

WORKSHOP
MICROSOFT OFFICE EXCEL
SHIPPING, FINANCE AND MANAGEMENT SKILLS

Instructor: Stella Moysiadou, Adjunct Lecturer, Post-Doctoral Researcher, Laboratory for International Shipping, Finance and Management, Athens University of Economics and Business
E-mail: stm@aueb.gr

PART II

Data Analysis, Visualization, Filtering and Validation
- Formulas, Functions and other Excel tools

A formula is an expression that returns a value. In most cases, this is a numeric value though it could also be a text string, a yes/no value, or a date. A formula is written using operators that combine different values, resulting in a single value that is then displayed within the cell.

The values that formulas use can be either specific or refer to the content of other cells. Including cell references rather than specific values in formulas allows the user to change the values being used in the calculation without having to modify the formula itself. If a formula contains more than one arithmetic operator, Excel performs the calculation using the same order of precedence as typically used in mathematics: it first calculates the value of any operation within parentheses, then it applies exponentiation (^), multiplication (*) and division (/), and finally it performs addition (+) and subtraction (-).

A function is a named operation that returns a value. Functions are used to simplify formulas, reducing what might be a long formula into a compact statement. For example, to add the values in the range A1:A10, you could either enter the following long formula: =A1+A2+A3+A4+A5+A6+A7+A8+A9+A10 or use the SUM function: =SUM(A1:A10). In both instances, Excel adds the values in cells A1 through A10, but the SUM function is faster and simpler to enter and less prone to a typing error. Excel supports more than 300 different functions from the fields of finance, business, science, and engineering that work with numbers, text, and dates.

In this section, participants will learn and practice the formulas' and functions' basics (inserting, editing, copying and pasting a formula/function, working with relative, absolute and mixed references, using the Autofill tool with formulas/functions). Also, they will learn how to a) quantify qualitative data using logical functions, b) filter large datasets using lookup functions, c) validate information using other combinations of functions, d) calculate statistical figures using relevant functions, and e) create nested functions. This Section also introduces a) editing and formatting of multiple worksheets simultaneously (working with groups of worksheets), b)

working with cell styles and workbook themes, c) data validation rules to control entries inserted in a spreadsheet, d) using sparklines to visualize data trends in a cell, e) how to separate content from one cell into multiple cells, f) how to merge content from multiple cells into one without losing information, g) the Flash fill tool, h) applying protection to a range of cells/worksheet/workbook/file, i) saving a workbook as a template and creating a new workbook from the saved template, and other Excel tools.

The workbook 'Crew Health Self-Declaration & Daily Temperature Records' includes information of a hypothetical group of seafarers who completed the health self-declaration form concerning Covid-19 and also provided daily morning and afternoon temperature records during August 2020, prior to their travels.

1. How will you handle cell A2 that is merged?
2. Find a quick way to check whether there is any indication that answers per crew member on the health self-declaration form concerning Covid-19 should raise worries. Use the SUM and IF functions (Insert function button, type 'sum', click 'Go', select 'SUM', click OK).
3. Apply the following changes simultaneously to the worksheets 'morning temperatures' and 'afternoon temperatures' (Group Worksheets: activate the first one, press Ctrl+Shift+Page Down OR Ctrl+click on the second worksheet):
 - a. Insert a blank top row (right click on the header of the first row, Insert).
 - b. In the blank row just created, insert the dates from 8/1/2020 to 8/31/2020, starting from cell B1. Use the Autofill tool (type the first two dates in the first two cells, select the cells, drag the fill handle to the last cell you want to fill a date in OR Type the first date in the first cell, select all the cells in the row you want to fill with dates, Home Ribbon tab, Editing Group, Fill, Series).
 - c. Format the cells that include temperatures as numbers with one decimal place (Home Ribbon tab, Number Group).
 - d. Colour the background of cells that contain temperatures in light yellow (Home Ribbon tab, Font Group).
 - e. Apply borders to all cells that contain data (Home Ribbon tab, Font Group).
 - f. Apply a Bold Font Style to all cells in the first row and first column that contain data and colour their background according to your preference (Home Ribbon tab, Font Group).
4. A cell style is a defined set of formatting characteristics, such as fonts and font sizes, number formats, cell borders, and cell shading. Microsoft Office Excel has several built-in cell styles that you can apply or modify. You can also modify or duplicate a cell style to create your own, custom cell style. The advantage of using Styles to format cells is that it saves time since it applies a set of formatting characteristics at one click. Moreover, in case the user decides to change the formatting in specific cells, he/she can just modify the style already applied to those cells and changes will automatically take effect.
 - a. Create a new custom cell style with the formatting features of cell B1 (Home Ribbon tab, Styles Group, New Cell Style).

