МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
ХАРКІВСЬКИЙ НАЦІОНАЛЬНИЙ ЕКОНОМІЧНИЙ УНІВЕРСИТЕТ
ІМЕНІ СЕМЕНА КУЗНЕЦЯ

"ЗАТВЕРДЖУЮ"
Проректор з навчально-методичної роботи
_____
Каріна НЕМАШКАЛО

ОСНОВИ ПРОГРАМУВАННЯ

робоча програма навчальної дисципліни

Галузь знань	***12 Інформаційні технології***
Спеціальність	***125 Кібербезпека***
Освітній рівень	***перший (бакалаврський)***
Освітня програма	***Кібербезпека***
Статус дисципліни	***обов'язкова***
Мова викладання, навчання та оцінювання	***англійська***

Завідувач кафедри
кібербезпеки та
інформаційних технологій _____ *Сергій ЄВСЄЄВ*

Харків
2021

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
SIMON KUZNETS KHARKIV NATIONAL UNIVERSITY OF ECONOMIC

"APPROVED"
Vice-rector for educational and methodical work
_____
Karina NEMASHKALO

BASICS OF PROGRAMMING

working program of the discipline

Branch of knowledge	***12 Information technologies***
Specialty	***125 Cybersecurity***
Educational level	***first (bachelor's)***
Educational program	***Cybersecurity***

Discipline status	***basic***
Language of instruction, teaching and assessment	***English***

Head of Department
cybersecurity and
information technology _____ *Serhii YEVSEIEV*

Kharkiv

2021

APPROVED
at a meeting of the Department of Cybersecurity and Information Technology
Protocol № 1 dated 27.08.2021

Developers:
Yevseiev S.P., Doctor of Technical Sciences, Full Professor, Head of CIT Department
Kovalenko S.M., Ph.D., Assoc. Prof. of the Department of CIT Department

Update and re-approval letter
working program of the discipline

Academic year	Date of the meeting of the department-developer of WPD	Protocol number	Signature of the head of the department

Abstract of the discipline

The thematic plan of the discipline "Basics of Programming" and its content by modules and topics are presented, the plans of lectures and laboratory classes are included.

The discipline "Basics of Programming" is assigned to the group of educational and professional disciplines for bachelors majoring in 125 "Cybersecurity".

Today's business conditions require cybersecurity professionals to make full use of the latest information technologies. Extensive capabilities of computerized tools in the collection, processing and output of the necessary information can significantly improve the quality of economic calculations, make more efficient the process of substantiation of economic decisions.

The discipline "Basics of Programming" is an instrumental basis for the analytical part of subsequent special courses, as well as term papers and dissertations.

The objective of teaching this discipline is to acquire the necessary knowledge of the basic concepts of algorithmization and techniques of application in programming basic algorithmic structures (organization of programs) and basic data types. Much attention is paid to the practical work of students on personal computers.

The results of the study of this discipline are practical skills to form a program code for the implementation of procedures and functions for solving problems of information protection in various areas of modern business.

Characteristics of the discipline

Course	**1**
Semester	**1**
Number of ECTS credits	**6**
Form of final control	exam

Structural and logical scheme of studying the discipline

Prerequisites	Postrequisites
Computer science according to the school program	Object-oriented programming
Mathematics according to the school program	Data bases
	Distributed and parallel calculations
	WEB-technologies and WEB-design
	Software development and testing technologies
	Cross-platform programming Programming for mobile devices

Competences and learning outcomes in the discipline

Competences	Learning outcomes
GC 5. Ability to search, process and analyze information. PC 1. Ability to apply the legal and regulatory framework, as well as national and international requirements, practices and standards for the purpose of carrying out professional activities in the field of information and/or cybersecurity. PC 3. Ability to use software and software-hardware complexes of information protection means in information-telecommunication (automated) systems. PC 4. Ability to ensure business continuity in accordance with established information and/or cybersecurity policies. PC 5. Ability to provide protection of information processed in information and telecommunication (automated) systems in order to implement the established policy of information and / or cybersecurity. PC 7. Ability to implement and ensure the functioning of complex information security systems (complexes of legal, organizational and technical means and methods, procedures, practical techniques, etc.). PC 8. Ability to carry out incident management procedures, conduct investigations, assess them.	LO 9 – implement processes based on national and international standards, detection, identification, analysis and response to information and/or cybersecurity incidents

