University of Glasgow Dip / MSc Information Technology Information Systems and Databases								
Exercise ISD1	Started Week 2	Due 13/10/2009	2 pm					

A Spreadsheet Program for Estimating Your Final Award

Setup

You will be e-mailed a spreadsheet called *ISD1.xls*. Create a folder *ISD1* in your *ISD* workspace folder and put this file in there. Make a copy (so you can go back to the beginning if things go wrong). Start up Excel and open *ISD1.xls*. The file has three sheets – *Calculator* which will be where you enter the award calculations; *Tables* which has some translation tables that you will need; and *Core* which will have the calculations for your three core Course grades.

Introduction

Your task is to create a spreadsheet which keeps track of how the marks you are receiving in the course are contributing to your final award. The task is in two parts. The first part requires you to provide the awards calculations in the *Calculator* sheet (in the grey cells). The second part requires you to enter the way in which your Course grades are created for your three core courses (Programming, ISD and S&N). You should use your handbook (pages 21-25 and 73-79) for further reference to the assessment method and examples.

Part 1 – Calculating the Bands for the Courses

In *ISD1.xls*, sample bands were put in for the courses. In fact, these are also calculated and in several different ways. For this exercise, we will use the three core courses as examples and these are in a separate sheet of ISD1.xls called *Core*. The initial version in *ISD1.xls* and the final version required are appended.

Each course has a number of marked components, which are listed in the table above. There are two methods for combining component marks (for the purpose of this exercise), which are using marks or using bands. Here is a description of each method:

- **Marks**. Each component has a maximum mark and a weighting the weightings adding up to 100 for the course. For instance, *ISD* has only one piece of coursework which is marked out of 100 and worth 30% of the overall score, while the exam is marked out of 75 and is worth 70% of the overall score. The final mark (out of 100) for ISD is therefore C*30/100 + E*70/75, where C and E are the coursework and exam mark. This is turned into a band by using a first lookup table which turns marks out of 100 into bands.
- **Bands**. Each component has only a weighting the weightings adding up to 100 for the course. Each component is assessed as a band, the bands are turned to scores using a second lookup table, the scores are turned to contributions using the weightings and the contributions are added up to make a final score out of 20. Taking S&N, for instance, with four components, three exercises worth 10% each and an exam worth the other 70%. Each is assigned a band and the final score is calculated as follows:

lookup(Ex1)*10/100 + lookup(Ex2)*10/100 + lookup(Ex3)*10/100 + lookup(Exam)*70/100

where lookup is the process of turning a band into a score out of 22. The final score is turned into a band using the second lookup table in reverse.

Start by working on the ISD course. The steps required are as follows:

- 1. You have in rows 5-7 the weights the amount the component is out of and the mark. Enter calculations in row 8 is work out the weighted score i.e. the mark multiplied by the weight divided by the maximum mark.
- 2. Add these up in G8.
- 3. Use this value to lookup a band in the table in cells B3 to C25 of the Tables sheet.

You can then do much the same for Programming, but CSN is different as it is scored in bands as discussed above. The process is as follows:

4. You must first calculate a score from the band as you did in step 1 of Part 1. These go in row 22. Then you require a weighted score, achieved by multiplying this with the weight. Then you add them up in G23. This is a different kind of score than those for DBS and FP and must be reverse transformed from scores to bands. This uses cells F3 to G25 of the *Tables* sheet.

Having done all of this you can make a link from the band scores in the calculator sheet to the calculated bands from the *Core* sheet, so that changes to the Core sheet directly affect the award calculations.

Part 2 – Calculating the Award

At the end of the course you will be eligible for zero or more of nine awards – MSc, PG Diploma and PG Certificate, each of which may be with Merit or with Distinction. The rules are worked out from a Total Weighted Average Score (explained below) and minimum requirements at different grades. Briefly the rules governing progression to the MSc phase are as shown in the following table:

Award TWAS Requirement		Grade Requirement		
Progress to MSc	12.0 over 120 credits	90 credits >= D, 120 credits >=F		
PGDip/Distinction	18.0 over 120 credits	40 credits $>=$ A, 120 credits $>=$ B		
PGDip/Merit	15.0 over 120 credits	40 credits >= B, 120 credits >=C		
PGDip	9.0 over 120 credits	$80 \text{ credits} \ge D$		
PGCert/Distinction	18.0 over 60 credits	$20 \text{ credits} \ge A, 60 \text{ credits} \ge B$		
PGCert/Merit	15.0 over 60 credits	$20 \text{ credits} \ge B, 60 \text{ credits} \ge C$		
PGCert	9.0 over 60 credits	40 credits >= D		

The October decisions bring in the 60 credits project grade and are as follows:

Award	TWAS Requirement	Project Grade
MSc/Distinction	18.0 over 120 credits	А
MSc/Merit	15.0 over 120 credits	В
MSc	Progress requirements above	D

One complicating aspect is that there are more credits on the course. You are required to get 180 credits of which 150 are at level M. If you add up all the credits on the spreadsheet, you will find that they come to 190 - 150 at Level M and 40 at level H. For the calculation we need to eliminate 10 of those credits and we do this by removing 10 credits of the worst scoring level H courses - i.e. either half of programming or all of ISD or S&N. This is dealt with in steps 2-3, 6 and 8a below.