- b. Apply the style just created to all cells of the first row that contain data (Select the cells, Home Ribbon tab, Styles Group, click on the Style to be applied).
 - c. Modify the fill and number format of the cell style you created (Home Ribbon tab, Styles Group, right click on the Style to be modified, Modify).
- 5. Cell styles are based on the document theme that is applied to the whole workbook. When you switch to another document theme, the cell styles are updated to match the new document theme. A document theme is a set of formatting characteristics like the text fonts, colors, or general look of objects in all worksheets of your workbook. Document themes help the user to format workbooks quickly and also maintain a uniform formatting among files of different Microsoft Office applications (e.g. Excel, Word, PowerPoint).
 - a. Apply the theme 'Organic' to the workbook (Page Layout Ribbon tab, Themes Group, Themes)
 - b. Create a new custom color theme (Page Layout Ribbon tab, Themes Group, Colors, Customize Colors).
 - c. Create a new font theme (Page Layout Ribbon tab, Themes Group, Fonts, Customize Fonts).
 - d. Insert a shape in the worksheet 'morning temperatures' and check the Theme effects (Page Layout Ribbon tab, Themes Group, Effects).
- 6. Apply a data validation rule to prevent entries of morning temperatures less than 35 and greater than 41 (Data Ribbon tab, Data Tools group, Data Validation).
 - a. Show an error warning to the user who inserts a temperature out of the range 35-41.
 - b. Circle Invalid Data.
 - c. Clear Validation Circles.
 - d. Make it impossible for the user to enter a temperature out of the range 35-41.
- 7. Create a drop-down list of crew members' names. Use the list to enter the names in the respective column (Data Ribbon tab, Data Tools group, Data Validation).
- 8. Insert sparklines to visualize each crew member's temperature record over August (Insert Ribbon tab, Sparklines group, Line).
- 9. Use the conditional formatting tool to highlight morning temperatures greater than 37.5.
- 10. Use a function that will check each crew member's daily morning temperature record and return the value 'High' for a morning temperature greater than 37 and the value 'OK' otherwise. Use the Autofill tool to copy the formula to the rest of the cells.
- 11. XLOOKUP and VLOOKUP are lookup functions that can be used to retrieve information from a range of cells or a table given a lookup value. Both functions can look for a value in one column of a range/table and return a value from the same row in another column. However, they differ in the following features:
 - a. VLOOKUP can search only to the right to find an exact or approximate match to the lookup value. So, the lookup value must be in the leftmost column of the range/table. XLOOKUP can search in both directions (left and right) to return an exact or approximate match to the lookup value.
 - b. In VLOOKUP, the return column must be indexed by a number (e.g. column A is indexed by number 1, column B by number 2, etc.). This requires the use of

another function (COLUMN) to index columns in large datasets. In XLOOKUP, the return column is referenced to a range or range name.

- c. VLOOKUP requires the user to specify whether he/she is searching for an exact or approximate match to the lookup value. XLOOKUP searches by default for an exact match and only if the user is looking for an approximate match is there the need that it be specified. Attention! In case an approximate match is searched for, the table/range of cells must be sorted in ascending order by the column that the lookup-value is placed in.

XLOOKUP is a successor of VLOOKUP (Vertical Lookup) and HLOOKUP (Horizontal Lookup) functions. It is available in Office 365. If combined with other functions or additional arguments, it can also return multiple results for the same lookup value, perform reverse searches (from the last value in a range to the first one) or check complex criteria.

