

## Model Building in Spreadsheets – Grade calculator

This exercise takes you through the steps necessary to build a grade calculator in Excel. It will cover using different tabs, advanced formula, drop down lists and other more advanced techniques.

For this activity, you will need to download both the completed version and a largely empty spreadsheet from the link at

<http://www.barryavery.com>

### Task 0 Using the Degree Calculator

Open *degree-calculator.xlsx* in Excel and enter some values to see how it works.

You will need to

- Choose some level 5 (2<sup>nd</sup> year) and level 6 (final year) modules
- Make up some predicted grades – these are percentages

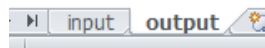
Note how the available module choices are a drop down list.

Click on the *output* tab to see the results

Please select modules for level 5		Grades
Module 1	Managing Financial Resources	45
Module 2	Operations and Project Management	55
Module 3	Managerial Decision Making	63
Module 4	Web Development for Business	77

Please select modules for level 6		Grades
Module 1	SIMAC	67
Module 2	Dissertation	58
Module 3	Business Data Analysis	68
Module 4	Corporate Financial Reporting	74



You should be able to see how the module choices and grades have been copied over, that the degree levels have been calculated for each module and an overall percentage has been used to calculate the final degree classification awarded.

Degree grade prediction		Grades	Level
Module 1	Managing Financial Resources	45	3rd
Module 2	Operations and Project Management	55	2:2
Module 3	Managerial Decision Making	63	2:1
Module 4	Web Development for Business	77	1

Module 1	SIMAC	67	2:1
Module 2	Dissertation	58	2:2
Module 3	Business Data Analysis	68	2:1
Module 4	Corporate Financial Reporting	74	1

With these grades, you could be awarded

Overall
65.4

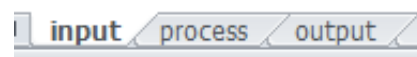
a 2:1 degree

The tasks in this handout will enable you to build the model. Note that the subjects offered and the calculation method shown were the mechanisms used when this handout was created, but both choices and classification calculations change over time and may be different to those shown here.

### Task 1 Creating the appropriate tabs

Open the Excel file *degree calculator blank.xlsx*.

This model will use three tabs



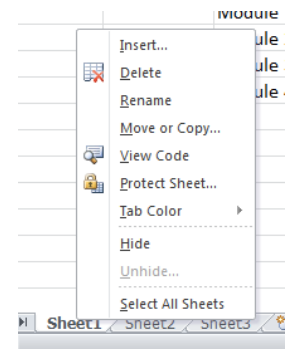
- *input* – which will take contain the input form
- *process* – a hidden tab which will contain all the calculations for the model
- *output* – which contains the results from the process tab

Placing the calculations on the *process* tab keeps the output page clean.

Hover the mouse over the first tab and right mouse click to get a context appropriate menu containing the tab options.

Choose *Rename* to change the name of the *Sheet 1* tab to *input*

Do this twice more to rename *Sheet 2* to *process* and *Sheet 3* to *output*

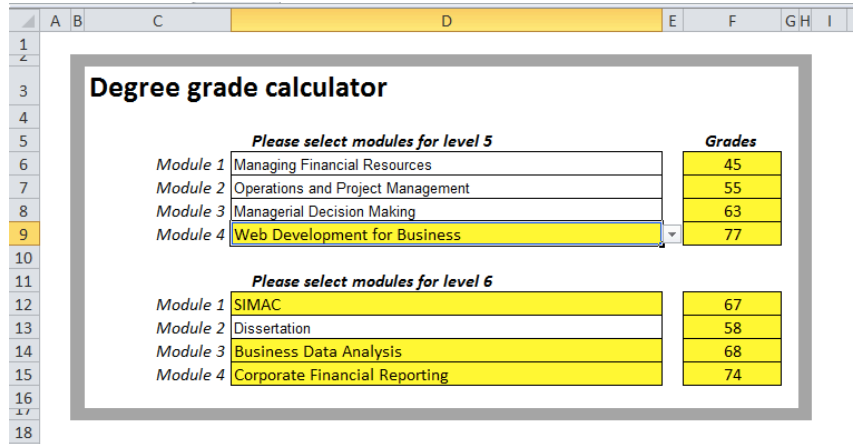


## Task 2 Styling the *input* page

Style the input tab to make it look like the design shown. To achieve this effect use these steps:

Change the widths of columns B, G and H to form narrow vertical columns

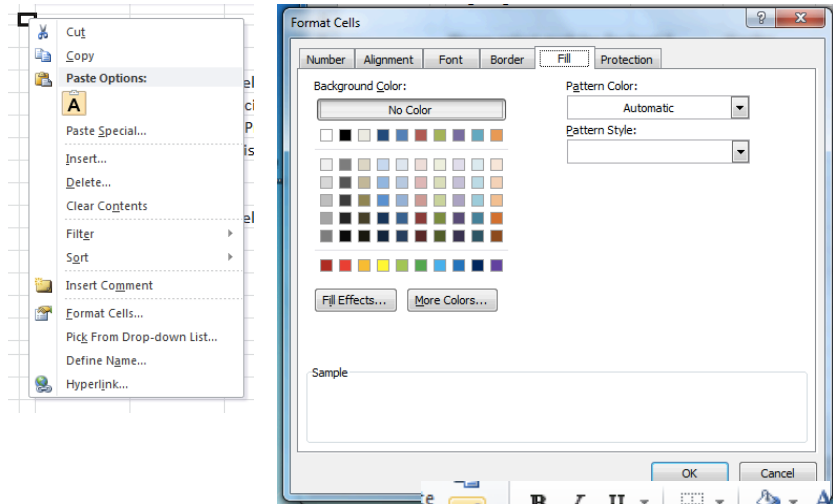
Change the heights of row 2 and 17 to form narrow horizontal rows.



Change the width of column D and E so that the module names fit correctly and there is an appropriate gap between the Modules and the Grades.

Place the cursor in cell B2, use a right mouse click and then pick *format cells*

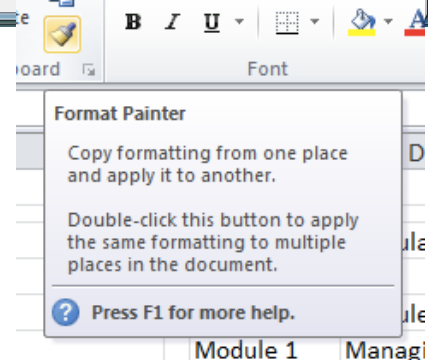
Pick a colour to fill the cell



Create the border around the whole input area

**Hint:** If you have a cell that has already been formatted correctly, you can use the format painter to copy the style to another cell

Click on the cell you wish to copy the format from, click format painter and then paint out the area that you wish to paint the style over



The text is formatted as follows

***Degree grade calculator*** – choose a larger font size and make it bold

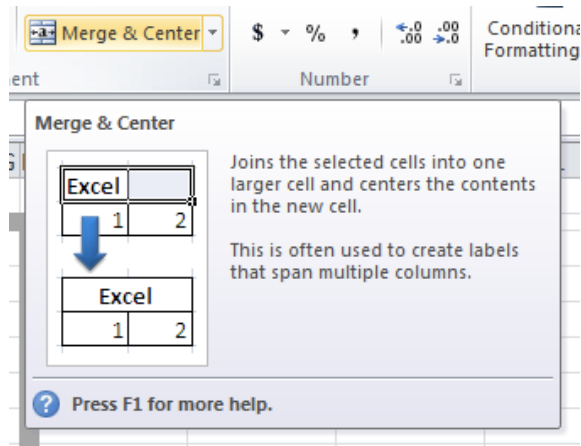
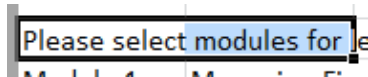
***Module n*** – choose italics and right align the text

***Grades*** – Choose bold, italics and align the text to the centre. Centre align the cells below that show the percentages

To achieve the effect for the ***Please select modules for level x*** text – choose bold and italics. To get the alignment for this label, merge cells C5 and D5 together

Select cells C5 and D5...

..then select *Merge & Center*

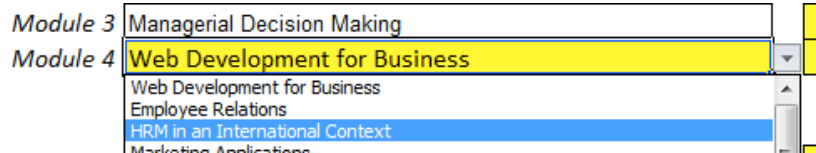


Finally – to suggest the areas where the user will be allowed to enter values, colour cells D9, D12, D14..D15 and the Grade column cells yellow, using the *format cells* technique used previously

