

CSE 123

Introduction to Computing

Course Overview

SPRING 2012

Assist. Prof. A. Evren Tugtas



Course Goals

- This course focuses on computational methods for engineering and scientific applications.
- Emphasis is focused on the use of spreadsheet for data analysis and use of a programming software to solve problems.
- Assignments cover programming concepts, data analysis and selected advanced topics.
- The Visual Basic programming language is used.

Learning Outcomes

1. Use advanced functions and tools in Excel to perform data analysis.
2. Learn core concepts of software development in VBA.
3. Use of VBA programming software to solve scientific and engineering problems.

Weekly Program

WEEK	Date	TOPICS
Week 1	14 Feb-16 Feb	Entering and Editing Worksheet Data and Data Validation
Week 2	21 Feb-23 Feb	Creating Charts with Excel and Working with Formulas and Functions
Week 3	28 Feb – 1 Mar	Matrix Operations
Week 4	6 Mar -8 Mar	Linear Regression and Curve Fitting
Week 5	13 Mar -15 Mar	Statistics Functions and Iteration
Week 6	20 Mar – 22 Mar	Pivot Tables Data Analysis Using Goal Seeking and Solver and Analysis ToolPak
Week 7	27 Mar – 29 Mar	External Data Sources and User Written Functions in Excel
Week 8	31 Mar - 8 Apr	Midterm Exam
Week 9	10 Apr-12 Apr	Programming with VBA (Projects, forms, modules, flowcharts, elements of programming)
Week 10	17 Apr – 19 Apr	Language Elements, Data Types, Range Objects
Week 11	24 Apr – 26 Apr	Built-In and Custom VBA Functions
Week 12	1 May – 3 May	Decision Structures (If-Then Structure, Select Case Structure, Error handling techniques)
Week 13	8 May – 10 May	Loops and Arrays (For-Next, Do-While, Do-Until)
Week 14	15 May – 17 May	Dialogue boxes and User forms
Week 15	22 May – 24 May	VBA Programming Exercises

Textbooks and other references

- **Larsen, R.W. Engineering with Excel. 3rd ed. New Jersey. Prentice Hall. 2009. *ISBN: 0-13-601775-4. (Textbook)***
- Walkenbach, J. Microsoft Excel 2010: Bible. 4th ed. Indiana. Wiley. 2010. *ISBN: 978-0470474877*
- Billo, E. J. Excel for Scientist and Engineers: Numerical Methods. Wiley. 2007. *ISBN: 978-0471387343*

Lab Sessions

Thursday 09:00 – 11:00

Thursday 11:00 – 13:00

MC566

Academic Honesty

- You may collaborate on understanding lectures, labs, and even homework problems.
- You may discuss your homework program if you get stuck at certain points.
- However, you must then do your homework yourself.
Do not attempt to copy homeworks from each other.

Grading

Evaluation Tool	Quantity	Weigh in total (%)
Midterm Exam	1	30
Laboratory Applications	10	30
Final	1	40

Office Hour – Lecture Notes

- Office → MD 119
- Office Hour → Monday 14:00 – 16:00
- Lecture Notes:
- eng.marmara.edu.tr → Bölümler → Çevre Müh
→ Lisans Programı → ders sayfaları

[http://eng.marmara.edu.tr/bolum/171702/Lisans Programı/sayfa/646/ders-sayfalari](http://eng.marmara.edu.tr/bolum/171702/Lisans_Programi/sayfa/646/ders-sayfalari)

- We will have laboratory sessions, however, you like you can bring your laptops to class.