A layout for a spreadsheet to perform these calculations is given as an appendix, as is a final version showing the results of the calculations. The initial version shows some cells in light grey (actually yellow in the spreadsheet) and some in dark gray. The yellow cells are for data entry. Change the grades or grade points here should change the awards. The dark gray cells are where you must enter formulae.

The process of creating the final version requires the following steps.

- 1. The first calculation required is the **scores** in column D in rows 6-9 and 11-18 and 20. These are derived from the band using a VLOOKUP function on the table in the *Tables* sheet from area E3 to F25. You will need to set the fourth parameter to False for an exact match.
- 2. We can now deal with **eliminating** 10 credits at level H. In cell D5, put the minimum of the scores in cells D6-9.
- 3. The **band** will also be useful later, so calculate this in C5 by carrying out a VLOOKUP using area F3 to G25 in the *Tables* sheet.
- 4. The **weighted scores** in column E are formed by multiplying the grade point with the score. Do this for row 5 as well as rows 6-9, 11-18 and 20.
- 5. The **grades** are also going to be useful. These are calculated in column F by using the LEFT text function. Do this for row 5 as well as rows 6-9, 11-18 and 20.
- 6. We now need the **totals of the grade points and the weighted score**. These should be put into B22 (just put 120) and E22 as the sum of the cells in rows 6-9, 11-18 subtracting the values in row5.
- 7 The main TWAS score is now E22 divided by B22 and this goes in B23.
- 8. We are going to need the totals of credits at each grade and at "at least" each grade. This is achieved in columns J and K as follows:
 - a) The **number of credits in each grade** is calculated in column J. You need to use SUMIF with the three parameters being the grades in column F, the grade in column I as the value to test, and the grade points in column B as the values to add up. You need finally to take away 10 credits if the grade in F5 is the same as the grade in the I column for this row (remember to guard the 5 in F5 with a dollar so you can copy the formula down).
 - b) The **number of credits of at least that grade** are calculated as the sum of the values in that row or higher in column J i.e. sum from J\$4 down to Jr where r is the number of this row. Again a dollar in the formula is useful here.
- 9. The **PGCert conditions** involve the weighted average over the best 60 grade points. This is achieved in columns G and H is the most complex part of the whole exercise. We need to proceed in six steps:
 - a) We must sort the input data (i.e. grade points and bands). This is better done by taking copies of the data. Select cells B6-18 and do take a copy. Then go to I20 and do Paste Special, selecting values as the thing to paste. Repeat this to copy E6-E18 into J20 and below.
 - b) Select I20-J32 and use Data menu Sort item to sort the data on the weighted score descending.
 - c) Put formulae in K20 and L20 to copy I20 and J20 respectively.
 - d) The rest of column K requires using an IF to test if the cell above is already at least 60. If it is just copy it. If it isn't, add the value in column I to the value above.

- e) The rest of column L is similar. It also uses the IF function, but it tests the value in column K of the row above and if it has reached 60, it copies the value above in column L, otherwise it adds the value from column J to the value above.
- f) The weighted average score over the best 60 credits is then the value ate the bottom of column L divided by the value at the bottom of column K.
- 10. Now, at last, we can make some awards. The formulae in cells B24 to B37 all use IF functions. They test the values in B20, B21 and the "at least" sums in column K. As all the tests involve at least two conditions you will have to use the AND function - X&Y&Z is done as AND(X, Y, Z).

Background Information

Lookup Tables

The lookup tables you need for this spreadsheet consist of a 2 by N grids of values, where N is the number of values, and can be organised into two rows by N columns or two columns by N rows. Let us say, you are turning a set of egg sizes into a grade of egg: albatross (80 or more), extra large (65-79), large (50-64), normal (40-49) and small (0-39).

To do this you would organise a table such as the following:

	D	Е	F	G	Н	Ι
41	egg size	0	40	50	65	80
42	grade	small	normal	large	extra large	albatross

Table 3 – Example Lookup Table

Then for a given egg, which has size in F12, say, to put its grade in G12, you would put the following expression:

G12 = HLOOKUP(F12, E41:I42, 2, TRUE)

in which the four parameters are:

F12 is the value being looked up

E41:I42 is the lookup table

- the "2" is the row position in the lookup table from which the value is returned i.e. this is the second row of the table
- the TRUE means that if it cannot find an exact match it looks for the largest value that is smaller than it; if FALSE, it returns N/A if it can't find an exact match. Note you will need to use both in the exercise.

The lookup process proceeds by taking the egg size and looking along the *egg size* row until it hits a value which is larger than this size. It then returns the *grade* of the previous column. For example, given the size 46, the process will pass over E41 and F41 and stop at G41, returning the value in F42 – normal.

Multiple Sheets

In a spreadsheet, you can have multiple sheets. You create them using the *Worksheet* option of the *Insert* menu. Each can be named, and if you want to use a value in X23 in sheet, *OtherSheet*, in another sheet, you must put OtherSheet!X23 in the calculation.