

## Data processing in life sciences

Microsoft Excel 2016

Lecture 2



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2018

## Lecture bonus with Mentimeter

### New bonus system

**Two bonus points** (1%) can be awarded in each lecture if:

1. Providing a valid **full name** at the Mentimeter test
2. **>3 correct answers** out of the 4 online test questions

### Participation:

- Mobile devices with installed Mentimeter application
- Online device with internet access <http://www.menti.com>



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<https://www.eduid.u-szeged.hu/en>

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- [National eduID website](#)
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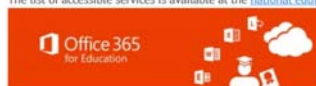
**What is eduID?**

eduID is the user authentication and authorisation federation of the Hungarian educational and research institutions. The aim of eduID is to allow the use of services of its members and partners in a mutually agreed, trusted way. When a user attempts to access such a service, it is their home institution that authenticates them to do and authorisation is based on the user information originating from their home institution.

See: [national eduID website](#)

**What services may be used with eduID?**

The list of accessible services is available at the [national eduID website](#).



**eduID**

Hungarian Research & Education Federation – provided by NIIF Institute

[Office 365 for Education](#)  
[Online Dictionaries of Akadémiai Kiadó](#)

**How can I enter these services?**

First of all, if you are a student or faculty/staff, you have to register into [our University's eduID system](#). If the registration is successful, you will get a username and select a password.

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<https://www.eduid.u-szeged.hu/reg/en>

USz | eduID

14 February 2018, Wednesday



Welcome to the eduID registration website of University of Szeged

- [Account management](#)
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**login**

Username:

Password:

[Forgotten password](#)

**Online registration**

[Neptun](#)

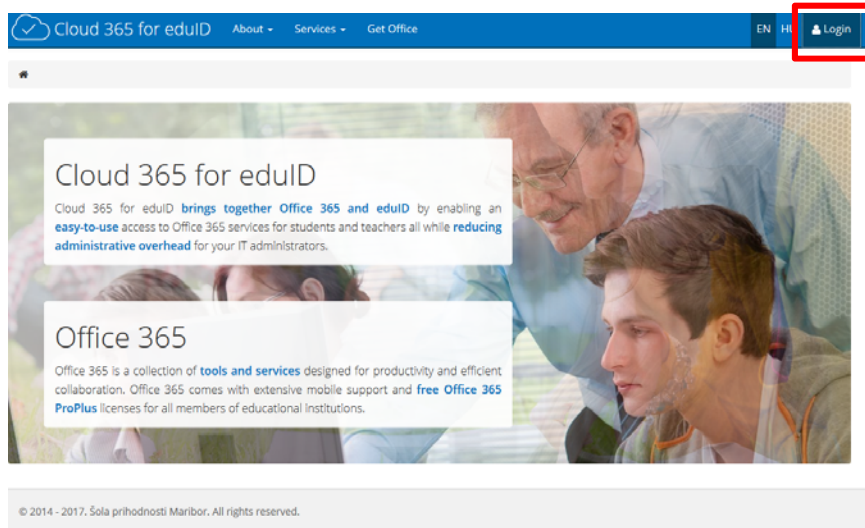
[KleBELSberg Library](#)

[Help Desk registration](#)

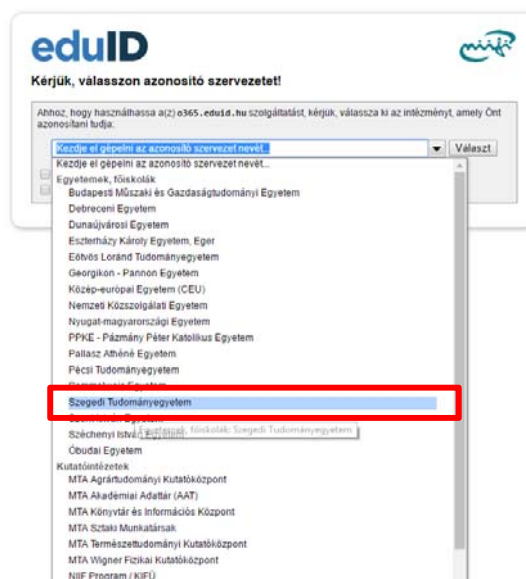
2018 www.eduid.u-szeged.hu- This is a Free Drupal Theme  
 Ported to Drupal for the Open Source Community by [Drupalizing](#), a Project of [More than \(just\) Themes](#). Original design by [Simple Themes](#).