		<b><i>Please select modules for level 5</i></b>		<b><i>Grades</i></b>
<i>Module 1</i>	Managing Financial Resources			45
<i>Module 2</i>	Operations and Project Management			55
<i>Module 3</i>	Managerial Decision Making			63
<i>Module 4</i>	Web Development for Business			77
		<b><i>Please select modules for level 6</i></b>		
<i>Module 1</i>	SIMAC			67
<i>Module 2</i>	Dissertation			58
<i>Module 3</i>	Business Data Analysis			68
<i>Module 4</i>	Corporate Financial Reporting			74

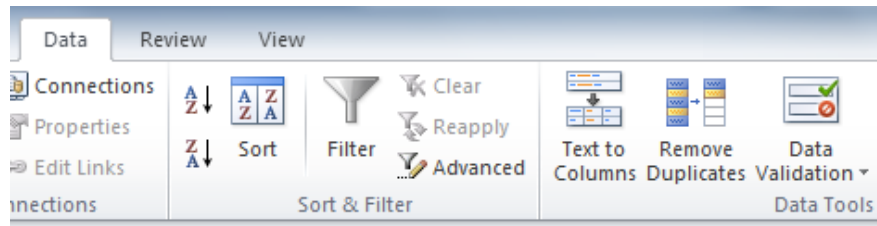
### Task 3 Adding a drop down choice

Cells D9, D12, D14 and D15 contain drop down lists, showing the specific module choices available.



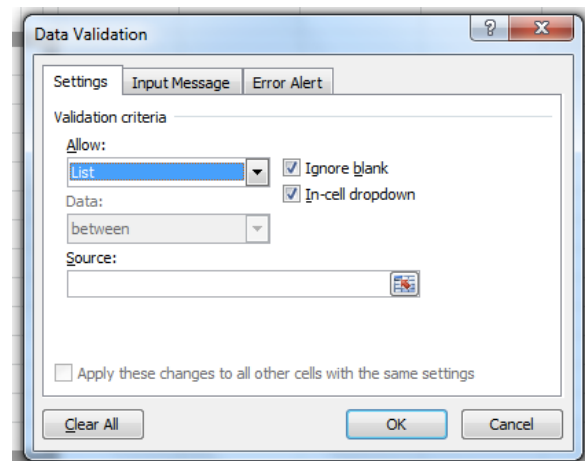
All the text for the module choices is on the *process* tab in various blocks.

Drop down select boxes are achieved by using the *Data - Data validation* technique.



Click in cell D9, choose the *Data* tab and then click the *Data Validation* icon

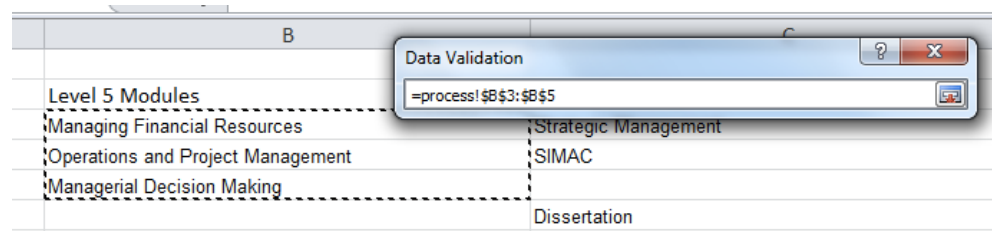
The dialog box allows various ways to validate a cell – choose *List* from the *Allow* drop down box and then click in the *Source* field.



The *Data Validation* dialog box will appear.

Click on the *process* tab and then select the level 5 modules for the first choice.

As the area is marked out, Excel will create the appropriate formula for the source of the drop down list. Press enter twice to save the formula and try it out to ensure it shows the list correctly.



When accessing cells on a different sheet, Excel uses this notation

=sheetname ! cell references

For the first drop down list the formula will be =process!\$B\$3:\$B\$5

## Task 4 Add the other drop down lists

Repeat the process for the other three drop down lists.

The formatting for the *input* tab should now be complete. Choose some sample modules and make up some percentages in the Grades column so you can test the *process* tab as it is being created in the next set of tasks.

Please select modules for level 5		Grades
Module 1	Managing Financial Resources	45
Module 2	Operations and Project Management	55
Module 3	Managerial Decision Making	63
Module 4	Web Development for Business	77

Please select modules for level 6		Grades
Module 1	SIMAC	67
Module 2	Dissertation	58
Module 3	Business Data Analysis	68
Module 4	Corporate Financial Reporting	74

## Task 5 Creating the process sheet – getting the values

It's good practice to bring all the data values over to the *process* sheet so they can be used to calculate the values required on the *output* sheet.

