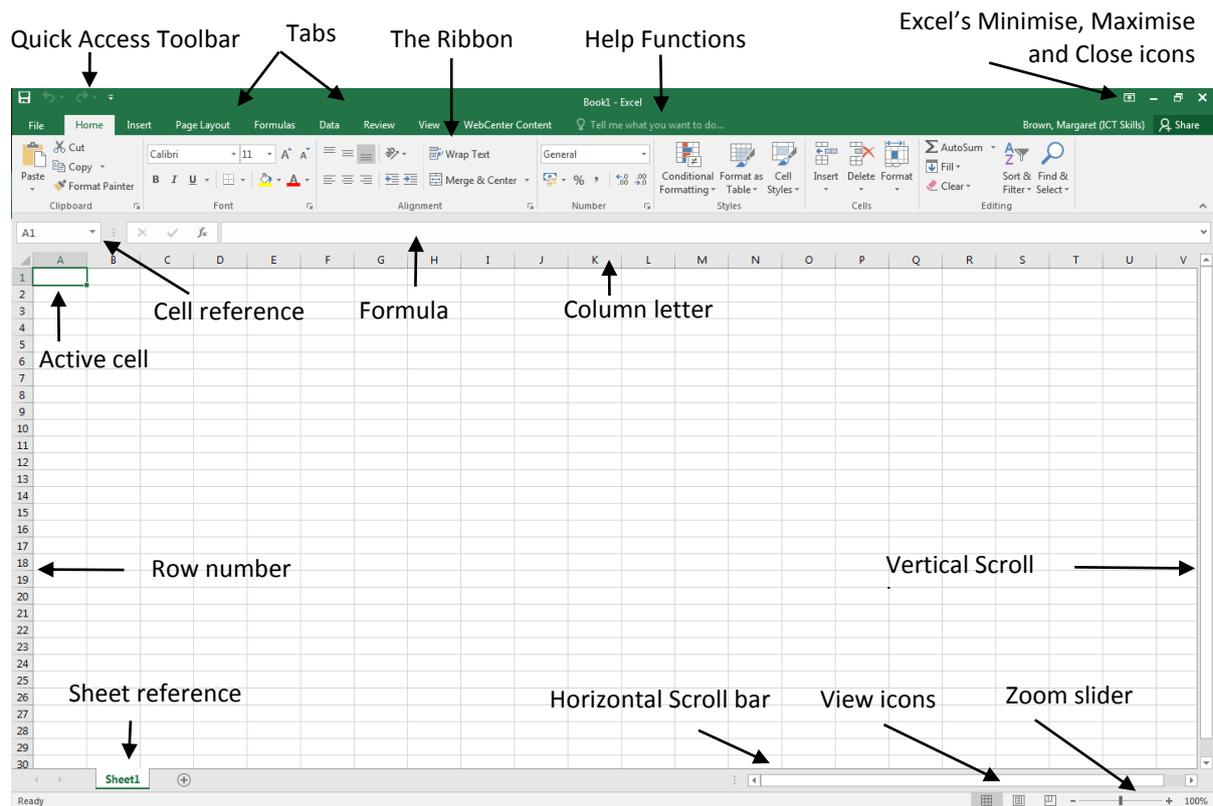
Figure 2: The Excel 2016 screen

What is Data?

Data is essentially information and can be either quantitative or qualitative.

Qualitative or Categorical Data (Nominal, Ordinal)

This data is non-numeric and can be gathered from questionnaires, interviews and written documentation. The two main types are:

Nominal Data: The type of categorical data in which objects fall into underordered categories. Some examples are: gender, hair colour, smoking status and so on.

Ordinal Data: The type of data in which the order is important. This data can be ranked or have a value in a scale. In a questionnaire you could be asked to rate your response from 1 -5 with 1 being the lowest and 5 being the highest.

Quantitative Data (Discreet, Continuous)

This data is numerical such as percentages or frequencies and can be measured and analysed statistically. The results are set of numbers. The two main types are:

Discreet Data: This data has values which are distinct and separate. Discreet data could be the number of students in a class.

Continuous Data: This data can be counted, ordered or measured. Continuous data could be your height, weight etc.

Task 1

Open Excel and enter the following data into a new spreadsheet:

	C	D	E	F	G	H	I	J
1	Course Code	Level	Date of Birth	Phone No	Pass	Mark	Year Passed	
2	BAAC	1	15/03/1975	511-1234	Yes	38	2002	
3	BSOO	2	13/07/1977	511-1235	No	30		
4	BARM	1	29/09/1982	511-1236	No	31		
5	BSOD	3	22/03/1988	511-1237	Yes	32.5	2004	
6	BAAC	1	13/12/1991	511-1238	Yes	37	2003	
7	BSOO	2	24/09/1995	511-1239	Yes	35	2004	
8	BARM	3	04/04/1994	511-1240	No	31.5		
9								

Adjust column widths if necessary. If you are unsure of how to do this, please refer to the Excel booklet. Save the spreadsheet as ICT Student Data.

Conditional Formatting

In Excel data can be difficult to immediately understand. Conditional formatting allows you to apply formatting which will change the appearance of one or more cells or the data within a cell if it meets specified criteria. This will make the data stand out visually and enables patterns and trends to be identified. To apply conditional formatting select the cell or range of cells you wish to apply formatting to. Then from the **Home** tab select the **Styles** group and **Conditional Formatting** command. A **Conditional Formatting** drop-down menu will be displayed with options for formatting, **Figure 3**.

