AN EXCEL TEMPLATE FOR PROCESSING EXAMINATION RESULTS FOR HIGHER INSTITUTIONS IN NIGERIA

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ABSTRACT:
In this work, we designed, developed and implemented an examination result processing template for all the Postgraduate programmes in the Faculty of Science, Kaduna State University, Kaduna. The designed template when fed in with data computes and grades students appropriately. Its design was done using the "IF" and "OR" logical functions. It was deployed and tested for the performance in terms of accuracy and speed, and as attested by the end users, it is excellent.

Keywords: MS Excel, "IF", "OR", Template, Examination, Grade, GPA

INTRODUCTION
The MS Excel is a very fascinating and useful package. It gives a platform for various solutions to numerous life problems. It contains modules that are user-friendly and work perfectly well such that their performances have shown high degree of accuracy and precision. Modern spreadsheet software, such as Microsoft Excel, can transform the use of statistics into a simple task. Instead of being difficult to do and to interpret, statistical tests can now be carried out simply and output is much easier to interpret (Millar, 2001).

MS Excel is the most commonly used spreadsheet, and has now grown into a more powerful software that can be used virtually by all branches of science and engineering (El-Gebely & Yushau, 2007).

In this work, we explored the usage of the logical "IF" and "OR" statement contained in the function library of MS Excel. The function was used to develop and implement an operational package for the computation of the Postgraduate examinations results for Faculty of Science, Kaduna State University, Kaduna. We adopted the Nigerian Universities Commission's grading systems for all our computations.

The IF statement is a simple function in MS Excel that is one of the building blocks we need when we are working with large spreadsheets. The "IF" function is one of the most popular and useful functions in Excel, we use the "IF" function to ask MS Excel to test a condition and to return one value if the condition is met, and another value if the condition is not met. Similarly, the MS Excel ‘OR’ function is a basic logical function that is used to compare two values or statements (Cheusheva, 2014).

The two functions "IF" and "OR" were integrated to come up with the examination results processing template.

MATERIALS AND METHODS
The "IF" Function
The "IF" function is one of MS Excel's logical functions that evaluates a certain condition and returns the value specified if the condition is TRUE, and another value if the condition is FALSE.

The syntax for MS Excel IF is as follows (ibid):

IF(logical_test, value_if_true, value_if_false)

Specifically, the IF function has 3 arguments, but only the first one is obligatory, the other two are optional.

- logical_test - a value or logical expression that can be either TRUE or FALSE (Required). In this argument, you can specify a text value, date, number, or any comparison operator.
- value_if_true - the value to return when the logical test evaluates to TRUE, i.e. if the condition is met (Optional).
- value_if_false - the value to be returned if the logical test evaluates to FALSE, i.e. if the condition is not met (Optional).

Though the last two parameters of the IF function are optional, the formula may produce unexpected results if we do not know the underlying logic beneath the hood.

1) If value_if_true is omitted: If the value_if_true argument is omitted in our MS Excel IF formula (i.e. there is only a comma following logical_test), the IF function returns zero (0) when the condition is met.

2) If value_if_false is omitted: If we do not care what happens if the specified condition is not met, we can omit the third parameter in our MS Excel IF formulas, which will result in the following:

If the logical test evaluates to FALSE and the value_if_false parameter is omitted (there is just a closing bracket after the value_if_true argument), the IF function returns the logical value FALSE.

3) Get the IF function to display logical values TRUE or FALSE: If we want our MS Excel IF formula to display the logical values TRUE and FALSE when the specified condition is met and not met, respectively, type TRUE in the value_if_true argument. The value_if_false parameter can be FALSE or omitted.

If we want our IF formula to return TRUE and FALSE as the logical values (Boolean) that other MS Excel formulas can...
recognize, we make sure not to enclose them in double quotes. A visual indication of a Boolean is middle align in a cell.

If we want to "TRUE" and "FALSE" to be usual text values, enclose them in "double quotes". In this case, the returned values will be aligned left and formatted as General. No Excel formula will recognize such "TRUE" and "FALSE" text as logical values.