CSE 123

Introduction to Computing

Lecture 1

Entering and Editing Worksheet Data and Data Validation

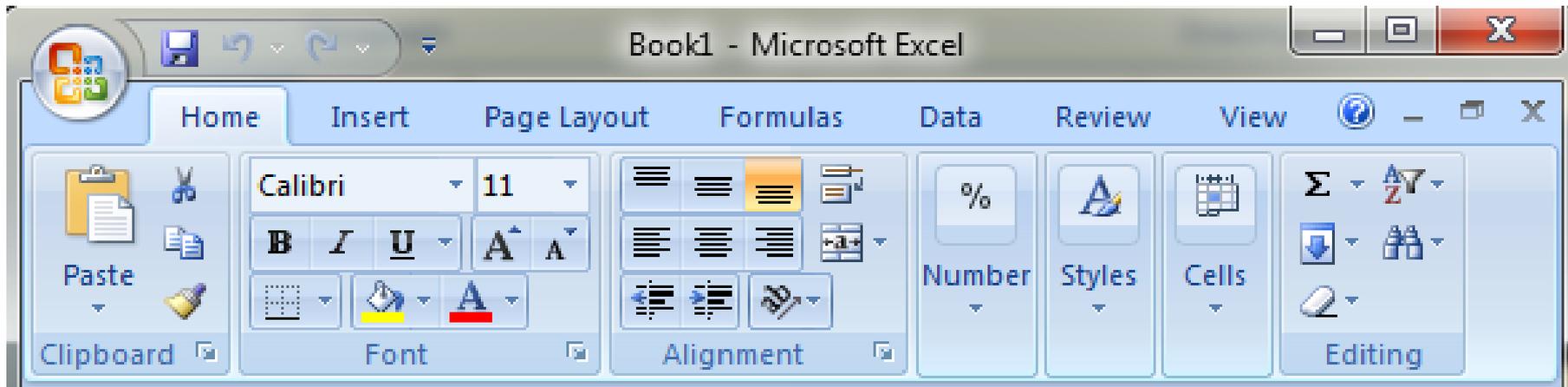
SPRING 2012

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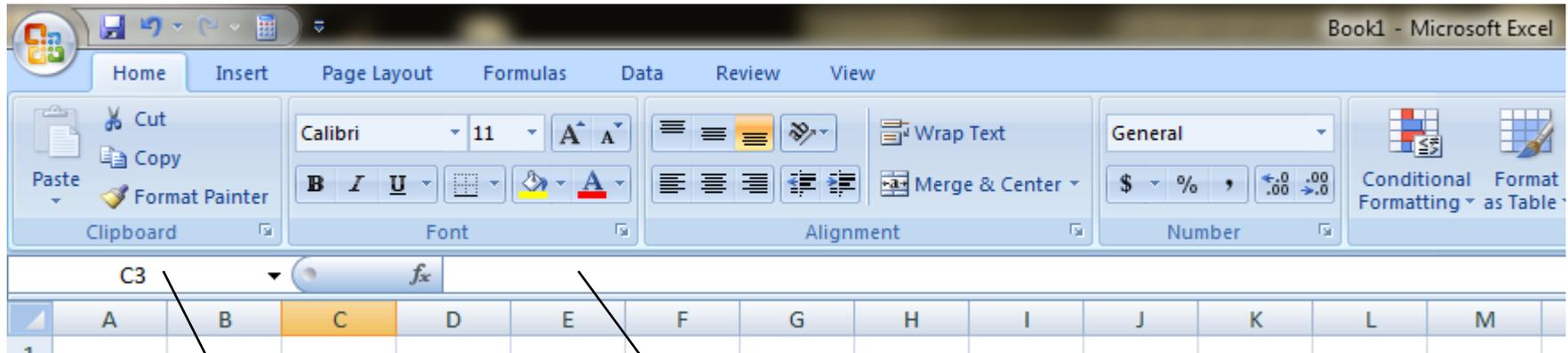
- Course notes have been prepared using some of the information in;
- Larsen, R.W. Engineering with Excel. 3rd ed. New Jersey. Prentice Hall. 2009. *ISBN: 0-13-601775-4*. (Textbook)
- Walkenbach, J. Microsoft Excel 2010: Bible. 4th ed. Indiana. Wiley. 2010. *ISBN: 978-0470474877*

The Ribbon



- The ribbon is formed of tabs
- You can access the ribbon using your keyboard, just press the “Alt” key to popup the keytips
- You can customize the Quick Access toolbar
- If you want to hide the ribbon just double click on any tab