Conditional Formatting command, drop down menu and further options.
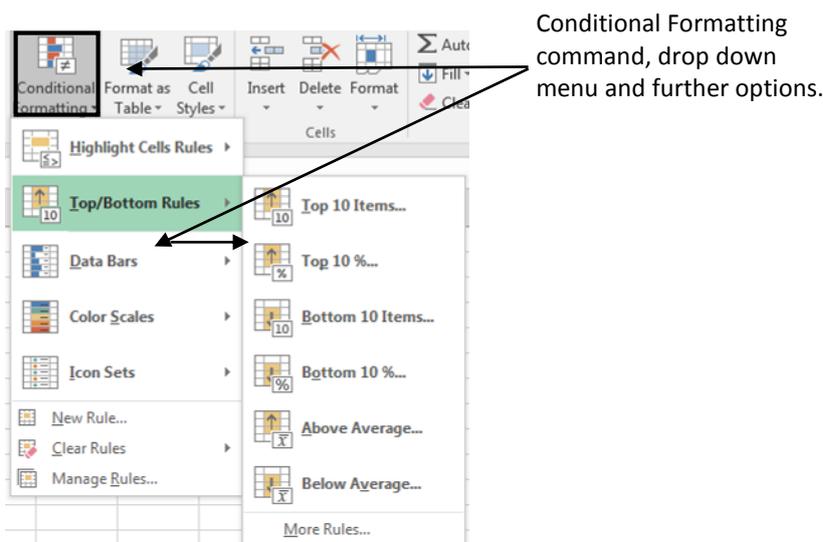
Figure 3: Conditional Formatting menu

From the drop-down menu choose the option you wish. For example, if the pass mark for the ICT Skills module was 32 out of 40 and we wished to see all pass marks in green and those below in red you can apply conditional formatting to do this. To apply conditional formatting for the pass marks, select the cells in the Mark column. Click the **Conditional Formatting** command and a drop-down menu will appear. Choose the **Highlight Cells Rules** option, a further menu will appear, choose the **Between** option. The **Between** dialogue box will be displayed. Type the values in the fields and choose the conditional formatting you wish to apply. If you do not see the colours you wish choose **Custom Format…** from the drop-down menu. Click **OK**. Then apply conditional formatting to the cells so that any cells containing a value below 32 appear in red.

Note: To remove or modify a conditional formatting select the data which has conditional formatting applied and from the **Home** tab, **Styles** group, click on the **Conditional Formatting** command. From the drop-down menu choose **Manage Rules…**. The **Conditional Formatting Manage Rules** dialogue box will be displayed showing all the rules applied to the data and you can choose to modify or remove any of the rules.

Task 2

Apply conditional formatting to the Pass column to show the text orange if a student has passed and blue if they have failed.

Sorting data

Data in rows or columns can be sorted either alphabetically or numerically, in ascending or descending order. To sort data, select <u>all</u> cells that contain the data to be sorted (not just the column or the row data has to be ordered by), then from the **Data** tab, **Sort & Filter** group click on the **Sort** command, **Figure 4**.

Header Row
Selector

Column drop
down list

Figure 4: Sort & Filter group in the Data tab.   **Figure 5:** Sort dialogue box.

The **Sort** dialogue box will be displayed. You can specify whether or not the data you have selected has a header row by checking the option, **Figure 5** above. Choose a **Column** heading to **Sort by** from the **Sort by** drop-down menu; then **Sort on** criteria from that menu and then the **sort Order** from the respective drop-down menus. When you are happy with the options selected, click **OK** to perform the sort.

Note: When performing a sort, you must select all data to be sorted, e.g. select numbers and formulae as well as labels if sorting alphabetically – for example if you have student information in various columns, but wish to sort by Matric No you need to ensure that all columns are highlighted, not just Column A. This way the correct details will remain with the correct student.

Note: Remember if the data has not been sorted correctly, you can use the **Undo** option to get the data back to its original form and try again.

Task 3

Sort the data alphabetically by Course Code. Re-save the ICT Student Data spreadsheet.

Filtering Data

When working in Excel you can choose to filter data to create a data subset which displays only information which meets specified criteria, other data will be hidden. You can filter by text, number, date, etc. For example, if you wished to show only students who had passed the ICT Skills module you could filter this information into a subset. After data has been filtered it can be copied, edited, charted etc. There are two main tools available for filtering data these are, the **Filter Command** and the **Custom AutoFilter**.

The Filter Command

Select a cell and then from the **Data** tab select the **Filter** command from the **Sort and Filter** group, Figure 6.
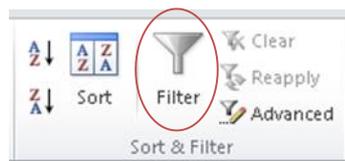
Figure 6: The Sort & Filter group and the Filter command

Filter arrows ▼ will appear at the top of the columns. Choose which column you wish to filter by and click the Filter arrow▼. A drop-down menu will be displayed giving all of the

sorting and filtering options (see Figure 7 below). The sorting options are at the top of the drop-down menu and the filtering ones are at the bottom. By default, all of the options in the filtering section will be selected, that is they will have a tick in the check box. To choose your own filter criteria, remove the default settings by clicking on the **Select All** check box at the top. All of the ticks will be removed from the check boxes. Then choose the criteria you wish to filter by. You could, for example, choose to display only those students who are in level one.

Note: You can also filter by using the **Sort and Filter** command in the **Editing** group of the **Home** tab.

Figure 7: Filter arrows

Task 4

Filter the data to show a subset containing only students who have passed the ICT Skills module. Restore it again to see all students.

Using the Custom AutoFilter

You can also specify or customise the values you wish to filter by. To do this, select a cell in your workbook, then from the **Data** tab, **Sort and Filter** group choose the **Filter** command. The Filter arrows ▼ will appear in the column headings. Choose the column heading that you wish to filter by and click on the Filter arrow. The drop-down menu will be displayed. If you choose a column that contains text you will be given options to custom filter by text, if you choose a column that contains numbers or dates you will be given other specific options. In the drop-down menu you will see Text/Number or Date filter options with right facing arrows▶. Rest the mouse on these arrows and a sub-menu appears with further options for setting the options of your filter. If one of the options in this menu is the criteria you are looking for then click on it. For example, you may choose to filter by a number higher or lower than one of the entries. If none of them are suitable choose the **Custom Filter** option at the bottom to customise the filter.