## Access MS Office tools for free

<https://o365.eduid.hu/>



## Access MS Office tools for free



# Access MS Office tools for free

**Cloud 365 for eduID** About Services Get Office EN HU Peták Ferenc Dr.habil.

User center / Dashboard

**User center**  
Welcome to **Cloud 365 for eduID's user center**. You can access all of the **Office 365 services** that you are eligible to use from the links below.

Dashboard Account settings

**Office 365 services**

- Office 365 portal**  
Get to know the most useful services in Office 365.
- OneDrive digital storage**  
Access the digital store where you can store and share your documents.
- SharePoint sites**  
Visit group web sites and access group information.
- Download Office**  
Download and install most recent version of Office software on your computer.
- Outlook webmail**  
Browse your e-mail, calendars, and other information.
- Schedule Lync meeting**  
Organize an online meeting and invite participants.

**User info**

- Peták Ferenc Dr.habil.
- petak.ferenc@o365.u-szeged.hu
- faculty
- 01. 01. 9999
- Account settings
- Multi-factor authentication

# Access MS Office tools for free

Office 365

Szoftver

Office  
Eszközök és bővítmények  
Skype Vállalati verzió  
Mobiltelefonon és táblagépen

**Office**

Az Office 365 ProPlus telepítése az új, 2016-os appokkal (ajánlott)

Ez a művelet a következő appokat telepíti a számítógépére: Word, Excel, PowerPoint, OneNote, Access, Publisher, Outlook, Skype Vállalati verzió, OneDrive Vállalati verzió

Word Excel PowerPoint OneNote Access Publisher Outlook Skype Vállalati verzió OneDrive Vállalati verzió

Nyelv:  Verzió:

Nem a megfelelő nyelvet látja? Telepíts a fenti listában felsorolt nyelvek egyikét, majd telepítsen egy nyelvi kiegészítő csomagot. A további nyelvek és nyelvi kiegészítő csomagok nem számláltak bele a telepítési korlátba.

[Rendelje meg a nyelvi kiegészítő csomagot](#)  
[Telepítse a nyelvi kiegészítő csomagot](#)

**Telepítés**

Az Office 365 ProPlus telepítése a 2013-as appokkal [Mentse telepítésem az Office 2013-as!](#)

## Main topics

1. Formula, reference types
2. Fill handle
3. Excel functions
4. Sorting and filtering
5. Charts
6. Pivot table, pivot chart

## Entering formula – arithmetic operations

- The formula is a mathematical expression that calculates a value
- Formulas always begin with „=„ sign
- The order of precedence is a set of predefined rules – in accordance with elementary mathematics
- Operator symbols:
  - Arithmetic: + - \* / ^ ( )
  - Comparison: = > >= < <= <>
  - Text concatenate: &



*"Those who can, do. Those who cannot, teach. Those who cannot teach, develop spreadsheets."*



## Reference types

- **A reference identifies a cell or a range of cells on a worksheet**

- **C13** - the cell in column C and row 13
- **C1:D10** - the range of cells C1 through D10
- **C1,D10** – C1 and D10 cells only!
- **3:3** - all cells in row 3
- **3:13** - all cells in row 3 through 13
- **C:C** - all cells in column C
- **Sheet2!C13** - refers to the worksheet named Sheet2