Table 1: List of Logical Operators with Formula Examples

<table>
<thead>
<tr>
<th>Condition</th>
<th>Operator</th>
<th>Formula Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater than</td>
<td>&gt;</td>
<td>=IF(A2&gt;5, &quot;OK&quot;, &quot;&quot;)</td>
<td>If the number in cell A2 is greater than 5, the formula returns &quot;OK&quot;; otherwise 0 is returned.</td>
</tr>
<tr>
<td>Less than</td>
<td>&lt;</td>
<td>=IF(A2&lt;5, &quot;OK&quot;, &quot;&quot;)</td>
<td>If the number in cell A2 is less than 5, the formula returns &quot;OK&quot;; an empty string otherwise.</td>
</tr>
<tr>
<td>Equal to</td>
<td>=</td>
<td>=IF(A2=5, &quot;OK&quot;, &quot;Wrong number&quot;)</td>
<td>If the number in cell A2 is equal to 5, the formula returns &quot;OK&quot;; otherwise the function displays &quot;Wrong number&quot;.</td>
</tr>
<tr>
<td>Not equal to</td>
<td>&lt;&gt;</td>
<td>=IF(A2&lt;&gt;5, &quot;Wrong number&quot;, &quot;OK&quot;)</td>
<td>If the number in cell A2 is not equal to 5, the formula returns &quot;Wrong number&quot;; otherwise &quot;OK&quot;.</td>
</tr>
<tr>
<td>Greater than or equal to</td>
<td>&gt;=</td>
<td>=IF(A2&gt;=5, &quot;OK&quot;, &quot;Poor&quot;)</td>
<td>If the number in cell A2 is greater than or equal to 5, the formula returns &quot;OK&quot;; otherwise &quot;Poor&quot;.</td>
</tr>
<tr>
<td>Less than or equal to</td>
<td>&lt;=</td>
<td>=IF(A2&lt;=5, &quot;OK&quot;, &quot;&quot;)</td>
<td>If the number in cell A2 is less than or equal to 5, the formula returns &quot;OK&quot;; an empty string otherwise.</td>
</tr>
</tbody>
</table>

(Source:https://www.ablebits.com/)

The "OR" Function

Microsoft Excel provides 4 logical functions to work with the logical values. The functions are AND, OR, XOR and NOT. We use these functions when we want to carry out more than one comparison in our formula, or test multiple conditions instead of just one. As well as logical operators, MS Excel logical functions return either TRUE or FALSE when their arguments are evaluated.

Table 2: Short Summary of the logical functions "AND","OR","XOR","NOT"

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
<th>Formula Example</th>
<th>Formula Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AND</td>
<td>Returns TRUE if all of the arguments evaluate to TRUE.</td>
<td>=AND(A2&gt;=10, B2&lt;5)</td>
<td>The formula returns TRUE if a value in cell A2 is greater than or equal to 10, and a value in B2 is less than 5, FALSE otherwise.</td>
</tr>
<tr>
<td>OR</td>
<td>Returns TRUE if any argument evaluates to TRUE.</td>
<td>=OR(A2&gt;=10, B2&lt;5)</td>
<td>The formula returns TRUE if A2 is greater than or equal to 10 or B2 is less than 5, or both conditions are met. If neither of the conditions is met, the formula returns FALSE.</td>
</tr>
<tr>
<td>XOR</td>
<td>Returns a logical Exclusive Or of all arguments.</td>
<td>=XOR(A2&gt;=10, B2&lt;5)</td>
<td>The formula returns TRUE if either A2 is greater than or equal to 10 or B2 is less than 5. If neither of the conditions is met or both conditions are met, the formula returns FALSE.</td>
</tr>
<tr>
<td>NOT</td>
<td>Returns the reversed logical value of its argument. I.e. If the argument is FALSE, then TRUE is returned and vice versa.</td>
<td>=NOT(A2&gt;=10)</td>
<td>The formula returns FALSE if a value in cell A1 is greater than or equal to 10; TRUE otherwise.</td>
</tr>
</tbody>
</table>

(Source:https://www.ablebits.com/)

The MS Excel OR function is a basic logical function that is used to compare two values or statements. The "OR" function returns TRUE if at least one of the arguments evaluates to TRUE, and returns FALSE if all arguments are FALSE. The "OR" function is available in all versions of Microsoft Excel 2013 - 2000. The syntax of the MS Excel "OR" function is:

OR(logical1, [logical2], ...)

The Model: Algorithm and Flow Chart of Our Model

Step 1 - Set the total value of credit units registered, say tcur, to zero. That is, tcur = 0.

Step 2 - Set the total value of credit units earned, say ttrue, to zero, i.e. ttrue = 0.

Step 3 - Set the total grade points, say tgp, to zero, i.e. tgp = 0.

Step 4 - Set remark to be an empty string, i.e. remark = "".

Step 5 - Input score, say s

Next, test the score entered to determine whether the course has been registered, registered but was absent or registered but was present by the student.