The **Custom AutoFilter** dialogue box will open with options to customise your filter, see **Figure 8**. The title of the field you have chosen will be showing with fields to customise the filter. From the drop-down menus you can choose criteria and values from the table or enter your own values.
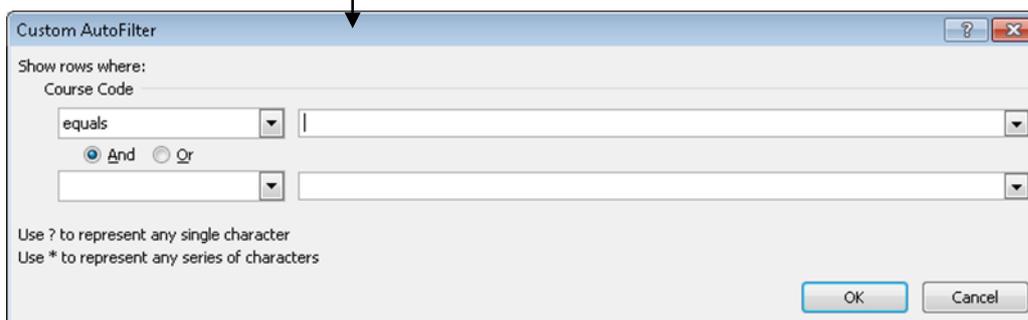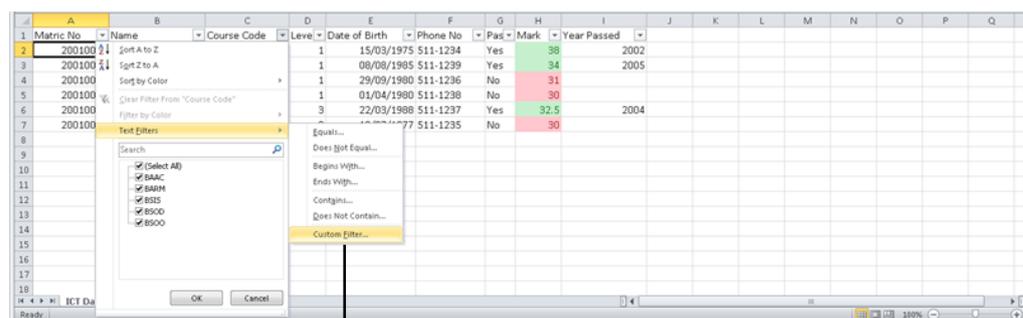
Figure 8: The Custom AutoFilter dialogue box.

 Note: You can customise your filters by using the comparison operators outlined below:

Comparison Operators

Operator	Meaning
=	Equals to
<	Less than
>	Greater than
<=	Less than or equals to
>=	Greater than or equals to
<>	Exactly equal to
AND	Both values must be true
OR	Either value can be true
Wildcard Operators	Use
?	Any single character e.g. t?n returns tin; ten; ton
*	Any number of characters eg*
~	Use before the another wildcard character to find the actual character in the data

To remove filters click on the **Filter** command in the ribbon, the data will be restored.

Task 5

Remove any filters already present.

Filter the data to show only students who have passed the ICT Skills module with a mark between 34 and 40. Remove the filters.

Parsing Data

Parsing Data is basically separating it to put each part in a separate column. Parsing data splits, the data in one column of an Excel spreadsheet and assign each segment to a separate column. For example, if you copy address data from Word into Excel and the address is all in one column, you can parse the data and split it into smaller parts. This would enable you for example to have the street name in one column, the town, the postcode and so on in others. Parsing data in this way allows you to split the data into more meaningful parts for analysis.

To parse data, open your spreadsheet if it is not already open. Create a new column(s) that will contain the data after it is parsed. Highlight the column which contains the data to be parsed. Click on the **Data** tab and from the **Data Tools** group choose the **Text to Columns** command, Figure 9.
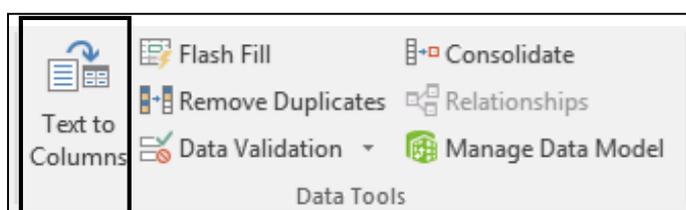
Figure 9: Data Tools group with Text to Columns command

The Convert Text to Columns Wizard – Step 1 of 3 will open.
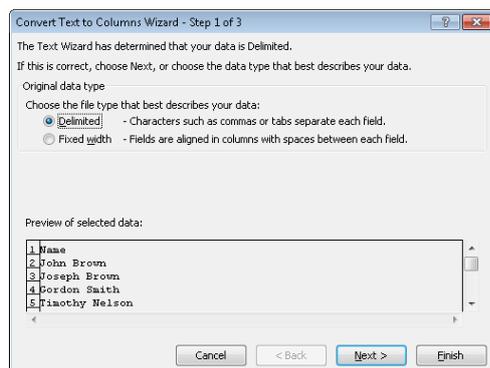
Figure 10: The Text to Columns Wizard dialogue box

Step 1: The Wizard will tell you if it has identified a delimiter for the data. A delimiter is a data separator. Common delimiters are ***** (a star); **,** (a comma); **;** (a semi-colon); : (colon) etc. You will be given a preview of your data, click on **Next**.

Step 2: You will then identify the delimiter, by checking the appropriate box (that is put a tick √ in it). The Data Preview section will show you where the separation will take place. Click **Next**.

Step 3: You can then set the Data format for your information. Choose the appropriate data type.

Step 4: Click **Finish**. Your data will be entered in the current and the new column(s) created for it. If you have not created enough columns to fit the data a warning dialogue box will be displayed stating "Do you want to replace the contents of the destination cells?".

Note: If you click OK and there are not enough columns the data in the corresponding cells will be overwritten.

Task 6

Make sure the data is not filtered. Parse the Name data in the spreadsheet to ensure that First Name and Surname are in two separate columns.