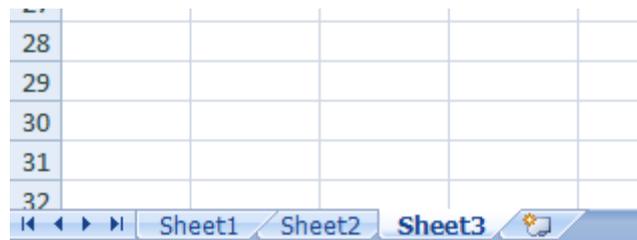
Formula Bars and Worksheets



Name Box

Formula Box

- Workbook, Worksheets (tag names)



Status Bar and View Selectors



Status Bar

Ready Mode

Enter Mode

Edit Mode

Point Mode

View Selectors

- To move between the sheets
“Control pagedown, pageup”

Entering and Editing Worksheet Data

- Each worksheet is made up more than 17 billion cells, which can hold three types of data
 - A numeric value
 - Text
 - A formulae
- Excel is precise up to 15 digits.
 - If you enter a 20 digit number, Excel only stores 15 digits.
 - It substitutes “zero” for the last digit
- **Do we use more than 15 digits in our daily lifes ?**

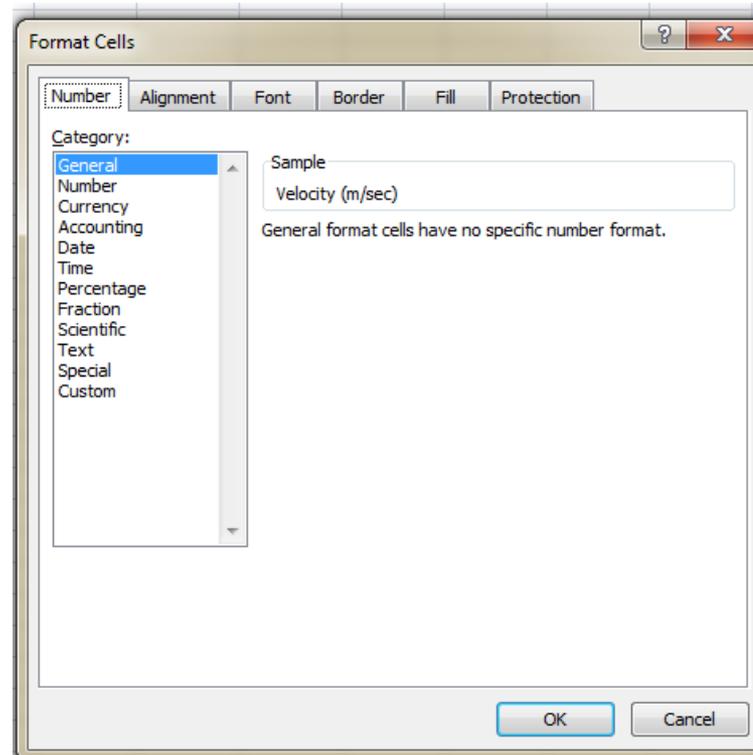
Entering and Editing Worksheet Data

- A cell can contain 32,000 characters
- If your text is longer than the current width of your cell;
 - Increase the width of the column
 - Use wrap text to toggle wrapping on and off

Entering and Editing Worksheet Data

Time, d	Concentration of A, mg/L
0.00	341
0.19	333
0.29	315
0.63	260
0.85	113
1.19	1
2.42	1
4.29	0

- Formating **EXAMPLE 1**
- Entering a column
- Text Wrapping (Alt-Enter)



Simple Calculations

Time, d	Concentration of A, mg/L	Molecular Weight of A (g/mol)	[A], M
0.00	341	60	
0.19	333	60	
0.29	315	60	
0.63	260	60	
0.85	113	60	
1.19	1	60	
2.42	1	60	
4.29	0	60	