PC 9. Ability to carry out professional activities on the basis of the implemented information and/or cybersecurity management system. PC 11. Ability to monitor the functioning of information, information and telecommunication (automated) systems in accordance with the established policy of information and/or cybersecurity. PC 12. Ability to analyze, identify and assess potential threats, vulnerabilities and destabilizing factors to the information space and information resources in accordance with established information and/or cybersecurity policies.	
PC 7. Ability to implement and ensure the functioning of complex information security systems (complexes of legal, organizational and technical means and methods, procedures, practical techniques, etc.). PC 12. Ability to analyze, identify and assess potential threats, vulnerabilities and destabilizing factors to the information space and information resources in accordance with established information and/or cybersecurity policies.	LO 12 – develop models of threats and violators
GC 1. Ability to apply knowledge in practical situations PC 3. Ability to use software and software-hardware complexes of information protection means in information-telecommunication (automated) systems. PC 7. Ability to implement and ensure the functioning of complex information security systems (complexes of legal, organizational and technical means and methods, procedures, practical techniques, etc.). PC 12. Ability to analyze, identify and assess potential threats, vulnerabilities and destabilizing factors to the information space and information resources in accordance with established information and/or cybersecurity policies.	LO 16 – implement complex information protection systems in automated systems (AS) of the organization (enterprise) in accordance with the requirements of regulatory documents
GC 1. Ability to apply knowledge in practical situations PC 1. Ability to apply the legal and regulatory framework, as well as national and international requirements, practices and standards for the purpose of carrying out professional activities in the field of information and/or cybersecurity. PC 3. Ability to use software and software-hardware complexes of information protection means in information-telecommunication (automated) systems. PC 4. Ability to ensure business continuity in accordance with established information and/or cybersecurity policies. PC 5. Ability to provide protection of information processed in information and telecommunication (automated) systems in order to implement the established policy of information and / or cybersecurity. PC 7. Ability to implement and ensure the functioning of complex information security systems (complexes of legal, organizational and technical means and methods, procedures, practical techniques, etc.). PC 8. Ability to carry out incident management procedures, conduct investigations, assess them. PC 9. Ability to carry out professional activities on the basis of the implemented information and / or cybersecurity management system. PC 12. Ability to analyze, identify and assess potential threats, vulnerabilities and destabilizing factors to the information space and information resources in accordance with established information and/or cybersecurity policies.	LO 35 – solve problems of providing and support of complex systems of protection of the information, and also counteraction to unauthorized access to information resources and processes in information and information and telecommunication (automated) systems according to the established policy of information and/or cybersecurity

Curriculum

Content module 1. Cybersecurity as a computer science

Topic 1. *Stages of program development and implementation. The concept of algorithm and typical algorithmic programming structures*
Topic2. *Algorithms and methods of their assignment*
Topic 3. *Stages of program development and implementation*
Topic 4. *Number systems*
Topic 5. *Computer architecture, principles of John von Neumann*
Topic 6. *Elements of algorithmic languages: concept of data types, names, values, pointers, variables, constants, operations, expressions*
Topic 7. *Structural programming: sequence, branching and loops*
Topic 8. *Preprocessing*

Content module 2. Basic derivative data types of programming languages

Topic 9. *Procedural-oriented programming*
Topic 10. *Dynamic layout libraries*
Topic 11. *Program development methodologies: descending and ascending design, modular programming*
Topic 12. *Arrays*
Topic 13. *Derivative data types*
Topic 14. *Compound data types*

The list of laboratory classes, as well as questions and tasks for independent work is given in the table "Rating-plan of the discipline".

Teaching and learning methods

In the course of teaching the discipline the teacher uses explanatory-illustrative (information-receptive) and reproductive teaching methods. Lectures (1-14), presentations (1-14) are used as teaching methods that are aimed at activating and stimulating the educational and cognitive activities of applicants.

The procedure for evaluating learning outcomes

The system of assessment of formed competencies in students takes into account the types of classes, which according to the curriculum of the discipline include lectures and laboratory classes, as well as independent work. Assessment of the formed competencies of students is carried out according to the accumulative 100-point system. Control measures include:

1) current control, which is carried out during the semester during lectures and laboratory classes and is estimated by the amount of points scored (maximum amount - 100 points; the minimum amount that allows a student to set off - 60 points);

2) final / semester control, which is conducted in the form of a test, in accordance with the schedule of the educational process.

The procedure for the current assessment of students' knowledge.

Assessment of student knowledge during lectures and laboratory classes is carried out according to the following criteria:

- ability to use basic programming concepts on the example of Scratch language;
- ability to develop algorithms in the form of pseudocode, flow charts and activity diagrams;
- ability to use branching algorithms;
- ability to use loops and variables;
- ability to use char arrays and data types and work with command line arguments;
- ability to use the features of working with files;
- ability to implement data structures and linked lists.

Final control of knowledge and competencies of students in the discipline is carried out on the basis of a semester exam, the task of which is to test students' understanding of the program material in general, logic and relationships between individual sections, ability to creatively use accumulated knowledge, ability to formulate their attitude to a particular problem. disciplines, etc.

Lectures: the maximum number of points is 15.