Name the new column **First Name**, rename the column next to it **Surname**

Functions and Formula

The real power of Excel is in being able to enter formulae to perform calculations on numeric data. A formula is a mathematical equation used to calculate a value and Excel has integrated functions which automate formulae creation. For example you could enter a formula to add cell contents in the following format =A1+A2+A3 or you can use the integrated **SUM** function which will insert the formula =SUM(A1:A3). There is an extensive list of formulae functions within the **Formulas** tab, Figure 11.
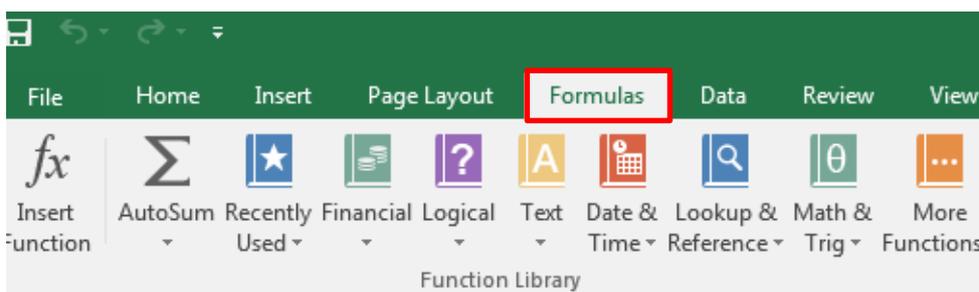
Figure 11: The Formulas tab, Function Library group

In order to use Excel you should have a basic knowledge of how formulae are written, this will help you to avoid problems when using formula.

Formulae always start with an '=' sign. This is to distinguish a formula from ordinary text. Some examples of formulae are:

= D2+C2 (addition)   =B3*B4 (multiplication)   =B4/A3 (division)
=C6-D10 (subtraction) =B9*10% (10% of cell B9) =(B3*B4)/D10

Note: If there is more than one mathematical operator present, operator precedent rules will apply. When a formula is entered, the result of the calculation is displayed in the cell. The actual formula can be seen in the Formula Bar at the top of the spreadsheet.

Cell Referencing

As a rule, cell references should be used when entering formulae so that if you change the contents of a cell, the result of the formula will automatically change. A cell reference is the location of a cell or group of cells in a spreadsheet and consists of the column letter and row number for example A1, (Column A; Row 1). The column letter is always listed first. Cell references identify individual cells, or cell ranges in a worksheet. When entering

a cell reference you can either type the cell reference in, or you can click on the cell, (this reduces the possibility of errors). There are three main types of cell reference:

1. **Relative cell referencing** – By default cell references are relative. This means that when a formula that contains relative referencing is copied, the pasted formula will have a cell reference that will change from row to row (or column to column).

2. **Absolute cell referencing** – An absolute cell reference is fixed. Absolute references do not change they always refer to the same cell even if you copy a formula from one cell to another. Absolute references have $ signs, e.g. D9. When this is copied from row to row the absolute cell reference will remain the same. You would use this if you have a value from a cell which does not change. By default cell references are relative if you wish to change them to absolute you will have to add the $ sign.

3. **Mixed cell referencing** - A mixed cell reference has either an absolute column and a relative row, or an absolute row and a relative column. $A1 is an example of a mixed reference where the column will not change but the row number will.

Sum Function/Formula

The **SUM** formula as mentioned earlier can be used to add the content of cells in either columns or rows. To use the **SUM** formula, move the cursor to the cell which will contain the result of the addition then type in the formula, for example =A1+B1+C1. This formula would add together the contents of cell A1, B1 and C1 and return the answer in the designated cell. To use the **SUM** function within Excel, choose the cell which will contain the results of the addition and click on the **AutoSum** command Σ AutoSum from the **Formulas** tab, **Function Library** group, see Figure 11. Excel will suggest which cells have to be added together by showing the selection in a broken line and entering the formula in the cell. If the suggestion is correct press **ENTER ↵ .** If not, type in the correct range of cells separated by a colon, e.g. A5:A10 or B10:F10, or highlight the range using the mouse. The **SUM** function will be displayed as **=SUM(A5:A10)**.

Average Function/Formula

When working with data you may also wish to find out the average number in a data set. For example it may be useful to find out the average mark scored by students who have undertaken the ICT Skills module. To do this you can either type the formula in the cell you wish to contain the answer, or you can use the AVERAGE function. To do this, click in the cell where you want the answer to be displayed. Then click on the **Formulas** tab,

Function Library group, **More Functions** command More Functions. A drop-down menu will appear offering options. Average is a statistical calculation, therefore choose **Statistical** from the options and a further drop-down menu will appear with the statistical options showing, Figure 12. Click on **Average**.
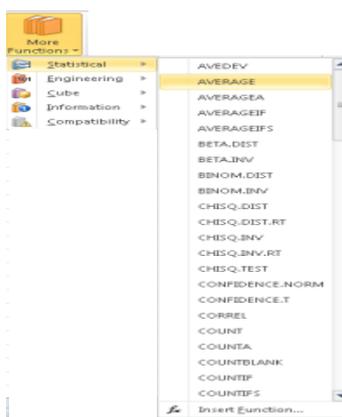
Figure 12: The More Functions command and sub-menus

The **Function Arguments** dialogue box will appear, Excel may enter a data range and if it is correct, click **OK**, if not enter the correct data range and then click **OK**. The result will be displayed in the chosen cell.
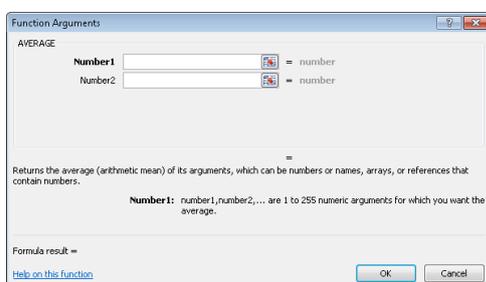
The data range will be entered or displayed in this field.

Figure 13: The Function Arguments dialogue box

> Task 7
>
> Use the Average function to calculate the Average mark of students on the ICT Skills module. Enter the results in cell B32 and the label Average Mark in B31.

Conditional (Logical) Function/Formula

These are formula which use the **IF**; **AND**; **OR**; **NOT** operators to test whether a condition is true or false.

