



Syllabus Course Program



Algorithmic languages (programming in C#)

Specialty

113 Applied mathematics

Educational program

Intelligent Data Analysis

Level of education

Bachelor's level

Semester

4

Institute

Educational and Scientific Institute of Computer Science and Information Technology

Department

Computer Mathematics and Data Analysis

Course type

Special (professional), Selective

Language of instruction

Ukrainian

Lecturers and course developers



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Candidate of Pedagogical Science (Information and Communication Technologies in Education), Assistant Professor of Computer Mathematics and Data Analysis Department

Work experience - more than 23 years. The author of more than 50 scientific, educational, and methodological works.

[More about the lecturer on the department's website](#)

General information

Summary

The main goal of the educational discipline "Algorithmic languages (programming in C#)" is to acquire basic knowledge in the field of development on the .net platform using one of the most popular languages, C#. The content of the course is aimed at familiarizing students with basic concepts and delving into the details of the functioning of .net applications. Acquisition of problem-solving skills that arise during the development of software systems.

Course objectives and goals

The purpose of this course is to provide participants with in-depth knowledge and skills in the field of programming using the .net platform and the C# language. Participants will develop an in-depth understanding of core processes and learn to use modern development tools and software. The course is aimed at preparing participants for the effective use of the C# programming language in various fields. Upon completion of the course, participants will have the necessary skills to implement modern software development techniques on the .NET platform and the C# programming language.

Format of classes

Lectures, laboratory classes, consultations, self-study. Final control in the form of an exam.

Competencies

GC 6. Ability to abstract thinking, analysis and synthesis.

SC 5. Ability to develop algorithms and data structures, software tools and software documentation.

SC 9. Ability to use modern technologies of programming and software testing.

Learning outcomes

LO 9. Build algorithms that are effective in terms of calculation accuracy, stability, speed, and system resource consumption for numerical research of mathematical models and solving practical problems.

LO 11. To be able to apply modern technologies of programming and software development, software implementation of numerical and symbolic algorithms.

Student workload

The total volume of the discipline is 180 hours. (6 ECTS credits): lectures – 32 hours, laboratory work – 48 hours, independent work – 100 hours.

Course prerequisites

"Algorithmization and programming", "Object-oriented programming".

Features of the course, teaching and learning methods, and technologies

When teaching this discipline, such teaching and learning methods as gamification and peer-to-peer are used. LMS (learning management systems) systems are used in the learning process.

Program of the course

Topics of the lectures

Topic 1. Introduction to C#.

Topic 2. Data types and variables

Topic 3. Conditional operators

Topic 4. Methods

Topic 5. Arrays and strings

Topic 6. Working with the text

Topic 7. Exceptional situations

Topic 8. Introduction to OOP and classes

Topic 9. Encapsulation, inheritance and polymorphism

Topic 10. Abstract classes. Interfaces

Topic 11. Structures

Topic 12. Generalized types

Topic 13. Collections

Topic 14. Events, delegates and lambdas

Topic 15. Expansion methods

Topic 16. LINQ

Topics of the workshops

Workshops are not provided within the discipline.

Topics of the laboratory classes

Topic 1. Serialization of data

Topic 2. Asynchronous programming

Topic 3. Reflection

Topic 4. Introduction to SQL

Topic 5. Entity Framework

Topic 6. Web applications. HTTP/HTTPS protocols

Topic 7. MVC template. Middlewares

- Topic 8. Routing
- Topic 9. Controllers
- Topic 10. Composition and partial representations
- Topic 11. Preservation of state
- Topic 12. Introduction of dependence
- Topic 13. Model binding
- Topic 14. Forms and validation
- Topic 15. Filters
- Topic 16. Configurations and logging

Self-study

The course involves the completion of individual tasks, the results of which are monitored and assessed by teachers. Students are also recommended additional materials (videos, articles) for self-study.

Course materials and recommended reading

1. J. Richter. CLR via C#: Developer Reference. - Microsoft Press, 2012. – 896 p.
 2. A. Troelsen, P. Japikse. Pro C# 9 with .NET 5: Foundational Principles and Practices in Programming. - Apress, 2021. – 1411 p.
- Online курсы:
 Coursera: C# for .NET Developers
 Udemy: C# Basics for Beginners: Learn C# Fundamentals by Coding

Assessment and grading

Criteria for assessment of student performance, and the final score structure

Description of the final score structure, course requirements, and necessary steps to earn points, especially paying attention to self-study and individual assignments.

Grading scale

Total points	National	ECTS
90–100	Excellent	A
82–89	Good	B
75–81	Good	C
64–74	Satisfactory	D
60–63	Satisfactory	E
35–59	Unsatisfactory (requires additional learning)	FX
1–34	Unsatisfactory (requires repetition of the course)	F

Norms of academic integrity and course policy

The student must adhere to the Code of Ethics of Academic Relations and Integrity of NTU "KhPI": to demonstrate discipline, good manners, kindness, honesty, and responsibility. Conflict situations should be openly discussed in academic groups with a lecturer, and if it is impossible to resolve the conflict, they should be brought to the attention of the Institute's management.

Regulatory and legal documents related to the implementation of the principles of academic integrity at NTU "KhPI" are available on the website: <http://blogs.kpi.kharkov.ua/v2/nv/akademichna-dobrochesnist/>

Approval

Approved by

Date, signature



Head of the department

29.08.2024

Olena AKHIEZER

Date, signature
29.08.2024



Guarantor of the educational
program
Olena AKHIEZER