Step 6 - If (s = "x") then Course not registered by student

Set the grade to be blank, i.e. grade = "".

tcur = tcur + 0
Excel Template For Processing Examination Results For Higher Institutions

```plaintext
Excel Template For Processing Examination Results For Higher Institutions

Else
    Course registered by student
    If (s = "-") then
        Student
            was absent for the course, thus cue=0 and gp=0
        i.e. grade = "ABS"
            tcuer = tcuer + cu
            remark = remark + ccode
            Else if (s < 50) then
                Student failed the course, thus cue=0 and gp=0
                grade = "F"
                tcuer = tcuer + cu
                remark = remark + ccode
            Else
                Student passed the course
                value of grade to A, i.e. grade = "A"
                gp = cu
                Else if (s >= 60) then
                    Set the value of grade to B, i.e. grade = "B"
                    gp = cu
                Else
                    Set the value of grade to C, i.e. grade = "C"
                    gp = cu
                End if
            End if
        Else
            If (s = "-") then
                Set the value of grade to ABS, i.e. grade = "ABS"
                tcuer = tcuer + cu
                remark = remark + ccode
            Else if (s < 50) then
                Set grade to F, i.e. grade = "F"
                tcuer = tcuer + cu
                remark = remark + ccode
            Else
                Set grade to A, i.e. grade = "A"
                gp = cu
                Else if (s >= 70) then
                    Set the value of grade to A, i.e. grade = "A"
                    gp = cu
                Else if (s >= 60) then
                    Set the value of grade to B, i.e. grade = "B"
                    gp = cu
                Else
                    Set the value of grade to C, i.e. grade = "C"
                    gp = cu
                End if
            End if
        Else
            Else if (s < 50) then
                Set grade to F, i.e. grade = "F"
                tcuer = tcuer + cu
                remark = remark + ccode
            Else
                Set grade to A, i.e. grade = "A"
                gp = cu
                Else if (s >= 70) then
                    Set the value of grade to A, i.e. grade = "A"
                    gp = cu
                Else if (s >= 60) then
                    Set the value of grade to B, i.e. grade = "B"
                    gp = cu
                Else
                    Set the value of grade to C, i.e. grade = "C"
                    gp = cu
                End if
            End if
        End if
    End if
End if

Step 7
End if

Step 8 - cgpa = gpa

Step 9 - If (remark = "") then remark = "Passed"

Step 10 - Finally display results for each student as requested such as the tcuer, tcue, tcp, gpa, remarks/carryover for current, previous and cumulative.
```

Excel Template For Processing Examination Results For Higher Institutions
Excel Template For Processing Examination Results For Higher Institutions.

Fig.1: Flow Chart of the PG Examination Results Template
The NUC is the regulatory agency for University education in Nigeria. The grading system as highlighted in the Benchmark Minimum Academic Standards (BMAS) for Postgraduate programmes in Nigeria (NUC, 2011) is as stated below.

- **a)** The minimum pass mark in any course shall be 50%.
- **b)** Grading of courses shall be done by a combination of percentage marks and letter grades translated into a graduated system of Grade Point Equivalents (GPE). For the purpose of determining a student’s standing at the end of every semester, the Grade Point Average (GPA) system shall be used. The GPA is computed by dividing the total number of credit points (TCP) by the total number of units (TNU) for all the courses taken in the semester. The credit point for a course is computed by multiplying the number of units for the course by the Grade Point Equivalent of the marks scored in the course.
- **c)** Each course shall be graded out of a maximum of 100 marks and assigned appropriate Grade Point Equivalent as in the following table:

<table>
<thead>
<tr>
<th>% Scores</th>
<th>Letter Grades</th>
<th>Grade Points (GP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vary according to contact hours assigned to each course per week per semester, and according to load carried by students.</td>
<td>70 – 100</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>60 - 69</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>50 - 59</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>0 – 49</td>
<td>F</td>
</tr>
</tbody>
</table>
RESULTS
Arbitrary marks were inputted to generate tables 4A, 4B, 5A and 5B; the template was actually tested with live data without encountering any problem.

Table 4A: First Semester Students’ Results by Courses Registered

| SN | REGISTRATION NO. | NAME | SCI801 MARK | SCI801 GRADE | BIO801 MARK | BIO801 GRADE | BIO803 MARK | BIO803 GRADE | BIO805 MARK | BIO805 GRADE | BIO807 MARK | BIO807 GRADE | BIO809 MARK | BIO809 GRADE | BIO811 MARK | BIO811 GRADE | BIO813 MARK | BIO813 GRADE | BIO815 MARK | BIO815 GRADE | ENV805 MARK | ENV805 GRADE | FSH801 MARK | FSH801 GRADE | FSH807 MARK | FSH807 GRADE | Remark |
|----|------------------|------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1  | KASU/MSC/BOP/14/10 01 | STUDENT’S NAME NO 1 | 50 C | C | 50 C | C | 50 C | C | 50 C | C | 50 C | C | 50 C | C | 50 C | C | 20 F | F | FSH807, |
| 2  | KASU/MSC/BOP/14/10 02 | STUDENT’S NAME NO 2 | 50 C | C | 50 C | C | 50 C | C | 50 C | C | 50 C | C | 50 C | C | 50 C | C | 80 A | A | 90 A | Passed |
| 3  | KASU/MSC/BOP/14/10 03 | STUDENT’S NAME NO 3 | 70 A | 70 A | 80 A | 90 A | x | 67 B | 50 C | x | x | 78 A | 56 C | 43 F | FSH807, |
| 4  | KASU/MSC/BOP/14/10 04 | STUDENT’S NAME NO 4 | 60 B | 48 F | 53 C | 35 F | 50 C | 57 C | 69 B | X | 70 A | X | 54 C | 13 F | BIO801, BIO805, FSH807, |
| 5  | KASU/MSC/BOP/14/10 05 | STUDENT’S NAME NO 5 | 60 B | 60 B | 60 B | 60 B | 60 B | 60 B | 60 B | 60 B | 60 B | X | X | X | X | Passed |
| 6  | KASU/MSC/BOP/14/10 06 | STUDENT’S NAME NO 6 | 90 A | 85 A | 75 A | X | 78 A | X | 88 A | 79 A | X | 72 A | 77 A | 70 A | Passed |
### Table 4B: Results Computation from Table 4A.