- **IF**: returns one value if the condition is true and another if it is false

- **AND**: If all of the conditions are true then TRUE will be returned. If one or more of the conditions are false then FALSE will be returned.

- **OR**: If any of the conditions are true then TRUE will be returned.

- **NOT**: If the condition is true **NOT** returns FALSE; If the condition is false **NOT** returns TRUE.

Once the true or false condition is determined a corresponding value will be returned. For example if you wanted to check if a student had scored enough to pass a module you could use a conditional formula to compare the value in the cell with the pass mark. If the mark is equal to or above the pass mark then you could display the value you wish to return for that (PASS), if it is false you could display another value (FAIL).

You can structure a conditional formula in a number of ways by using the operators listed above. One of the most common conditional formulae is the IF formula.

IF

The IF formula is used within Excel to test whether the contents of a cell meet certain criteria specified by you, and then return a value on that basis. This formula has three main parts:

1. **LOGICAL_ TEST**: This is what the formula is using to decide which value to return
2. **VALUE_ IF_ TRUE**: This value will be returned if the condition is met (is TRUE)
3. **VALUE_ IF_ FALSE**: This value will be returned if the condition is not met (is FALSE)

An IF formula therefore would consist of the following:

=IF(logical_test, value_if_true, value_if_false)

For example, a pass for students undertaking the ICT Skills assessment is 32. A conditional formula displaying Pass and Fail text in our spreadsheet would look like:

=IF(B2<32,"Fail","Pass")

| logical_test | value_if_true | value_if_false |

You could also have more complex **IF** formula, for example if students undertaking an assessment were graded according to their mark, perhaps over 80 would be an A, over 65 a B, over 50 a C and below 50 a Fail. This would be written like this:

=IF(B2>=80,"A",if(B2>=65,"B",if(B2>=50,"C","FAIL")))

To enter an IF formula, click on the cell you would like the results of the IF formula to appear. Then type the formula, you will notice as you type the **=if**, that the functionality within Excel will try and predict the formula you are using and offer you the option of using the functions within Excel. A description of the different options will appear in a blue band across the screen. You can choose to use the options suggested or just continue typing in at this point.

Task 8

In cell K1 type the word **Grade**, and then in cell K2 construct an IF formula that will grade the ICT Skills assessment marks returning A for 38 and above, B for 34 and above, C for 32 or above and Fail for anything else.

Once the result is displayed in cell K2, copy the formula down the column to return all grades.

COUNTIF

The COUNTIF formula is used within Excel to count cells within a data range which meets set criteria using conditional logic. For example, we may wish to know how many students have failed the ICT Skills assessment. A COUNTIF formula has two main parts.

1. **RANGE:** the data range of the cells you wish to count, for example A1:K7
2. **CRITERIA:** for example ,"Fail" – this will count all cells which have the value "Fail" in them

A COUNTIF formula would consist of the following:

=COUNTIF(Range, Criteria)

A formula used to count the number of students who failed could then be shown as:

=COUNTIF(K2:K7,"Fail")

        ↑   ↑

   Data Range   **Criteria**

Wildcard characters can also be used, two of the most common wildcard characters are:

? – this will return any single character

* - this will return a sequence of characters.

To use COUNTIF, place the cursor in the cell in which you wish the results to show and type in the formula. Alternately click on the **Formulas** tab, **Function Library** group and **More Functions** command. A drop-down menu with options will appear. COUNTIF is a statistical function so click on this option. A further drop-down menu appears, choose the **COUNTIF** function, Figure 14.
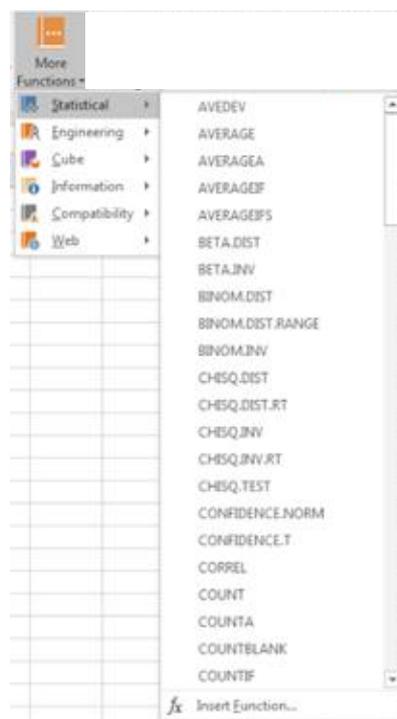
Figure 14: More Functions Command, with drop-down menus

The Function Arguments dialogue box will appear as shown in Figure 15 below.
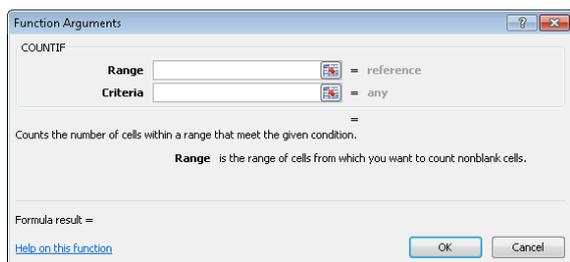
Figure 15: The Function Arguments dialogue box.

Enter the data range in the **Range** field, this will be in the format **A1:B7** and the criteria of the cells you wish to count in the **Criteria** field. This can be a number, a range of numbers or letter(s) or wildcard characters. Then click on **OK**. The count should now appear in the cell selected by you.

Task 9

In cell B33 on the spreadsheet create a COUNTIF formula which will count the number of students from the BAAC course code who have undertaken the ICT Skills Assessment. Label it BAAC student count in cell A33.

LOOK UP Function

You can use Excel to "look up" and then return a value in a list or in a table. After the value has been looked up it can be used for calculations. This can be useful to ensure the accuracy and validity of information and eliminate data entry errors. There are different ways of looking up values in a list and displaying the results. The two most popular functions are, the VLOOKUP where the V stands for vertical and HLOOKUP where the H stands for horizontal. Both work in much the same way therefore just the VLOOKUP function will be described.

