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


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

<table>
<thead>
<tr>
<th>Evaluation Tool</th>
<th>Quantity</th>
<th>Weigh in total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midterm Exam</td>
<td>1</td>
<td>30</td>
</tr>
<tr>
<td>Laboratory Applications</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Final</td>
<td>1</td>
<td>40</td>
</tr>
</tbody>
</table>
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-sayfaları

- 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

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Course notes have been prepared using some of the information in:

The Ribbon

- The ribbon is formed of tabs
- You can access the ribbon using your keyboard, just press the “Alt” key to pop up 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

- Workbook, Worksheets (tag names)

![Excel interface with Formula Bars and Worksheets](image-url)
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

#### EXAMPLE 1

<table>
<thead>
<tr>
<th>Time, d</th>
<th>Concentration of A, mg/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>341</td>
</tr>
<tr>
<td>0.19</td>
<td>333</td>
</tr>
<tr>
<td>0.29</td>
<td>315</td>
</tr>
<tr>
<td>0.63</td>
<td>260</td>
</tr>
<tr>
<td>0.85</td>
<td>113</td>
</tr>
<tr>
<td>1.19</td>
<td>1</td>
</tr>
<tr>
<td>2.42</td>
<td>1</td>
</tr>
<tr>
<td>4.29</td>
<td>0</td>
</tr>
</tbody>
</table>

- Formatting
- Entering a column
- Text Wrapping (Alt-Enter)
### Simple Calculations

<table>
<thead>
<tr>
<th>Time, d</th>
<th>Concentration of A, mg/L</th>
<th>Molecular Weight of A (g/mol)</th>
<th>[A], M</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>341</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>0.19</td>
<td>333</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>0.29</td>
<td>315</td>
<td>60</td>
<td></td>
</tr>
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</tr>
<tr>
<td>4.29</td>
<td>0</td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>

### Example 2

- Simple Calculations
- Fill handle
- Auto-filling
Relative and Absolute Cell Addressing

- You can make any address absolute by including dollar signs in the address;
  - $B5 \rightarrow \text{Column B is absolute, Row 5 is relative}
  - $B$5 \rightarrow \text{Column B is absolute, Row 5 is absolute}
  - B$5 \rightarrow \text{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.
- \( \text{AVG}(\) 
- \( \text{STDEV}(\) 
- \( \text{PI}(\)

EXAMPLE 4
Conditional Formatting

- Particular format attributes are applied only if certain conditions is met.
- You can clear the conditional formatting
Clipboard Group and Sorting Data

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

- Sort the data in Example 4 from lowest to highest
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)
Excel can draw circles around the invalid entries.

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.
Using Formulas with Data Validation

- The formula should contain logical returns either TRUE or FALSE

- 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

EXAMPLE 5
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
Creating a dependent list

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