Laboratory classes: the maximum number of points is 45 (defense of laboratory works - 33, tests – 12), and the minimum – 35.

Individual work: consists of the time that the applicant spends on preparation for laboratory work and on preparation for express surveys of lectures and tests for laboratory work of the discipline, in the technological map points for this type of work are not allocated.

Final control: is carried out taking into account the exam.

Each exam ticket consists of 3 practical situations (one stereotypical, one diagnostic and one heuristic task), which involve solving typical professional tasks in the workplace and allow to diagnose the level of theoretical training of the student and his level of competence in the discipline. Evaluation of each task of the examination ticket is as follows: the first task is 20 test tasks of the

closed form, its performance is estimated by 20 points; the second task is devoted to the disclosure of the theoretical question in the discipline, its implementation is evaluated by 10 points; the third task - writing program code, its execution is estimated by 10 points.

The result of the semester exam is evaluated in points (maximum number – 40 points, minimum number of credits – 25 points) and is affixed in the appropriate column of the examination "Information of success".

A student should be considered certified if the sum of points obtained as a result of the final / semester test is equal to or exceeds 60. The minimum possible number of points for current and modular control during the semester is 35 and the minimum possible number of points scored in the exam is 25.

The final grade in the discipline is calculated taking into account the points obtained during the exam and the points obtained during the current control of the accumulative system. The total result in points for the semester is: "60 or more points - credited", "59 or less points – not credited" and is entered in the test "Statement of performance" of the discipline.

The final grade is set according to the scale given in the table "Grade scale: national and ECTS".

Forms of assessment and distribution of points are given in the table "Rating-plan of the discipline".

Assessment scale: national and ECTS

The sum of points for all types of educational activities	Rating ECTS	Score on a national scale	
		for exam, course project (work), practice	for offset
90 - 100	AND	perfectly	credited
82 - 89	B	fine	
74 - 81	C		
64 - 73	D	satisfactorily	
60 - 63	E		
35 - 59	FX	unsatisfactorily	not credited

Rating plan of the discipline

Topic	**Forms and types of education**		**Forms of evaluation**	**Max ball**
Topic 1	***Classroom work***			
	Lecture	Lecture *"Stages of program development and implementation. The concept of algorithm and typical algorithmic programming structures"*	Work on lectures	1
Topic 2	***Classroom work***			
	Lecture	Lecture *"Algorithms and methods of their assignment"*	Work on lectures	1
	Laboratory lesson	*Laboratory work №1. Development of graphical schemes of algorithms by the method of step-by-step detailing*	defense of the laboratory work	3
	Individual work			

	Questions and tasks for self-study	Search, selection and review of literary sources on a given topic. Preparation for laboratory classes.		
Topic 3	***Classroom work***			
	Lecture	Lecture *" Stages of program development and implementation"*	Work on lectures	1
	Laboratory lesson	*Laboratory work № 2. Introduction to the integrated software development environment. Preparation and solution of linear problems on a PC*	performing laboratory work	3
	Individual work			
	Questions and tasks for self-study	Search, selection and review of literary sources on a given topic. Preparation for laboratory classes.		
Topic 4	***Classroom work***			
	Lecture	Lecture *"Number systems"*	Work on lectures	1
	Laboratory lesson	*Laboratory work №3 Preparation and solution of branching problems on a PC.*	performing the laboratory work	3
	Individual work			
	Questions and tasks for self-study	Search, selection and review of literary sources on a given topic. Preparation for laboratory classes.		
Topic 5	***Classroom work***			
	Lecture	Lecture ”*Computer architecture, principles of John von Neumann”*	Work on lectures	1
	Laboratory lesson	*Laboratory work № 3 (continued). Preparation and solution on the PC of branching problems.*	defense of the laboratory work	2
	Individual work			
	Questions and tasks for self-study	Search, selection and review of literary sources on a given topic. Preparation for laboratory classes.		
Topic 6	***Classroom work***			
	Lecture	Lecture *"Elements of algorithmic languages: concept of data types, names, values, pointers, variables, constants, operations, express"*	Work on lectures	1
	Laboratory lesson	*Laboratory work № 4. Preparation and solution in PS of problems, using choosing statement*	defense of the laboratory work	2
	Individual work			

