

O. M. BEKETOV NATIONAL UNIVERSITY OF URBAN ECONOMY IN KHARKIV

**Educational and Scientific Institute
energy, information and transport infrastructure**

APPROVED
Director ESI/INI
(Igor BILETSKY)
« 22 » 2021
L.S.



WORK PROGRAMME OF THE ACADEMIC DISCIPLINE

OBJECT-ORIENTED PROGRAMMING



type	<i>compulsory OK-19</i>
semester	<i>3</i>
number of ECTS credits	<i>4</i>
form of final control	<i>defence of the practical training report</i>
language of instruction, teaching and assessment	<i>English</i>
department	<i>Computer Science and Information Technology</i>

for higher education applicants:

level of higher education	<i>first (bachelor's degree)</i>
branch of knowledge	<i>12 Information Technology</i>
specialty	<i>122 Computer Science</i>
educational programme	<i>Computer Science</i>
form of study	<i>full-time</i>

2021 – 2022 ACADEMIC YEAR

Developers of the Work Programme of the Course Work

Surname and initials	Position, email	Scientific degree, academic title	Signature
Volodymyr BREDIKHIN	Associate Professor Volodymyr.Bredikhin@kname.edu.ua	Ph.D., associate professor	
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The Work Programme was approved **at the proceedings** of the Department *Computer Science and Information Technology*

Minutes dated «30» 08 2021 No. 2

Head of the Department _____  (Maryna NOVOZHYLOVA)

The Work Programme of the Course Project (Work) corresponds to the Educational Programme: *Computer Science*

Guarantor of the Educational Programme _____  (Mykola PAN)

1. Purpose of the discipline

The purpose of the practical training *Formation of theoretical knowledge and practical skills in object-oriented programming technology and in-depth mastery of modern C # programming technologies using classes, inheritance and polymorphism*

2. Interdisciplinary connections

The practical training is directly based on: *"Higher Mathematics", "Algorithm Theory", "Programming"*

3.

Learning outcomes

Programme learning outcome	Teaching methods	Forms of evaluation	Learning outcomes of the practical training
PRN9. Develop software models of subject environments, choose a programming paradigm from the standpoint of convenience and quality of application for the implementation of methods and algorithms for solving problems in the field of computer science.	Verbal, visual, practical	Oral examination, practical test of skills, work defense	Ability to think logically, build logical conclusions, use formal languages and models of algorithmic calculations, design, development and analysis of algorithms, evaluate their efficiency and complexity, solvability and unsolvability of algorithmic problems for adequate modeling of subject areas and creation of software and information systems
PRN10. Use tools for developing client-server applications, design conceptual, logical and physical models of databases, develop and optimize queries to them, create distributed databases, repositories and showcases of databases, knowledge bases, including cloud services, using web languages - programming.			Ability to design and develop software using different programming paradigms: generalized, object-oriented, functional, logical, with appropriate models, methods and algorithms of calculations, data structures and control mechanisms. Ability to implement a multi-tier computing model based on client-server architecture, including databases, knowledge and data warehouses, perform distributed processing of large data sets on clusters of standard servers to meet the computing needs of users, including cloud services. Be able to apply methodologies, technologies and tools to manage the life cycle of information and software systems, products and services of information technology in

		accordance with customer requirements.
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4. Programme of the discipline

Module 1

Content module 1 Object-oriented analysis and design

The concept of object-oriented analysis, design and programming is considered. Object model of the subject environment, the principles of its construction. The concept of objects, classes and their relationships.

Content module 2 Object-oriented programming technology

The principles of data encapsulation are considered. Constructors, destructors. Classes and objects, object attributes: class members, class functions, functions outside the class, scope and permissions.

Content module 3 Object-oriented programming of windows-applications

The issue of handling exceptional situations is considered. Development of graphical user interfaces. Standard class libraries of application developer environments.

5. Structure of the discipline and distribution of time

Content modules	Number of hours				
	total *	lectures	practice	lab	independent work
MODULE (semester)	120	15	30	-	75
Content module 1	30	5	10	-	15
Content module 2	45	6	12	-	27
Content module 3	30	4	8	-	18
Final control	15	-	-	-	15

6. Themes of the lectures

Theme	Contents (plan)	Number of aud. hours
Content module 1		
1. The concept of object-oriented analysis, design and programming.	C # as a powerful classic developer tool. The place of C # and OOP in the modern world of software development. Development prospects.	2
2. Object model of the subject environment, the principles of its construction.	Fields and methods of the class. Variants of syntax and structure of the class description.	3
Content module 2		
3. Fundamentals of object-oriented programming	Procedural languages. Disadvantages of structural programming. Object-oriented approach. Basic concepts of object-oriented programming	2

language		
4. Data abstraction and encapsulation	Encapsulation through access specifiers. Access to the object via a pointer. Keyword this.	2
5. Fundamentals of object-oriented programming language	Polymorphism. New classes and dynamic binding. Examples of programs.	2
Content module 3		
6. Exceptional handling.	Exception handling. Object exceptions, interception options, use of polymorphism	2
7. Standard libraries for middle-class software developer classes.	Elements of the purpose of programming	2