- Simple Calculations
- Fill handle

	Monday
9:00	

EXAMPLE 2

- Auto-filling

Relative and Absolute Cell Addressing

- You can make any address absolute by including dollar signs in the address;
- $\$B5$ → Column B is absolute, Row 5 is relative
- $\$B\5 → Column B is absolute, Row 5 is absolute
- $B\$5$ → Column B is relative, Row 5 is absolute
- Pressing [F4] also adds dollar signs

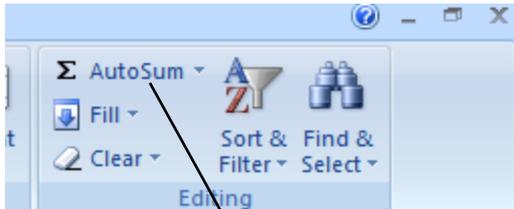
EXAMPLE 3

Naming Cell Ranges

- When you name a cell, the given name can be used in the formula instead of \$ signed cell address.
 - You can also assign names to Cell ranges
 - You can remove the assigned names
- Formulas → Name manager

EXAMPLE 4

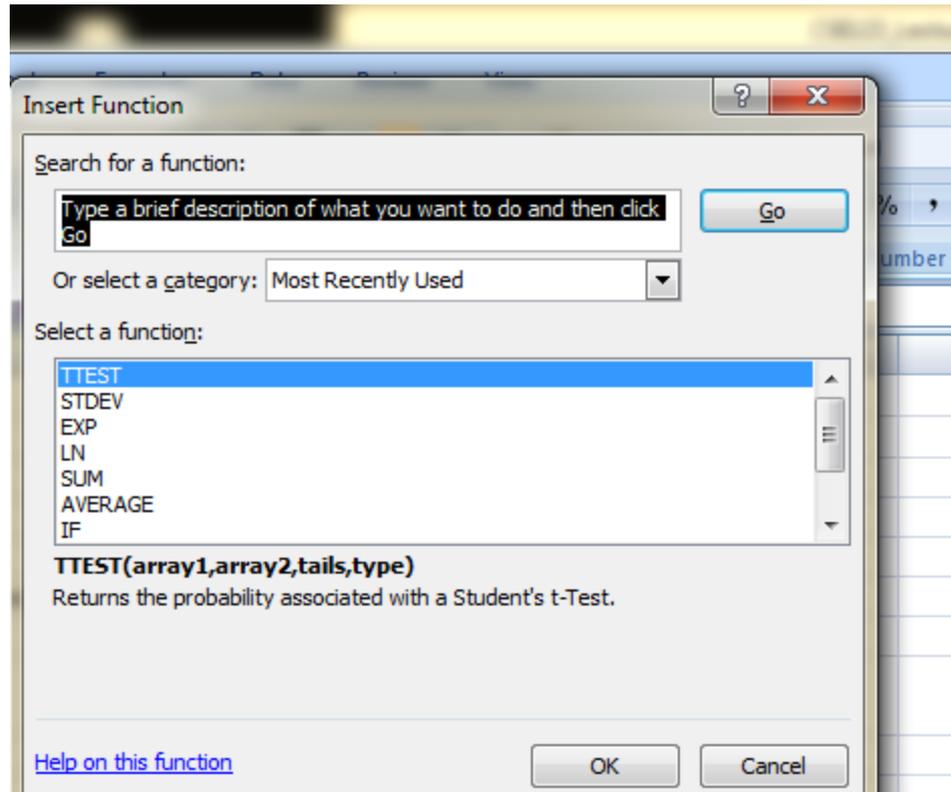
Built-in Functions



Excel's built-in functions are located here.