Vertical LOOKUP (VLOOKUP)

The VLOOKUP formula, searches the values in the vertical columns of a list or table for a specified value, column by column from the left side. This data is then copied and can be returned elsewhere in the worksheet/book. There are four basic arguments in this function:

=VLOOKUP(lookup_value,table_array,col_index_num,[range_lookup])

1. **LOOK UP VALUE**: Identifies the value to be looked up, this could be a number, a string of text or an actual cell reference. In the **lookup_value** section enter the value that you wish to look up. You can do this by either clicking on the cell which contains the value, or typing the value in.

2. **THE TABLE ARRAY**: The cell range containing the data. This is normally in the format A1:D10, it is recommended that when you use a cell range that you make the cell references absolute by inserting the $ sign in front of them (see the description on p 12).

3. **THE COL_INDEX_NUM**: An index number to identify the column (or the row in case of HLOOKUP) from which the value will come. This is the column within the table which contains the data you are looking for.

4. **THE RANGE LOOKUP**: This is a non compulsory option. A range lookup specifies whether there is an exact match or an approximate match for the search. If you wish an EXACT match you must put FALSE in this section. If you wish an APPROXIMATE match to be found (the largest value that is less than the lookup_value) then TRUE should be entered.

To look up a value you must firstly click in the destination cell. That is the cell in which you wish the result of your lookup to be displayed. Then from the **Formula** tab choose the **Lookup and Reference** command. When you click on this a drop-down list displaying the various functions will show. Choose the **VLOOKUP** option, **Figure 16**.

Figure 16: the Lookup and Reference command and drop-down menu

The **Function Arguments** dialogue box will be displayed, Figure 17. Enter the function arguments as required. Then click on **OK**.
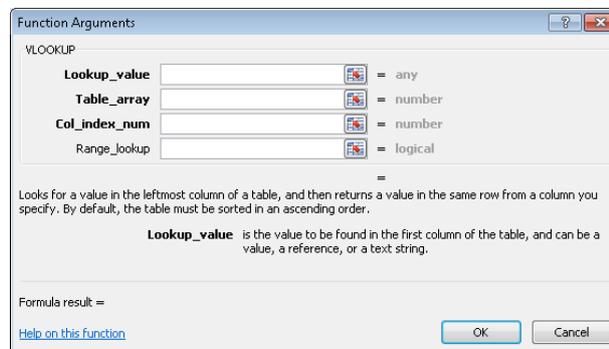
Figure 17: Function Arguments dialogue box

For example, from the table we have currently created you could use a VLOOKUP function and look up the Matric no of a student from the table and return their course code. To do this you would:

1. Open your workbook if it is not already open.

2. Type the label(s) for your lookup. In this case it would be:

   a. **Enter a Matric no** (cell A9)

   b. **Course Code** (cell A10)

3. Use the VLOOKUP function in the destination cell (B10) and enter all of the arguments. Press **Enter** or click **OK**

The formula you would enter in cell B10 would be:

=VLOOKUP(B9,A1:K7,4,FALSE)

Or the arguments you would enter in the Function Arguments dialogue box would be:

- **Lookup_ value:** B9 (Excel will go to cell B9 for the value entered there)

- **Table_array:** A1:K7, (the cell range of the table)

- **Col_index_num:** 4 (the column number which contains the data you would like returned)

- **Range_lookup:** False (an exact match for your lookup value must be found. For this particular example we would require an exact match, for many others an approximate would be required)

Note: You will receive #N/A answer in your cell until you enter a matriculation number in cell B9.

Task 10

Type the labels, **Enter a Matric No** in cell A34 (the matriculation number would be entered in B34, and **Phone No** in A35 (the phone number would be displayed in B35.

Using a VLOOKUP formula or function, search the workbook by matriculation number to return the phone number for students.

VLOOKUP Errors

If you find once you have entered your formula that you have an error indication in your returns (**#N/A**) check the validity of the data you have entered. Common reasons for error messages are:

Exact and approximate values. If you specify that you wish the function to return an exact value and that exact value does not exist this may then lead to an error.

Missing Data: If you use a value that does not exist then you will be given an error message. When the formula searched the table for the value it was missing, an error message was then generated.

Unsorted Data: When you use a VLOOKUP function the value will be looked up from a sorted list, if the list is not sorted this may cause an error message to be generated.

Custom/worksheet function used that is not available: If you have created the lookup formula using a customised function it may not be available on all versions of the application. If you then use another computer which does not have the updated functionality you may not be able to access it.

SUBTOTALS

The subtotal function enables you to calculate **Subtotals** and **Grand totals** for data in your spreadsheet. The subtotals you create will summarise your data by for example average or sum of the data range. A full list of summary subtotal functions is listed in the table below.

Note: If you filter data that contains subtotals they may appear hidden.

Function	Use
AVERAGE	Calculates the arithmetic mean of a group.
COUNT	Counts the number of entries in a group.
MAX	Returns the maximum value in a group.
MIN	Returns the minimum value in a group.
PRODUCT	Multiplies values in a group.
STDDEV	Estimates standard deviation of the samples of a group.
STDDEVP	Calculates standard deviation of a group.
SUM	Calculated the sum of the values in a group.
VAR	Estimates the variance of the samples of a group.
VARP	Calculates the variance of a group.