- References are **not case-sensitive**

	A	B	C	D	E
1	1	3		=A1	=B1
2	2	4		=A2	=B2
3					

## Reference types

- **Relative reference: e.g. A1, C3:D6**

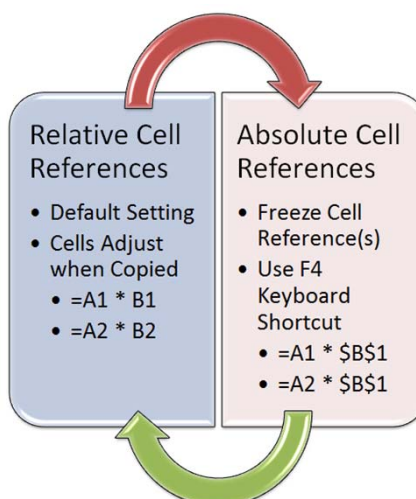
- Based on the relative position of the cell that contains the formula and the cell the reference refers to
- **Copy** → the reference automatically adjusts

	A	B	C	D	E
1	1	3		=A1	=B1
2	2	4		=A2	=B2
3					

## Reference types

- **Absolute reference: e.g. \$A\$1, \$C\$3:\$D\$6**
  - Always refer to a cell in a specific location
  - **The absolute reference does not adjust**
- **Mixed reference: \$A1, A\$1**
  - Either an absolute column and relative row, or absolute row and relative column. If you copy or fill the formula across rows or down columns, **the relative reference automatically adjusts**, and **the absolute reference does not adjust**
- Each push of **F4** will toggle the reference type

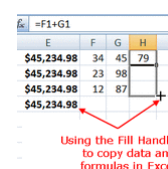
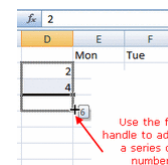
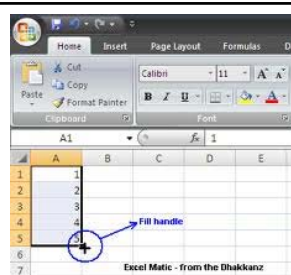
## Absolute and relative references



<http://www.thecompanyrocks.com/>

## The fill handle

- **Small black dot or square in the bottom right corner of the active cell**
- The use of the fill handle depends on the active cell content:
  - If the active cell content is a number or text
    - **Auto Fill** other selected cells with the next items in the series
  - If the active cell content is a formula or function
    - **Copy cell content** to adjacent cells
- Use: click on it with the mouse pointer to drag select adjacent cells.
- Special use:
  - Double click: fill until the last cell on the left



## Use Excel functions

- The Excel function is a predefined (built-in) formula for commonly used data processing
- General syntax of the Excel function:

**=FunctDef(argument<sub>1</sub>, argument<sub>2</sub> ... argument<sub>n</sub>)**

Defines the function  
has to be performed

e.g. **=average**  
**=count**  
**=stdev**

Numbers, text, cell references used  
by the function

Some arguments are optional  
Some functions has no arguments



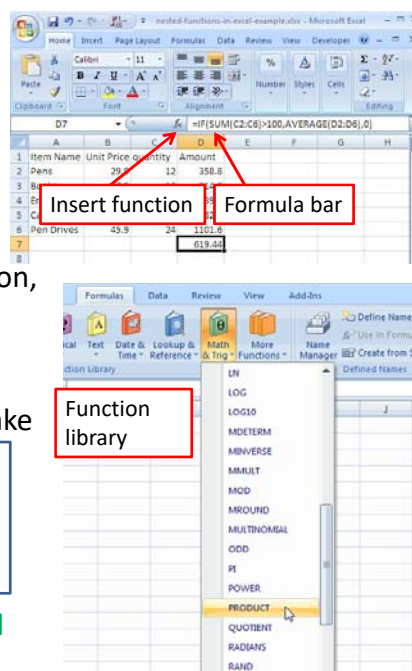
„There are two ways to develop error-free spreadsheets. Only the third one works. „





