

<b>Title of the course:</b>	<b>Introduction to Programming (Algorithms)</b>		
<b>Course ID:</b>	VE-MIT003		
<b>Level of education:</b>	Erasmus	<b>Academic semester:</b>	Optional
<b>Professor's name:</b>	Dr. Gabor FACSKO, PhD	<b>Academic title: assistant professor</b>	
<b>Hours per semester:</b>	26	<b>Credits:</b>	4
<b>Exam:</b>	Practical exam	<b>Pre-requisites:</b>	Attending courses and solving homeworks/ signature

### Aims of the course

Learning the basics of programming for BSc in Computer Science students using a modern programming language (C#) and a software developing environment (MS Visual Studio). Developing algorithmic problems solving abilities. The Object Oriented (OO) technologies will not be discussed, however, the course will use the OO services during solving simple tasks.

### Course outline

**Topics, introduction, development environment** What is the source and how does it work? Introduction to programming languages. The parts of the development environment (recent projects, solution explorer). Creating a new project. (and project directory. The location of exe and cs files. Tabulation using tab, and shift + tab. Console.WriteLine() command. Error list, error messages. Stop using Console.ReadLine(). Main method. Understanding Using System, namespaces, and classes. Sequence. Build/Debug differences.

**Comments** Switching off the "Save new projects when created" option. Creating namespaces is not obligatory. Comments (//, /\* \*/). Escape-sequences: \t, \n, Environment.NewLine. Console.Write(); Console.ReadKey();

**Variables** Numbers: int, byte types. Text type: string (char array), char. Declaration of variables: number: "= number", string: "=string", character " = 'c' ". Logical: bool. The size of variables. Write of variables. Multiple variable declarations in a line using ',' as a separator.

**Operators** Value assignment from right to left. There cannot be two variables with the same name. Append (writeline + operator). Value assignment operator: =. Mathematical operators: + - \* / %. Checking whether the number is even using the % operator. Relation operators. Using If for presenting relational operator. F11 Step into, the Locals window. Logical operators! || &&. Shorten operators.

**The for-cycle** The for cycle (presenting step by step, F11). Variables exist inside the cycle core. Printing 10 words using cycle. Printing the first 100 numbers using cycle. Interactive example. Exercise for practicing: (1) The sum of the first n even, odd, and divisible by 13 numbers. (2) Celcius to Fahrenheit, Fahrenheit to Celsius conversion. (3) Is a number even or odd?

**The while- and the do-while cycles** The while-cycle. Example for infinity cycle. Interactive example-(the sum of the first 100 numbers using a while). The do-while cycle. While (true).

**Input to the program. Solving second-order equations. Goto, sum, if, and switch.** Console.ReadLine(). Double variables. Math.Sqrt. Goto, the thesis of the sum. More about the if and switch statements. Refactor/rename. Developing a calculator using the switch.

**Auxiliary commands. Error handling basics. Arrays. Embedded cycles.** Console.BackgroundColor; Console.Beep; Console.Clear; Console.CursorVisible; Console.ForegroundColor; Console.ResetColor; Console.SetCursorPosition; Console.Title; Console.WindowHeight; Console.WindowWidth; Console.SetWindowSize. Error handling using while and do-while cycles. Try-Catch (Exception). 1D array, or vector. Declaration of an array, referring to its elements, initialization of its elements one by one. Embedded (multiple) cycles.

**Random numbers. The theses of sum, count, selection, maximum, and minimum selections.** Generation of random numbers. The thesis of the sum. Theses of count and selection. Searching the maximal and minimal element of an array.

**Sorting array and string handle** Sorting arrays in descending and ascending orders. Quicksort. Array.Sort(arrayname). More string handle, examination of char type. Many examples.

**Files** Read and write files. The classes of the System.IO namespace: StreamReader, StreamWriter, and some of their methods: File.ReadAllLines, File.ReadAllText, File.WriteAllLines, File.WriteAllText. The types of the System.Text.Encoding class and their application.

**Functions, snippets. List, ArrayList. Formated print, operator with three parameters..** Functions, methods. Void functions. Snippets. System.Collections.Generic.List, System.Colleitions.ArrayList. Formated print. Using ternary operator.

### Practical works

C# programming, MS Visual Studio. The lecturer gives a presentation on a previously prepared task. Later the students will prepare and submit three programming exercises. The lecturer and the students solved an exercise based on the material of the previous lecture.

### Requirements and assessment

- Participation in the course (max three lectures can be missed)
- Activity during the courses
- Submitting the three home exercises
- Passing the test at the end of the semester

Recommended topics for essay (if it needs)

### Grades:

Insufficient (1), Satisfactory (2), Average (3), Good (4), and Excellent (5)

### Readings

N/A – The textbooks are in Hungarian.