To add subtotals click on a cell within the spreadsheet. Then from the **Data** tab, **Outline** group click on the **Subtotal** command, Figure 18.
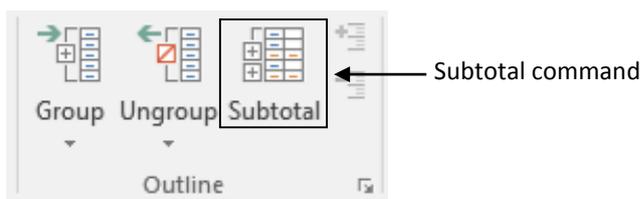
Figure 18: The Outline group within the Data tab

The subtotal dialogue box will be displayed, Figure 19, with subtotal options.
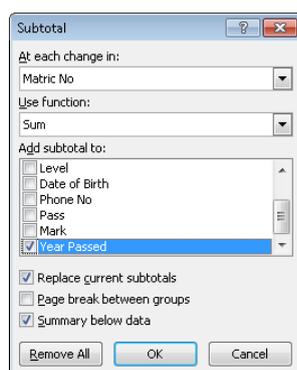
Figure 19: The Subtotal dialogue box**.**

Depending on your subtotal criteria choose where your subtotals will be inserted from the **At each change in:** drop down menu. This will be one of the column headings. Next choose which summary function you would like from the **Use function:** drop down menu. A full list of the functions and their use is shown in the table on the previous page.   Then choose the column you would like to add the subtotal to from the **Add the subtotal to:** list by checking the box next to the column name.

You also have the option to choose to replace current subtotals, insert page breaks between subtotals and to include a summary below the data. If you do not tick the

Summary below data option check box, you will not see a grand total in your spreadsheet.

Once you have chosen all options click on the **OK** button.

To remove a subtotal, click on the **Subtotal** command, when the **Subtotal** dialogue box opens click on the **Remove All** button.

Task 11

Create subtotals for students who have passed the ICT Skills module. Display the mark by Course Code.

Save and close the spreadsheet.

Pivot Tables

PivotTables are used in Excel to summarise data and present the information in report format. PivotTable reports allow large volumes of data to be split into small concise reports. When creating a PivotTable report it is important to remember that each column heading in your workbook will become a field name in the report. Column headings must therefore be appropriate. Also when creating a PivotTable report it is best to ensure your data has no blank columns or rows.

To create a PivotTable report, click in a cell in your spreadsheet, then from the **Insert** tab, **Tables** group click on the top half of the **PivotTable** command, Figure 20. If you click at the bottom half choose **PivotTable** from the menu that will appear.
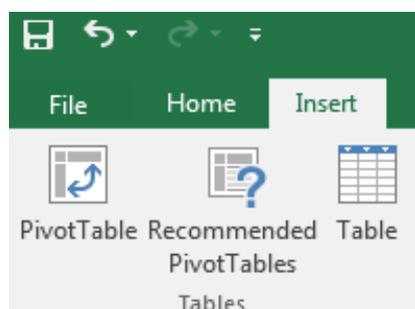
Figure 20: Table group and PivotTable command

The **Create PivotTable** dialogue box will open, the data source chosen earlier will be showing in the **Select a table or range**, **Table/Range** field. Choose where the PivotTable report should be displayed within the workbook with the default option being in a **New Worksheet**, Figure 21.
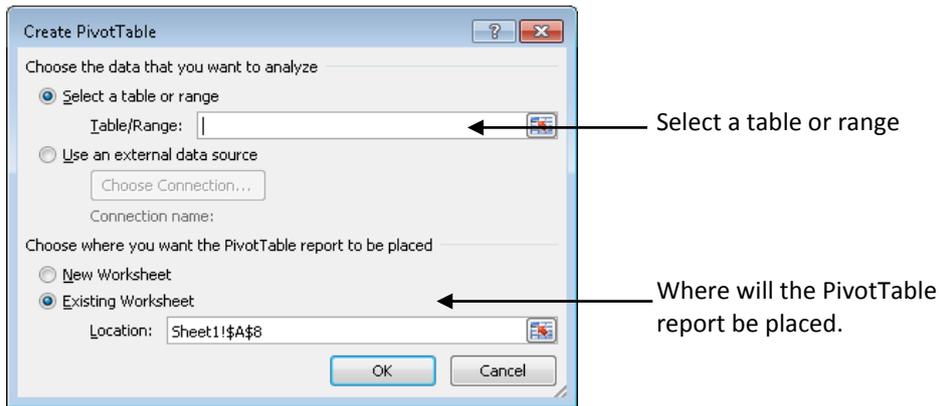
Figure 21: Create PivotTable dialogue box