- $AVG()$
- $STDEV()$
- $PI()$

EXAMPLE 4



Conditional Formatting

- Particular format attributes are applied only if certain conditions is met.
- You can clear the conditional formatting

EXAMPLE 4

Clipboard Group and Sorting Data

- Cut (Ctrl X)
- Copy (Ctrl C)
- Paste (Ctrl v)

- Sort the data in Example 4 from lowest to highest

EXAMPLE 4

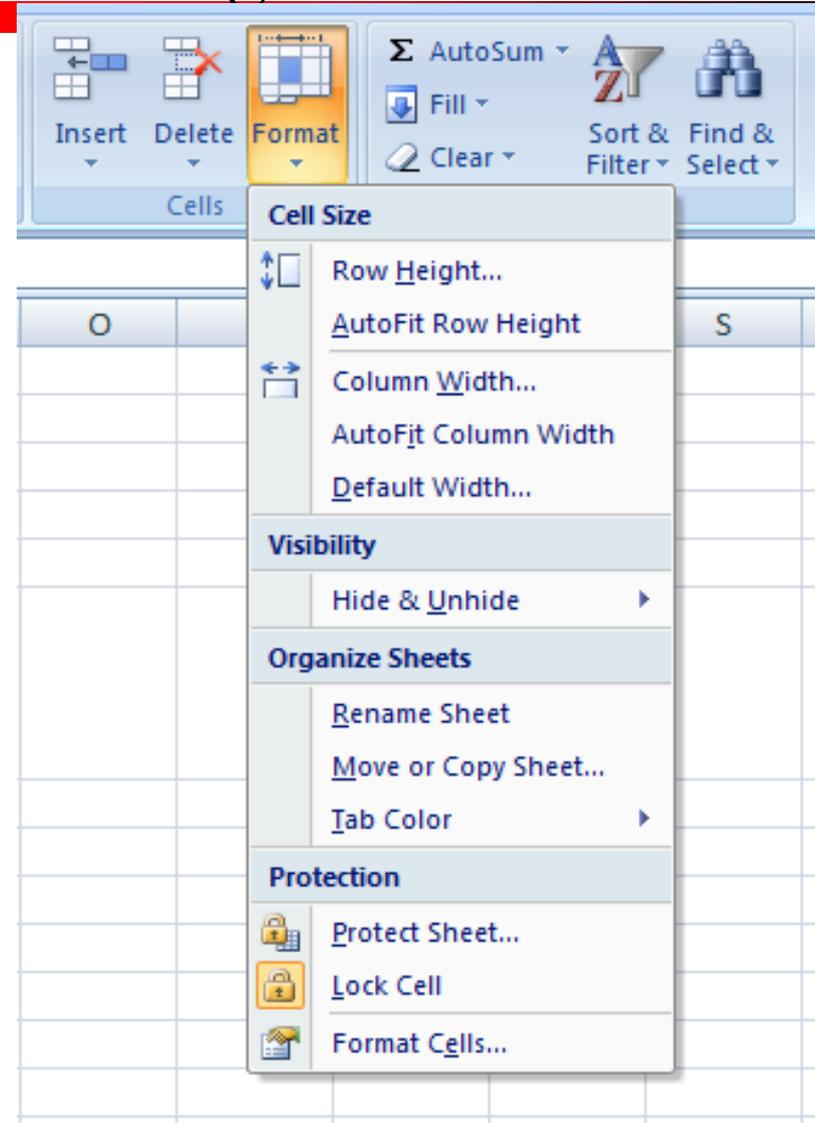
Formatting as Table and Sorting Data

- Format the data in Example 4 as table
- Sort the data in Example 4 from lowest to highest
- Enter “Table/Totals” row (right-click anywhere on the table and select Table/Totals row)
- You can deactivate the defined table

