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

"ЗАТВЕРДЖУЮ"
Заступник керівника
(проректор з науково-педагогічної роботи)
_____
Микола АФАНАСЬЄВ

КОМП'ЮТЕРНІ СИСТЕМИ ТА АРХІТЕКТУРА КОМП'ЮТЕРІВ

робоча програма навчальної дисципліни

Галузь знань	***12 Інформаційні технології***
Спеціальність	***121 Інженерія програмного забезпечення***
Освітній рівень	***перший (бакалаврський)***
Освітня програма	***Інженерія програмного забезпечення***

Статус дисципліни	***базова***
Мова викладання, навчання та оцінювання	***англійська***

Завідувач кафедри
кібербезпеки та
інформаційних технологій _____ *Сергій ЄВСЄЄВ*

Харків
2020

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

COMPUTER SYSTEMS AND COMPUTER ARCHITECTURE

Working program of academic Discipline

Branch of knowledge	***12 Information Technologies***
Specialty	***121 Software Engineering***
Educational level	***First (Bachelor)***
Educational program	***Software Engineering***

Type of discipline	***Basic***
Language of teaching, learning and evaluation	***English***

Head of Department
cybersecurity and information technology _____ Serhii YEVSEIEV

Kharkiv
2020

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Approved
At a meeting of the cybersecurity department
and Information technologies
Protocol No 2 from 31. 08. 2020

Developer:
Stanislav MILEVSKYI, Ph.D., Associate professor of CIT dept.

Update letter and re-approval
Working program of academic discipline

Academic year	Date of department meeting – developer of WPAD	Protocol number	Head of the Department

Annotation of academic discipline:

The purpose of the discipline is mastering the necessary knowledge on the Fundamentals of the theory of constructing and functioning of the main devices, assemblies, basic elements and architecture of modern computer equipment, which are performed on the basis of integral technology, formation of solid practical skills regarding estimation of technical state of computer equipment calculation of analogue and digital circuits parameters, analysis of conditions of operation and synthesis of given characteristics and Training highly qualified specialists who are able to rationally choose and use modern types of computers under automated design; To analyze, calculate, synthesize and design digital electronic devices used in computer and microprocessor systems.

The object of study of the discipline are computer systems, processors, their logic and circuitry.

The subject of the discipline is the means of building, organizing and researching computer systems.

The results of the study of this discipline are the acquisition of skills in research, design of computer systems, as well as comprehensive practical skills in computer systems management.

Characteristics of the discipline

Course	**2**
Semester	**3**
Number of credits ECTS	**5**
Final Control Form	**Exam**

Structurally-logical scheme of study of academic discipline:

Prerequisites	Postrequisites
Discrete mathematics	**ComputerSystems**
Physics, electrical Engineering and electronics	**ComputerNetwork**
Algorithms and data structures	**Modelling of information systems**

Competencies and studies of training in the discipline:

Competence	Learning outcomes
Ability to perform analysis and synthesis of digital electronic devices	Use modern diagnostic tools for computer equipment, communication facilities and service
Creating algebra logic models for complex digital circuitry	Use the physical principles of electronic analogue and digital elements and components that make up the basis of constructionsandmodern computer equipment and logical foundations of digital technology
Ability to represent logical functions in different ways of task and exercise their minimisation	Use the logical basics of digital technology
Analysis of conditions for functioning of digital circuits of computer technics, as well as synthesis of digital circuits with given properties in different basis functions systems	Know the methods of analyzing and calculating the parameters of the circuitry of computerized means
The ability to perform calculations of the necessary parameters ofcomputercircuitry, to use basic logical elements of different types of	To know the methods of analyzing the conditions of digital and analog circuits of computer equipment, as well as the

Competence	Learning outcomes
logic in compatible work	procedure for the synthesis of digital circuits with data properties .
Ability to develop specification of computer equipment, services ofcommunication and service	Know the order of estimation of characteristics of elements and knots, detection and troubleshooting in elements and circuits of computer Technics
Test and debug hardware and software systems and complexes of automation and control	Know the Basics of Computer Engineering (computer circuitry, computer architectures, microprocessor systems)