## Use Excel functions

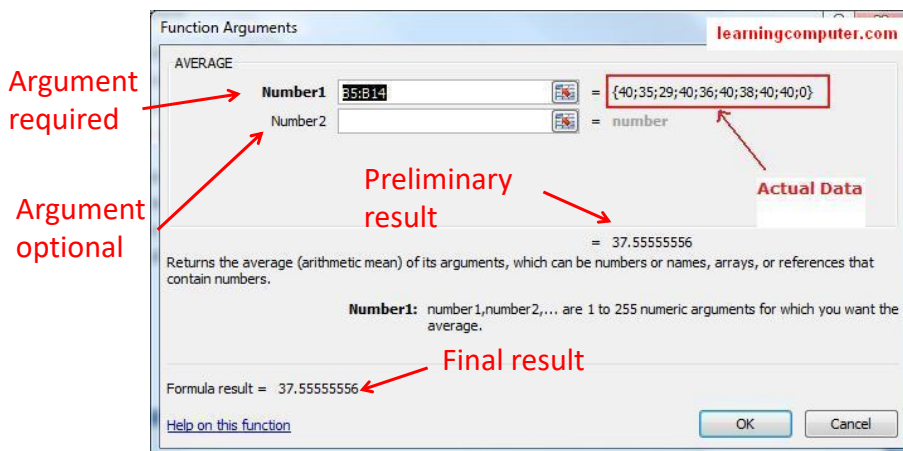
- Excel supplies more than 350 functions organized into 10 categories
  - Database, Date and Time, Engineering, Financial, Information, Logical, Lookup, Math, Text and Data and Statistical
- Entering a function:
  - Manual (typing) – risk for a mistake
  - Insert function button on the Formula bar
  - Formulas tab – Function library group



Recommended to avoid mistakes and have description

## Use Excel functions

After selecting the appropriate function



## Sorting, ranking

### Why sorting?

- Easier to follow the sorted data
- Easier to find a specific information (name, group, treatment, outlier data, etc)
- Helps discovering data entry errors
- Excel help sorting in ascending (increasing) or descending (decreasing) orders



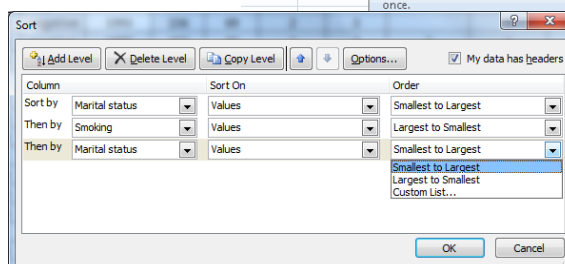
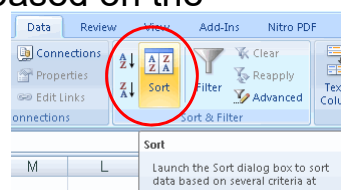
## Sorting

Before sorting: make sure: all data are selected, or a cell is selected within a continuous table!

Tip: a continuous table is sorted based on the category of the selected cell

### Made in 2 steps:

1. Select data in the worksheet to be sorted (sorting will be based on the current column)
2. Data/Sort and Filter
  - Ascending
  - Descending order





## Filtering



- Working with a subset of data selected from the original data base
- A filtered range displays only the rows that meet the criteria
- Unlike sorting, filtering does not rearrange the data
- Temporarily hides the rows that are not intended to display



- Select the Filter option, from the Sort & Filter ribbon in the Data tab.

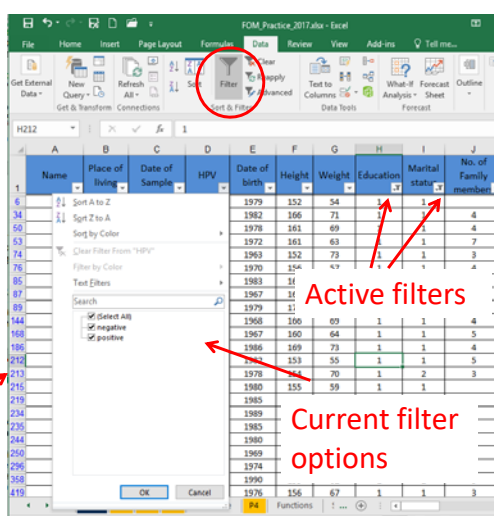


## Filtering - Autofilter



- Find and work with a subset of data
- After filtering
  - reapply a filter to get up-to-date results
  - clear a filter to redisplay all of the data.