	Questions and tasks for self-study	Search, selection and review of literary sources on a given topic. Preparation for laboratory classes.		
Topic 7	***Classroom work***			
	Lecture	Lecture*" Structural programming: sequence, branching and loops"*	Work on lectures	1
	Laboratory lesson	*Laboratory work №5. Preparation and solution in PS of problems, using compound conditions*	performing laboratory work	2
	Individual work			
	Questions and tasks for self-study	Search, selection and review of literary sources on a given topic. Preparation for laboratory classes.		
Topic 8	***Classroom work***			
	Lecture	Lecture *"Preprocessing"*	Work on lectures	1
	Laboratory lesson	*Laboratory work №6. Preparation and solution in PS of problems with loops*	performing the laboratory work	2
			test	6
	Individual work			
	Questions and tasks for self-study	Search, selection and review of literary sources on a given topic. Preparation for laboratory classes.		
Topic 9	***Classroom work***			
	Lecture	Lecture *" Procedural-oriented programming"*	Work on lectures	1
	Laboratory lesson	*Laboratory work №6. (continued). Preparation and solution in PS of problems with loops*	defense of the laboratory work	2
	Individual work			
	Questions and tasks for self-study	Search, selection and review of literary sources on a given topic. Preparation for laboratory classes.		
Topic 10	***Classroom work***			
	Lecture	Lecture *"Dynamic layout libraries"*	Work on lectures	1
	Laboratory lesson	*Laboratory work №7. Preparation and solution on the PC of problems with nested loops*	defense of the laboratory work	2
	Individual work			
	Questions and tasks for self-study	Search, selection and review of literary sources on a given topic. Preparation for laboratory classes.		

Topic 11	***Classroom work***			
	Lecture	Lecture *"Program development methodologies: descending and ascending design, modular programming"*	Work on lectures	1
	Laboratory lesson	*Laboratory work №8. Preparation and development of problems for processing one-dimensional arrays on a PC*	defense of the laboratory work	2
	Individual work			
	Questions and tasks for self-study	Search, selection and review of literary sources on a given topic. Preparation for laboratory classes.		
Topic 12	***Classroom work***			
	Lecture	Lecture *"Arrays"*	Work on lectures	1
	Laboratory lesson	*Laboratory work №9. Preparation and development of problems for processing two-dimentional arrays on a PC*	defense of the laboratory work	2
	Individual work			
	Questions and tasks for self-study	Search, selection and review of literary sources on a given topic. Preparation for laboratory classes.		
Topic 13	***Classroom work***			
	Lecture	Lecture *"Derivative data types"*	Work on lectures	1
	Laboratory lesson	*Laboratory work №10. Preparation and solution on the PC of problems of processing of arrays with use of pointers*	defense of the laboratory work	2
	Individual work			
	Questions and tasks for self-study	Search, selection and review of literary sources on a given topic. Preparation for laboratory classes.		
Topic 14	***Classroom work***			
	Lecture	Lecture *" Compound data types"*	Work on lectures	1
	Laboratory lesson	*Laboratory work №11. Preparation and solution of problems on the PC using functions and procedures*	defense of the laboratory work	2
	Individual work			
	Questions and tasks for self-study	Search, selection and review of literary sources on a given topic. Preparation for laboratory classes.		
i c	***Classroom work***			

	Lecture	Lecture *"Compound data types"*	Work on lectures	1
	Laboratory lesson	*Laboratory work №12. Preparation and solution of problems on the PC using files*	performing of the laboratory work	2
	Individual work			
	Questions and tasks for self-study	Search, selection and review of literary sources on a given topic. Preparation for laboratory classes.		
Topic 16	***Classroom work***			
	Laboratory lesson	*Laboratory work № 12(continued). Preparation and solution of problems on the PC using files*	defense of the laboratory work	2
			test	6
	Individual work			
	Questions and tasks for self-study	Search, selection and review of literary sources on a given topic. Preparation for laboratory classes.		
Exam				40

Recommended Books

Basic

1. Roth S/ Clean C++: Sustainable Software development Patterns and Best Practices with C++ 17. Apress. 2017. – 299p.
2. Rao S. C++ in One Hour a Day. Sams Teach Yourself. Pearson. 2016. – 798p.
3. Horton I., van Weert P. Beginning C++ 17. From Novice to Professional. Fifth Edition. Apress. 2018. - 780p.
4. Lospinoso J. C++ Crash course. No starch Press. 2019. – 720p.
5. Grimes. R. Beginning C++ Programming. Packt. 2017. – 560p.
6. Kanetkar Y. Let Us C++. Third Edition. BPB. 2019 – 345p/

Optional

7. Karumanshi N. Data Structures And Algorithms Made Easy. CareerMonk Publications. 2017. – 828p.
8. Bhagava A.Y. Grokking Algorithms. Manning Shelter Island. 2016. – 258p.
9. KalicharanN. Learn to Program with C. – Apress. 2015. – 323p.
10. AumassonJ.-P. Serious Cryptography. A Practical Introduction to Modern Encryption. No Starch Press. 2018. – 434p.
11. The C Programming Language The Ultimate Beginner's Guide. Easy Programming Publisher, 2016. – 151p.

Information resource

1. Web-site of personal learning systems KNEU on discipline "Basics of programming" – https://pns.hneu.edu.ua/course/view.php?id=8121