

**APPROVED**  
by the Senate in VUC  
decision \_\_\_\_\_  
on \_\_\_\_\_, 2018

**Visual Programming Languages (ENG)**  
**Vizuālās programmēšanas valodas (LV)**

Course short name: VPL2018

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LAIS course code	
Form of evaluation	Exam
Academic credit points (ECTS credit points)	6 ECTS
The total number of contact lessons	32
The number of lectures	8
The number of practical classes	24
Prerequisites	Basic programming skills, Object-Oriented programming basics, Experience of JAVA or C/C++ programming language
Part of the study program	Current issues in the study (required base courses)

**Introduction and objective of the study course**

This is a practical course made to introduce the students with the capabilities of modern visual programming languages in software engineering for a target user.

The main objective of this course is to introduce students to Microsoft Visual Studio IDE, .NET platform, C# programming language and various related advanced technologies, to provide an understanding of the advantages and disadvantages of the technology as well as the main applications.

This course incorporates a Project-Oriented Problem Based Learning (POPBL) model that is intended to align students' views with industry needs, which ensures that the student will gain necessary practical experience and knowledge throughout realistic project work.

This course will introduce the students with the fundamental visual programming concepts, which will be immediately applied through various exercises and projects. During this course the students will learn how to work with MS Visual Studio, create desktop and mobile applications and apply C# programming language for solving real-life problems of various scenarios.

### **Study results**

After successful completion of this course, students are expected to gain the following competences and skills:

- Familiarity with the .NET environment and the C# programming language and an understanding of the application capabilities;
- Capability of distinguishing tasks that can be solved using MS Visual Studio;
- Ability of creating, compiling and running object-oriented C# programs using MS Visual Studio;
- Capability of using graphical user interface (GUI) components;
- Ability of writing and understanding C# language constructs, syntax and semantics;
- Ability of building GUI application by using Extensive Application Markup Language (XAML);
- Understanding the best practice concepts for programming and exception handling with C#;
- Capability of building their own project with MS Visual Studio, and apply their acquired knowledge from other courses in practice;
- Ability to use an OOP approach; adapt fragments of more complex programs and use existing libraries to achieve desired behavior;
- Ability to develop reusable .NET components via interface realization and standard design patterns;
- Skills of leveraging the major namespaces and classes of the .NET Framework;
- Knowledge and experience of accessing databases using Language Integrated Query (LINQ);
- Skills of debugging, testing, optimizing and documenting the written software.

### **Organization mode of students' individual work**

The independent work of students includes:

- a regular learning of the course by using lecture materials, study literature, internet resources and teamwork;
- course project development;
- work with various libraries;
- preparations for the exam.

### **Evaluation of study results**

The final result is made of:

- Team projects and homework 20%,
- Milestone tests 20%,
- Course paper 20%,
- Final exam 40%.

### Study course outline

No.	Title of the topic
1.	Introduction to Visual Studio as a development platform.
2.	Graphical User Interfaces (GUI) in real world applications.
3.	Hands on C# projects, OOP and GUI development.
4.	Working with 2D/3D graphics. Canvas, 2D/3D objects. OpenGL basics.
5.	Processing and displaying video and sensory data.
6.	Application debugging and testing.
7.	Working with data. Integrating and using Data Bases.
8.	Parallelization techniques and parallel computing basics.
9.	Web application development.
10.	Building innovative GUI applications (teamwork projects) for solving real-world problems.

### Study course schedule

No. of the class	Title of the topic	Type of class, amount of academic hours
1.	Introduction to MS Visual Studio, .NET platform, C # Language Syntax. Creating a MS Visual Studio C # project.	2x lectures, 2x practical classes
2.	Inheritance in C #. Creating a graphical user interface (GUI) using different approaches.	2x lecture, 2x practical classes
3.	Hands on C# projects, OOP and GUI development.	2x practical classes
4.	Working with 2D/3D graphics. Canvas, 2D/3D objects. OpenGL basics.	1x lecture, 2x practical classes
5.	Processing and displaying video and sensory data.	1x lecture, 2x practical classes
6.	Application debugging and testing.	1x lecture, 1x practical class
7.	Integrating and using Data Bases.	2x practical classes / laboratory work
8.	Parallel programming implementation	1x lecture, 2x practical classes
9.	Web application development. Server-client communication.	3x practical classes
10.	Building innovative GUI applications (teamwork projects) for solving real-world problems.	6x practical classes

## **Basic literature**

1. J.Sharp, **Microsoft Visual C# Step by Step (9th Edition) (Developer Reference)**, Microsoft Press, ISBN-13: 978-1509307760, ISBN-10: 1509307761, July 2018.
2. Andrew Troelsen, **Pro C# 7: With .NET and .NET Core 8th ed. Edition**, Professional Apress, ISBN-13: 978-1484230176, ISBN-10: 1484230175, November 2017.

## **Supplementary literature:**

1. Anders Hejlsberg, Mads Torgersen, Scott Wiltamuth, Peter Golde, *C# Programming Language, The 4th Edition*, Courier in Westford, Massachusetts, 2010.
2. Jesse Liberty, *Programming C#. Building .NET applications*, O'Reilly Media, 2001.
3. A.Harris, *Microsoft C# Programming for the absolute beginner*, Series Edition, Premier Press, 2002.
4. Eric Brown, *Windows Forms programming with C#*, Hanning Publications Co., 2002.

## **Other sources of information:**

1. Microsoft Developer Network (MSDN), C# Tutorials:  
<http://msdn.microsoft.com/en-us/library/aa288436%28v=vs.71%29.aspx>;
2. Working with C#: <https://code.visualstudio.com/docs/languages/csharp>

## **Law on Institutions of Higher Education, Section 56.<sup>1</sup> Study Course**

(1) Institutions of higher education and colleges shall determine the procedures by which study courses shall be developed and included in study programmes, in order to ensure the achievement of the common study results. The description of a study course shall be prepared and approved in accordance with the procedures specified by the institution of higher education and college.

(2) The study course description shall:

- 1) define the requirements for the commencement of the acquisition of the study course;
- 2) determine the aims for the implementation of the study course and the planned study results;
- 3) outline the content of the study course necessary for the achievement of study results, contain the study course calendar, mandatory and supplementary literature, indicate other sources of information;
- 4) describe the organisation and tasks for the independent work of students; and
- 5) determine the evaluation criteria of study results.

[14 July 2011]