Click **OK**. Your PivotTable report layout will be created and look like
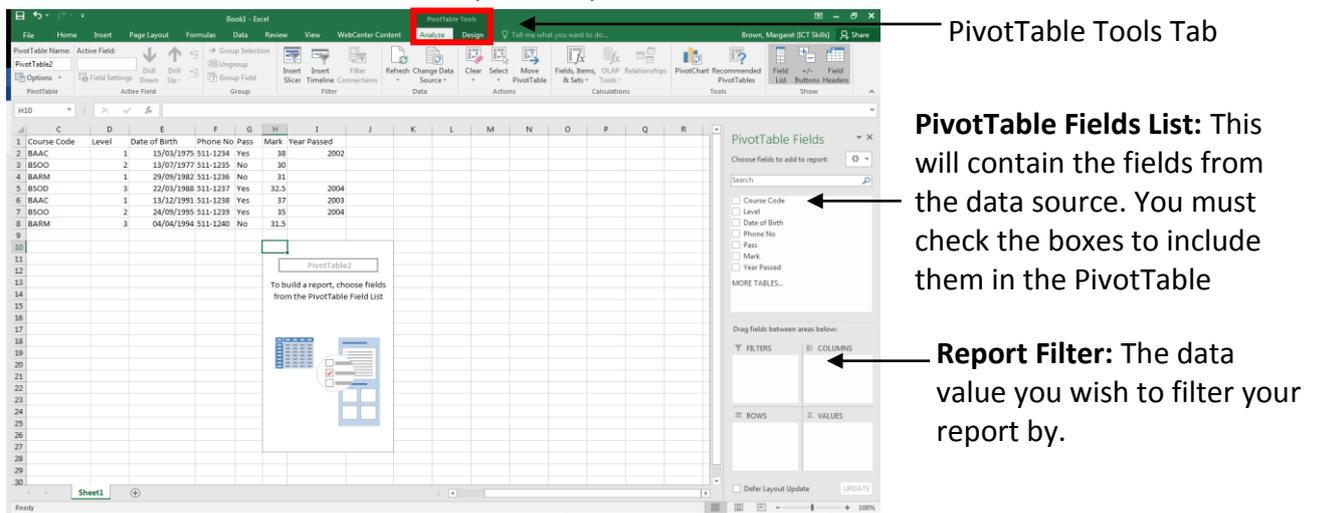
Figure 22 below.
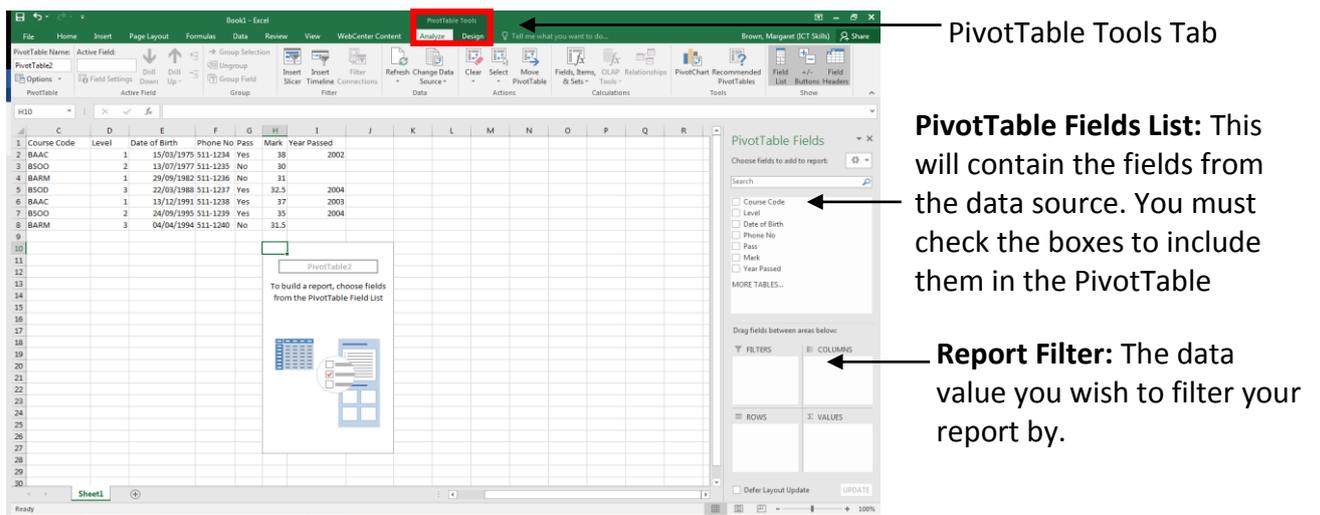
Figure 22: PivotTable Report worksheet

The PivotTable Report layout will be displayed in the left hand side of the worksheet and the **Pivot Table Field List** pane will have opened at the right hand side. Select the fields you wish to add to your report by checking the box next to the field name in the **Pivot Table Field List** pane. You should notice the data appearing in your PivotTable. Excel will

automatically assign the value(s) to the four smaller areas below the **PivotTable Field List** pane. If, however, you wish them to be in another area you can change the area by dragging and dropping the value to the area you wish. Alternately, click on the value that you wish to move and a menu will appear for you to choose the option you wish.

Note: The data in the PivotTable will change as you move the values around.

The fields you add to your PivotTable will depend on what you would like to report on. For example, if you would like to know the number of students from each course you would add the Course Code and Student Nos fields to the PivotTable.

Task 12

Remove the subtotal.

Create a PivotTable Report showing the Marks by Course Code

You can also add fields to your report to expand on it, you could perhaps create a PivotTable report which shows the average mark of the students on each programme and the average overall mark. To do this add the Programme Code and Mark fields to your PivotTable Report. Excel will assign them to the areas and add them to the PivotTable. By default the Value is **SUM** ($\sum$), however you can choose another value for the field. To do this click on the field name, a pop up menu will be displayed, Figure 23.

Move **U**p

Move **D**own

Move to Be**g**inning

Move to **E**nd

Move to Report Filter

Move to Row Labels

Move to Column Labels

Σ Move to Values

Remove Field

Value Field Set**t**ings...
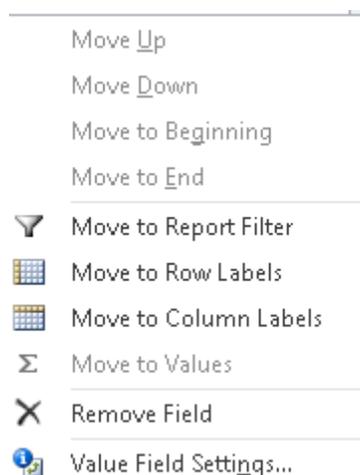
Figure 23: Values pop up menu

Choose **Value Field Settings…** from this menu and the **Value Field Settings** dialogue box will be displayed, Figure 24.
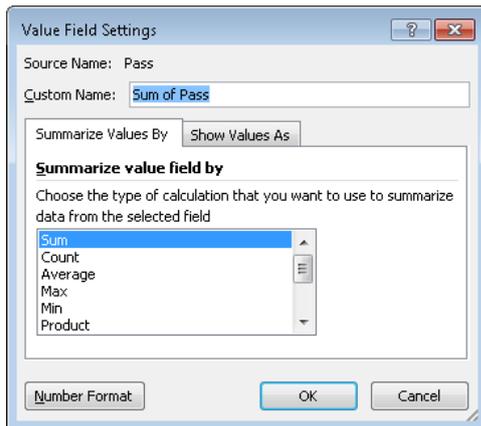
Figure 24: Value Field Settings dialogue box

Excel will insert a custom name for the value, if you do not wish this name change it to the one you wish. Then choose which calculation type you would like from the menu at the bottom and click **OK**. The calculation will be performed on your chosen field.

Task 13

Change your PivotTable report to show the average marks for each programme.

If the data you have is large you may not be able to see all of the entries. To enable you to see the entries more clearly you can Pivot the information. To pivot the information you move the information from the Rows area at the bottom of the Pivot Field List pane to the Columns. This changes the layout of the information.

Task 14

Pivot the table to show Courses in the columns.

Save and close the spreadsheets.