- a. Use the VLOOKUP and XLOOKUP functions to find the morning temperature of R.N. on 8/2/2020.
 - b. Use the XLOOKUP function to find the morning temperature on 8/1/2020 of a crew member whose surname begins with a Q (?Q*). Do the same using the VLOOKUP function (?Q* OR "*"&"Q").
 - c. Use the XLOOKUP function to get in a row all morning temperatures for M.R.
 - d. Use the XLOOKUP function to search temperatures per day and get the name of the member of the crew with a high temperature. If all temperatures per day are normal, then have the value 'all ok' returned.
 - e. What if there are more than one crew members with a high temperature per day? (COUNTIF)
- 12.** Calculate the average monthly morning temperature per crew member (Insert Function button, select the function 'AVERAGE' or Home Ribbon tab, AutoSum, Average).
- 13.** Create a function that,
- in case the answers per crew member on the Health Self-Declaration form deviate from normality,
 - will check whether there is at least one indication of high morning temperature per crew member in August.
 - If there is, the function will return the first date that a high temperature per crew member was reported.
 - If not, the function will return the value 'not due to high temperature'.
 - If there is no deviation from normality given the answers in the Health Self-Declaration form, the function will return the value 'ok' (nested XLOOKUP into IF).
- 14.** Place each crew member's first and last name in separate columns using the Flash fill tool (Data Ribbon tab, Data Tools group, Flash Fill). How can you merge the two elements back into a cell using a formula? (=C3&" "&D3).
- 15.** Protect the worksheet 'morning temperatures' with a password, so that no editing besides selection of cells can be made. Cancel the protection (Review Ribbon tab, Protect group, Protect/Unprotect Sheet).

16. Allow only editing (unlocking with a password) of the range of cells that contain temperatures. Cancel the protection (Review Ribbon tab, Protect group, Allow Edit Ranges/Unprotect Sheet).
17. Protect the structure of the workbook with a password. Cancel the protection (Review Ribbon tab, Protect group, Protect/Unprotect Workbook).
18. Encrypt the workbook with a password. Cancel the encryption (File tab, Info, Protect Workbook, Encrypt with Password. To cancel the encryption, delete the password).
19. Save the workbook as a template (File tab, Save As, xltx).
20. Create a new document based on the template (File, New, Personal Templates).

Appendix IV:

A. Microsoft official support pages for the commands used in Part IV

- ✓ [Overview of formulas in Excel](#)
- ✓ [Excel functions \(by category\)](#)
- ✓ [SUM function](#)
- ✓ [IF function](#)
- ✓ [Group worksheets](#)
- ✓ [Fill data automatically in worksheet cells](#)
- ✓ [Apply, create, or remove a cell style](#)
- ✓ [Change the appearance of your worksheet](#)
- ✓ [Apply data validation to cells](#)
- ✓ [Create a drop-down list](#)
- ✓ [Use sparklines to show data trends](#)
- ✓ [Use conditional formatting to highlight information](#)
- ✓ [XLOOKUP function](#)
- ✓ [VLOOKUP function](#)
- ✓ [COUNTIF function](#)
- ✓ [AVERAGE function](#)
- ✓ [Use nested functions in a formula](#)
- ✓ [Using Flash Fill in Excel](#)
- ✓ [Protect a worksheet](#)
- ✓ [Protect a workbook](#)
- ✓ [Protect an Excel file](#)
- ✓ [Save a workbook as a template](#)

B. Further Practice

1. Open the file 'Crew List'.
2. In which ways the formulas, functions and tools introduced in this section can facilitate your daily work activities when using this file?
For example, would you be able to:
 - Use a function to get an indication on whether the sign-off date is greater than the initially estimated sign-off date or not?

- Apply conditional formatting/filtering/sorting tools to quickly filter the results of the function?
- Calculate the time interval in days between two dates?
- Merge the Surname and Name in one column without losing data?
- Quickly find a crew member's sign-off date given his/her identification code?
- Protect the cells that include dates so that no changes are allowed?
- Insert the ranks of crew members using a drop-down list of entries?
- Count how many cells meet specific criteria?