Subset of data



# Working with charts

Quantitative data in life sciences can be represented as:

## Text

elevations in EDVLP ( $8.4 \pm 0.2$  mmHg vs.  $18.4 \pm 1.7$  mmHg in groups I and C, respectively,  $p < 0.001$ ), indicating the occurrence of left-ventricular failure.

The presence of coronary ischemia during the repeated measurements (performed 4 weeks after the first phase of the study) did not have a significant effect on the baseline values of  $R_{\text{DO}}$

( $48.9 \pm 4.0$  cmH<sub>2</sub>O s/l vs.  $46.6 \pm 2.1$  cmH<sub>2</sub>O s/l respectively;  $p = 0.6$ ), G ( $878 \pm 48$  cmH<sub>2</sub>O  $p = 0.6$ ) or H ( $2694 \pm 113$  cmH<sub>2</sub>O/l vs. 2703

The arterial and respiratory flow was?

## Table

Table 1. Demographic, Anesthesiometric, and Clinical Characteristics of Patients

	CPR (n = 14)	OPCAR (n = 18)
Age (years)	47 ± 2.5 (16-80)	
Weight (kg)	76 ± 3 (58-101)	
Height (cm)	163 ± 2.5 (149-180)	
BMI	29 ± 1.2 (23.6-37.6)	
Sex (M/F)	10/0	
Anesthesia time (minutes)	204 ± 13 (145-300)	
Surgery time (minutes)	163 ± 16 (130-240)	
Perfusion time (minutes)	93 ± 11 (52-219)	
Reperfusion time (minutes)	30 ± 10 (10-140)	
Aortic clamping time (minutes)	30 ± 4.2 (21-60)	
FVC (%)	84.7 ± 3.6 (71-119)	
FEV <sub>1</sub> (%)	79.9 ± 5.1 (51-109)	
BIC (ml)	176 ± 105 (50-340)	
FFP (ml)	2 patients received 400 and 800 ml, respectively	
Total fluid balance (ml)	2,763	(1,050-4,900)
Smoking (Y/N/E/O)		(3/13/1)

Values are mean ± standard error (minimum-maximum). BMI = body mass index; CPR = cardiopulmonary bypass; FEV<sub>1</sub> = forced expiratory volume in 1 second; FVC = forced vital capacity; OPCAR = off-pump coronary artery bypass; BIC = transfusion of packed Red Blood Cells and hypotensive therapy; and FFP = fresh frozen plasma.

## Chart

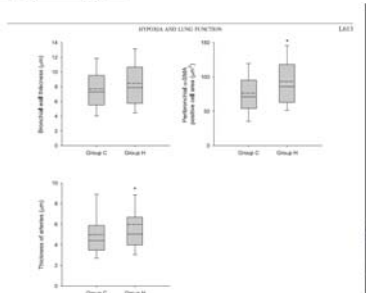
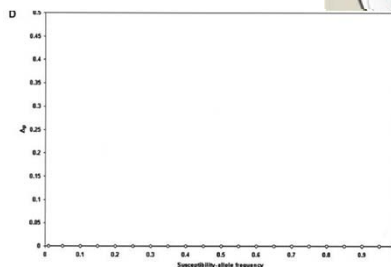
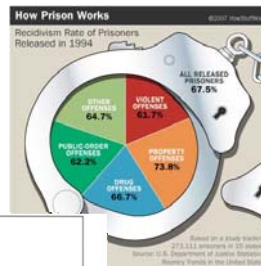
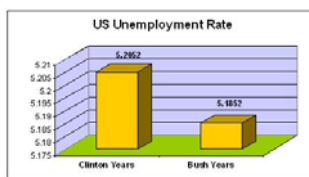
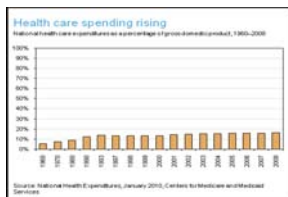


Fig. 4. Assessment of the long-term left ventricular load in the control group (Group C) and in the test group in chronic coronary ischemia (Group H). The frequency of the test results is shown in the top plot (the 100 patients). The box within the box shows the median and the frequency of the test results from each side of the 25th percentile. From the bottom plot, the box within the box shows the median and the frequency of the test results from each side of the 25th percentile. From the bottom plot, the box within the box shows the median and the frequency of the test results from each side of the 25th percentile. From the bottom plot, the box within the box shows the median and the frequency of the test results from each side of the 25th percentile. From the bottom plot, the box within the box shows the median and the frequency of the test results from each side of the 25th percentile.