7. Themes of the practical (laboratory) classes

Theme	Contents (plan)	Number of aud. hours
Content module 1		
1. The concept of object-oriented analysis, design and programming.	The concept of object-oriented analysis, design and programming	4
2. Object model of the subject environment, the principles of its construction.	Object model of the subject environment, the principles of its construction	6
Content module 2		
3. Fundamentals of object-oriented programming language	Composition and collection of objects	4
4. Data abstraction and encapsulation	Overload of operations and functions	4
5. Implementation of polymorphism.	Polymorphism. New classes and dynamic binding	4
Content module 3		
6. Exceptional handling.	Exceptional handling	4
7. Standard libraries for middle-class software developer classes.	Standard class libraries of application developer environments Libraries of classes of implementation of functionality	4

8. Individual task (IT) (Curriculum does not provide)

9. Methods of control and the procedure for assessing learning outcomes

The current control system based on the use of the following forms of control:

- oral examination based on lecture materials;
- oral examination based on the results of the practical lesson;
- testing in a virtual educational environment on the MOODLE platform;

The final control in the form of an examination earned out in writing on examination tickets.

Structure of the discipline and distribution of points

Content modules	Maximum number of points		
	total	practice	independent work
MODULE (semester)	100	30	70
Content module 1	20	10	10
Content module 2	20	10	10
Content module 3	20	10	10
Final control	40	-	40

Types of the tasks, means of control and maximum number of points

Types of the tasks and means of control	Distribution of points
Content module 1	20
Practical task "The concept of object-oriented analysis, design and programming" (report on work, defense)	5
Practical task "Object model of the subject environment, principles of its construction" (report on work, protection)	5
Test on the theoretical material of CM1	10
Content module 2	20
Practical task "Composition and collection of objects" (work report, defense)	2
Practical task "Overload of operations and functions" (report on work, protection)	4
Practical task "Polymorphism. New classes and dynamic binding" (report on work, defense)	4
Test on the theoretical material of CM2	10
Content module 3	20
Practical task "Handling of exceptional situations" (report on work, protection)	5
Practical task "Standard class libraries of application developer environments Libraries of classes of implementation of functionality" (report on work, protection)	5
Test on the theoretical material of CM3	10
Final control - public defence	40
Theoretical question 1	10
Theoretical question 2	10

Task 1	10
Task 2	10
TOTAL FOR THE MODULE	100

Grading scale

The sum of points for all types of educational activities	Score on a national scale	
	for the exam, diff. test	for test
90-100	excellent	passed
82-89	good	
74-81		
64-73		
60-63	satisfactory	failed with the possibility of retaking
35-59	unsatisfactory with the possibility of retaking	
0-34	unsatisfactory with compulsory re-study of the discipline	failed with compulsory re-study of the discipline

10. Material and technical and information support

Methodical support

1. Distance course in the discipline "Object-Oriented Programming" in a virtual educational environment on the platform Microsoft Teams Access mode: https://teams.microsoft.com/_#/school/files/%D0%9E%D0%B1%D1%89%D0%B8%D0%B9?threadId=T9%3A27da5a9b51d640d9834115a0f84446cd%40thread.tacv2&ctx=channel&context=Object-oriented%2520programming&rootfolder=%252Fsites%252FCS2020-2aBocharov%252FShared%2520Documents%252FGeneral%252FObject-oriented%2520programming

Recommended literature and information resources

1. Beginning Object-Oriented Programming with C# 1st Edition, Kindle Edition by Jack Purdum - John Wiley & Sons, Inc., 2020, - 628 p.
2. Practical Object-Oriented Design An Agile Primer Using Ruby6 Sandi Metz - John Wiley & Sons, Inc., 2020, - 462 p.
3. Object Oriented Programming Dr Robert Harle Access mode: <https://www.cl.cam.ac.uk/teaching/0910/OOProg/OOP.pdf>
4. C# 8.0 Pocket Reference: Instant Help for C# 8.0 O'reilly Media, 2019. - p. 248.
5. C#: Learn C# in One Day and Learn It Well. Jamie Chan, 2020. - p. 170.

Hardware, equipment, software products

№ s/n	Name of computer laboratory, its area sq. meters	Academic discipline	Number of personal computers with a service life of not more than eight years	Name of application packages (including licensed) Availability of	Internet access channels (yes / no)
1	Laboratory of computer and microprocessor systems and devices № 218Ацк,	Object-oriented programming	12 11 Impression Intel Celeron J1800, O3Y 4 G, HDD 500 G (2015, 2016, 2018) 1 Solti Intel Celeron J1800, RAM 4 G, HDD 500 G (2014) Epson M2170	Microsoft Office Professional Microsoft Visual- studio-20 10-express Maxima, MathCad,	yes
2	Laboratory of corporate network technologies № 218В цк,	Object-oriented programming	15 Impression Intel Celeron J1800, RAM 4 G, SSD 128G (2016)	Microsoft Office Professional Microsoft Visual- studio-20 10-express	yes