Click on the *process* tab and scroll to cell E1 to reveal a grid that has been created for the calculation process

	E	F	G	H	I	J	K	L
1								
2							Mean	Weight
3	Module 1							
4	Module 2							
5	Module 3							
6	Module 4							
7								
8								
9	Module 1							
10	Module 2							
11	Module 3							
12	Module 4							
13								Overall
14								
15								
16		Degree outcomes						Overall class
17		3rd			40			
18		2:2			50			
19		2:1			60			
20		1			70			
21								

Click on the cell F3 and add the formula `=input!F3`

This will bring the value in cell F3 on the *input* sheet over to the *process* sheet. Add similar formulae to bring all the subjects and percentages over in column F and H.

Module 1	Managing Financial Resources		45
Module 2	Operations and Project Management		55
Module 3	Managerial Decision Making		63
Module 4	Web Development for Business		77
Module 1	SIMAC		67
Module 2	Dissertation		58
Module 3	Business Data Analysis		68
Module 4	Corporate Financial Reporting		74

### Task 6 Calculating the classification for each module

Column I contains the classification level for each module (i.e. whether each module would be classed as a 1<sup>st</sup>, 2:1, 2:2 or 3<sup>rd</sup>). To achieve this a lookup formula can be used, which will use the values in cells F17:H20

	E	F	G	H
15				
16		Degree outcomes		
17		3rd		40
18		2:2		50
19		2:1		60
20		1		70

List of return values – one of these will be returned

List of values to be searched

Lookup formula

Syntax:

`=lookup( value to be searched for, range of cells containing search values, column containing values to be returned )`

For the first grade we want to look up the value 45 in column H (the list of grade boundaries to be searched). Column F gives the returned value - the name of the classification achieved.

Add a formula to cell I3 with the following lookup formula

`=lookup(I3, H17:H20, F17:F20 )`

When the lookup formula fails to find the exact value, it will look down the column to find the appropriate closest row (hence a grade between 40 and 50 will return the value '3<sup>rd</sup>').

Repeat this seven more times for the cells I4 to I12.

**Hint:** If you simply copy the formula down, you will get error messages. You will have to use absolute addressing in the formula (using the \$ notation) if you wish to simply copy it.

## Task 6 Calculating overall grade for the degree

The overall grade for the degree is calculated by using a weighted average of the two years. The second year counts for 20% of the final grade, with the final year counting for the other 80%.

To achieve this add the following formulae

- In cell K3 add an average formula for the level 5 modules (H3:H6)
- In cell K9 add an average formula for the level 6 modules (H9:H12)
- In cell L3 add a formula =K3\*0.2
- In cell L9 add a formula =K9\*0.8

Finally in cell L14 calculate the overall percentage using =L3+L9

H	I	J	K	L
			Mean	Weight
45	3rd		60	12
55	2:2			
63	2:1			
77	1			
67	2:1		66.75	53.4
58	2:2			
68	2:1			
74	1			
				Overall
				65.4

## Task 7 Calculating the overall classification for the degree

The final piece of information required is the overall classification for the degree. This is achieved by using another lookup formula.

Add a lookup formula in cell L17 to work out the overall class. Lookup the overall grade (cell L14), in the range H17:H20 and return the class from the F column (F17:F20).

L
Weight
12
53.4
Overall
65.4
Overall class
2:1

## Task 8 Creating the Output page - creating the look and feel

Style the *output* sheet, using changes in column and row height, font, italics and bold, similar to the techniques used to style the *input* sheet

	A	B	C	D	E	F	G	H	I	J	
1											
2											
3			<b>Degree grade prediction</b>								
4											
5											
6			Module 1								
7			Module 2								
8			Module 3								
9			Module 4								
10											
11											
12			Module 1								
13			Module 2								
14			Module 3								
15			Module 4								
16											
17			<i>With these grades, you could be awarded</i>								
18											
19											
20											
21											

## Task 9 Copying values over to the output sheet

Add formulae to the D, F and H column to bring the module names, grades, level and overall percentage from the *process* sheet, for example cell D6 would be

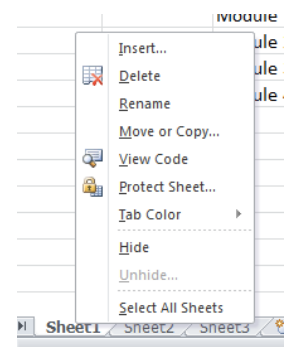
=process!F3

Add a formula in D18 to bring over the final degree classification.