EXAMPLE 4

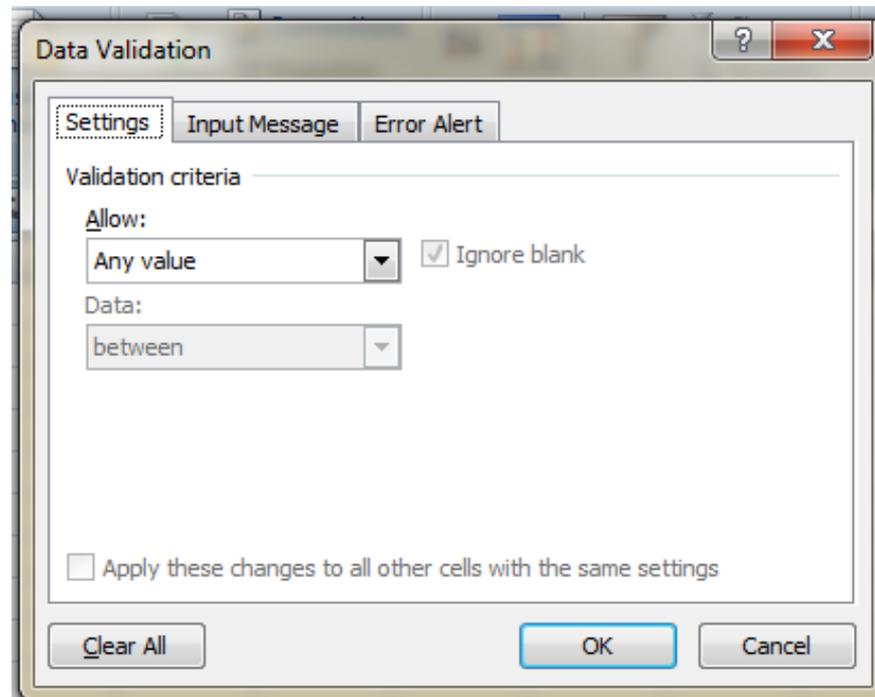
Locking Cells and Protecting Sheets

- You can lock your cells, however you need to protect your sheet to prevent access to your locked cells.
- Home/Cells/Format



Data Validation

- Data validation enables user's to add dynamic elements to a worksheet without using macro programming.
- Data → Data tools → Data validation



Data Validation

- Data validation can be used for;
 - Whole numbers
 - Decimal numbers
 - List
 - Date
 - Time
 - Text Length
 - Custom (you must supply a logical formula – TRUE FALSE)

Data Validation

- Excel can draw circles around the invalid entries

13		
14	92.59	36.36
15	185.19	36.36
16	555.56	54.55
17	370.37	54.55
18	92.59	18.18
19	92.59	36.36
20	370.37	290.91
21	277.78	363.64
--	---	---

EXAMPLE 5

- A drop-down list with an input message can be created using data validation
 - Enter the list of items into a single row
 - Select the cell which will contain dropdown menu
Data → Data tools → Data Validation

- Select List

EXAMPLE 6

Using Formulas with Data Validation

- The formula should contain logical returns either TRUE or FALSE

EXAMPLE 5

- Look at logical and information functions at handout 1
- ISODD(): Returns TRUE if the number is odd.
 - Select the range which will contain your data
Data → Data tools → Data Validation
 - Select Custom

Data Validation

- Accepting text only =ISTEXT()
- Accepting larger values than the previous cell =
C2>C1
- Accepting nonduplicate entries only
=COUNTIF(\$A\$2:\$D\$30, A2)=1
- Accepting text, which begins with a specific character and has exactly 8 characters
=LEFT(A2)="p"
- =COUNTIF(A2,"P???????")=1

Data Validation

- Accepting values that do not exceed the total
 $=\text{SUM}(\$A\$2:\$A\$10) \leq A11$
- e.g. Budget

Creating a dependent list

- Let's say doing a research on polluted soil and you want to create a list in Excel
- Create dropdown menu for 3 types of pollutants
 - 1) Heavy metals
 - 2) Solvents
 - 3)Pesticides
- Create dropdown menu for pollutants
 1. Cu, Pb, Fe, Hg
 2. Benzene, chlorinated solvents, phenols
 3. PCB, organophosphorous pesticides, organonitrogen pesticides

EXAMPLE 7

Creating a dependent list

- Use named ranges
- Data validation in the dependent list uses the following formula
- INDIRECT ()
- Example 7:

15	Second list should be dependent on the first list				
16					
17		HeavyMetals	Solvents	Pesticides	Pesticides
18		Cu	Benzene	Organophosphorous pesticide	organonitrogen pesticides
19		Pb	chlorinated solvents	organonitrogen pesticides	Organophosphorous pesticide
20		Fe	Phenols	PCB	organonitrogen pesticides
21					PCB