<table>
<thead>
<tr>
<th>S/N</th>
<th>REGISTRATION NO.</th>
<th>NAME</th>
<th>CURRENT</th>
<th>PAST</th>
<th>CUMULATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>TCUR</td>
<td>TCUE</td>
<td>TCP</td>
</tr>
<tr>
<td>1</td>
<td>KASU/MSC/BOP/14/1001</td>
<td>STUDENT'S NAME NO 1</td>
<td>36</td>
<td>33</td>
<td>99</td>
</tr>
<tr>
<td>2</td>
<td>KASU/MSC/BOP/14/1002</td>
<td>STUDENT'S NAME NO 2</td>
<td>36</td>
<td>36</td>
<td>120</td>
</tr>
<tr>
<td>3</td>
<td>KASU/MSC/BOP/14/1003</td>
<td>STUDENT'S NAME NO 3</td>
<td>27</td>
<td>24</td>
<td>105</td>
</tr>
<tr>
<td>4</td>
<td>KASU/MSC/BOP/14/1004</td>
<td>STUDENT'S NAME NO 4</td>
<td>30</td>
<td>21</td>
<td>75</td>
</tr>
<tr>
<td>5</td>
<td>KASU/MSC/BOP/14/1005</td>
<td>STUDENT'S NAME NO 5</td>
<td>27</td>
<td>27</td>
<td>108</td>
</tr>
<tr>
<td>6</td>
<td>KASU/MSC/BOP/14/1006</td>
<td>STUDENT'S NAME NO 6</td>
<td>27</td>
<td>27</td>
<td>135</td>
</tr>
</tbody>
</table>

### Table 5A: Second Semester Students' Results by Courses Registered

**KADUNA STATE UNIVERSITY**  
DEPARTMENT OF BIOLOGICAL SCIENCES  
Master of Science in Biology Second Semester 2014/2015 Academic Session Results

<table>
<thead>
<tr>
<th>S/N</th>
<th>REG. NO.</th>
<th>NAME</th>
<th>CURRENT</th>
<th>PAST</th>
<th>CUMULATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>TCUR</td>
<td>TCUE</td>
<td>TCP</td>
</tr>
<tr>
<td>1</td>
<td>KASU/MS/BO/P/14/1001</td>
<td>STUDENT'S NAME NO 1</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>KASU/MS/BO/P/14/1002</td>
<td>STUDENT'S NAME NO 2</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>No</td>
<td>Name</td>
<td>Roll No</td>
<td>Subjects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----</td>
<td>------</td>
<td>---------</td>
<td>----------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>KAS UMS C/BO P/14/1003</td>
<td>70809</td>
<td>FSH807, BIO802</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>KAS UMS C/BO P/14/1004</td>
<td>6453505</td>
<td>BIO801, BIO805, FSH807, SCI802</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>KAS UMS C/BO P/14/1005</td>
<td>6666606</td>
<td>Passed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>KAS UMS C/BO P/14/1006</td>
<td>987558X</td>
<td>Passed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Excel Template For Processing Examination Results For Higher Institutions
DISCUSSION
The major components of the templates, which are (a) grading of the student’s score; (b) computations of the credit units registered/credit units earned/credit points/grade point average/diploma or degree classification, were adequately captured and implemented as could be seen from results in tables 4A, 4B, 5A and 5B. All the computations were done in accordance with Table 3.

The template was deployed and used for the computation of the first semester (2014/2015 session) examination results in all the Post Graduate programmes in the Faculty of Science, Kaduna State University; and it performed perfectly well.

ACKNOWLEDGEMENT
We acknowledge Svetlana Cheusheva for the usage of her materials (tutorials) from the website https://www.ablebits.com/

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