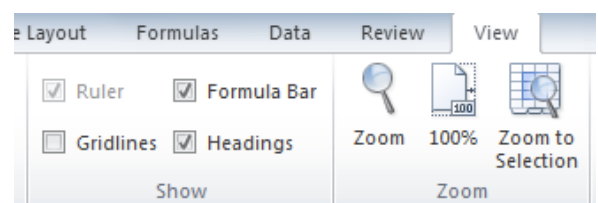
## Task 10 Finishing the look

There are a few techniques used to finish the visual look of the spreadsheet.

Hide the *process* tab by right mouse clicking on it and then selecting *hide*



Turn off grid lines in both the *input* and *output* sheet (and row and column headings if you wish) by using the *View* tab and options in the *Show* panel





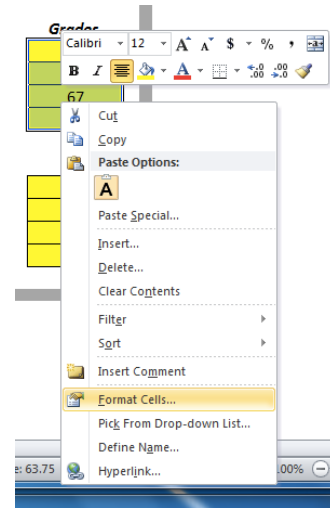
## Task 11 Protecting the spreadsheet

The final stage involves protecting the spreadsheet so that it won't be accidentally changed during use. This is done in two stages

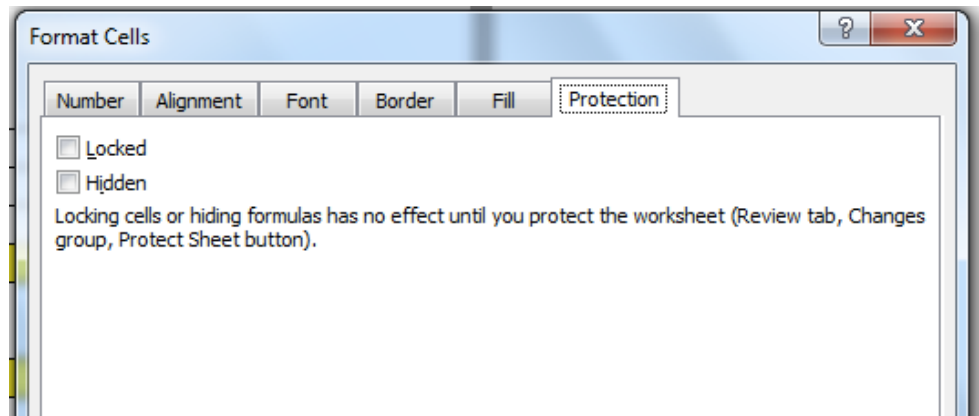
**One** – mark out the cells that will be *unlocked* – i.e. the cells that are writable

**Two** – lock the spreadsheet

Click on the input tab and select cells F6:F9. Right mouse click and choose *Format Cells*

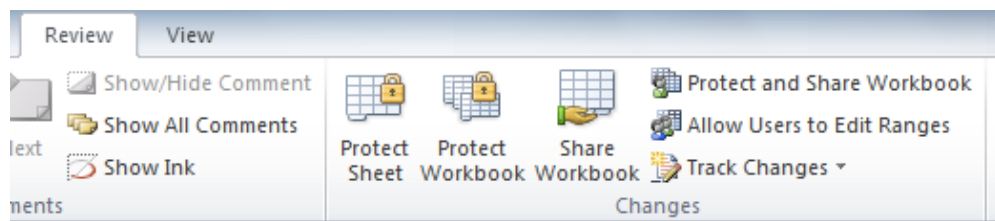


From the Format Cells dialog box **untick** the *Locked* checkbox. This ensures that the selected cells will be *unlocked* when the sheet is locked in the next step.



Repeat this unlocking process for *all* the cells where the values can be changed (i.e. all the cells coloured yellow in the earlier task).

Finally – lock the spreadsheet by using the *Review – Protect Sheet* icon on both the *input* and *output* sheets. You can lock a sheet without supplying a password, although you may use one if you wish.



Test the spreadsheet out to ensure that only the correct cells can be modified.