# Keep your charts informative rather than decorative!

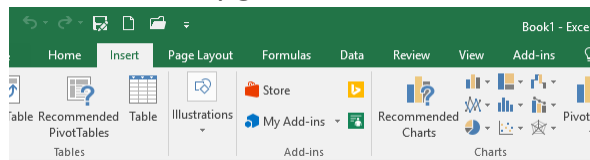


Wittke-Thompson et al, Am J Hum Genet 76: 967-986, Fig 1

"Effective is not the same as beautiful"

## Working with charts

- A chart can be embedded in an existing worksheet or can be created on a separate worksheet
- Access: Insert tab/Charts



- Steps to create a chart:
  0. Think and plan!
  1. Select the data range (data series)
  2. Select chart type
  3. Insert chart at the specified location
  4. Choose chart options („Layout” and „Design” tabs)
  5. Change chart style, location, size

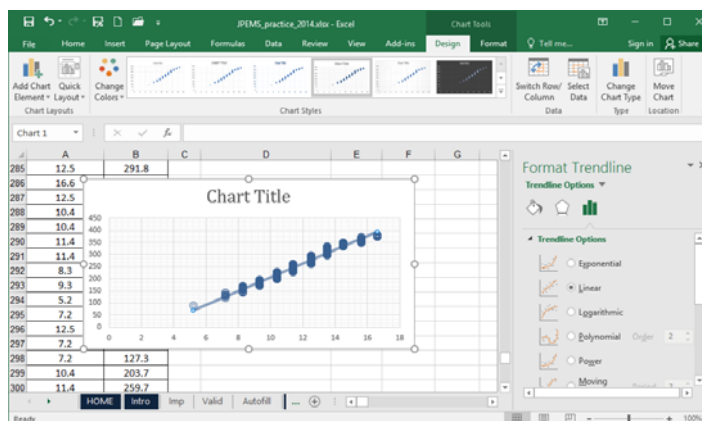


## Working with charts

Trend and regression analyses are often performed in **life sciences**

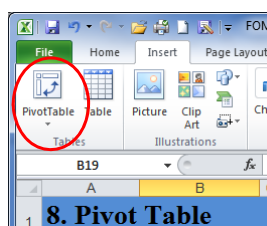
**Adding trendline:**

- Linear regression
- Best fit line
- Regression coefficient
- Curve fitting



## Pivot table

- Summarization tool found in data visualization programs such as **spreadsheets** or business intelligence software.
- To **analyze** numerical **data** in depth and to answer unanticipated questions
  - Lists data in categories
  - Computes summary statistics for those categories
  - Pivot chart to display output



## Pivot table - Example

“Is HPV positive test related to the education level or smoking?”

**Create PivotTable**

Choose the data that you want to analyze

Select a table or range

Table/Range: DATA[SAS1]!\$A:\$A15661

Use an external data source

Choose where you want the PivotTable report to be placed:

New Worksheet

Existing Worksheet

Location: '9.Pivot1'!\$A\$17

OK

Whether the HPV positive test is related to the education level

Count of Height	Column Labels	1	2	3	4	(blank)	Grand Total
Row Labels	HPV	6	10	21	12	3	52
	Smoking	6	9	18	5	2	40
	Grand Total	12	19	39	17	5	92

Education level →

No smoking →

Smoking →

Number of patients →

**PivotTable Field List**

Choose fields to add to report:

HPV

Date of birth

Height

Weight

Education

Marital status

No. of Family members

Type of nutrition

Coffee

Drag fields between areas below:

Report Filter

HPV

Column Labels

Education

Row Labels

Smoking

Σ Values

Count of Height

Update

## Pivot chart - Example

“Is HPV positive test related to the education level or smoking? “