Program of academic discipline

Semantic Module 1. Structure of microprocessor Systems

Theme 1. *Information submission forms*
Theme 2. *Logical basics of building elements*
Theme 3. *Circuit engineering of the combinational knots*
Theme 4. *Circuitry of digital elements. RS-trigger.*
Theme 5. *Circuitry of digital elements. JK-Trigger.*
Theme 6. *Schemetechnique of digital elements. Dtrigger.*

Semantic Module 2. Digital computers

Theme 7. *Universal displacement rugister K155P1.*
Theme 8. *Classification of meters.*
Theme 9. *Circuit engineering of analog nodes*
Theme 10. *Digital Computers*
Theme 11. *Storage devices*
Theme 12. *CPU - Processors*

The list of practical (seminar) / 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. Problem-based lectures, presentations, conversations, individual and group projects, and master classes are used as teaching methods that are aimed at activating and stimulating the educational and cognitive activities of applicants.

Evaluation procedure for Learning outcomes

Assessment of the formed competences in students considers the types of classes, which according to the curriculum include lectures, laboratory classes, as well as the performance of independent work. Students can assess the established 100-point system of competences formed. In accordance with the interim provisions "on the procedure for evaluating the results of student training in the accumulation Ballroom-rating system" KHU named. Village Kuznetsya, control measures include:

Current control carried out during the semester during lecture, laboratory classes and evaluates score (maximum amount is 60 points; the minimum amount allowing the student to take the exam is 35 points);

Modular control, conducted in the form of a colloquium as an intermediate mini-exam on the initiative of the teacher, taking into account the current control over the corresponding semantic module and aims at integrated Assessment of student learning outcomes after studying the material from the logically completed part of the discipline – aims module;

Summary/Semester control, conducted in the form of semester exam, according to schedule of educational process.

The procedure for conducting an ongoing assessment of student knowledge. Evaluation of the student's knowledge during laboratory classes and individual tasks fulfillment is performed on the following criteria:

Understanding, the degree of mastering the theory and methodology of the problems addressed; Degree of assimilation of the actual material of academic discipline; Acquaintance with the recommended literature, as well as with modern literature on issues addressed; Ability to combine theory with practice in considering industrial situations, solving problems, making settlements in the process of executing individual tasks and tasks, rendered for consideration in the audience; Logic, structure, style of of presentation material in written works and at speeches in the audience, ability to justify its position, to make the generalization of information and to draw conclusions; Arithmetic correctness of individual and complex settlement task fulfillment; Ability to conduct critical and independent assessment of certain problematic issues; Ability to explain the alternative views and their own point of view, the position on a certain problematic issue; Application of analytical approaches; The quality and clarity of reasoning; Logic, structuring and substantiation of conclusions concerning a specific problem; Independence of work; Literacy of material submission; Use of methods of comparison, generalization of concepts and phenomena; Registration of work.

General criteria by which the assessment of extracurricular independent work of students is: depth and strength of knowledge, level of thinking, ability to systematize knowledge on separate topics, ability to make informed conclusions, possession of Kategorìjnim the apparatus, skills and techniques of practical tasks, ability to find the necessary information, to make it systematization and processing, self-realization in laboratory classes.

The final control of the knowledge and competence of students on discipline is carried out on the basis of semester exam, whose task is to check the student's understanding of the program material in general, logic and interrelations between separate sections, ability of creative use of the accumulated knowledge, ability to formulate their attitude to a certain problem of discipline etc.

The exam ticket covers a program of discipline and envisages defining the level of knowledge and degree of competence by students.

Each examination ticket consists of 3 practical situations (one stereotypical, one diagnostic and one heuristic task) that provide solutions to typical professional tasks in the workplace and allow to diagnose the level of Theoretical training of the student and the level of his competence in academic discipline.

The result of the semester exam is estimated in points (the maximum number is 40 points, the minimum amount, which is counted – 25 points) and is affixed in the corresponding column of the exam "information accounting for points".

The student should be **considered attested** if the amount of scores obtained according to the results of the final/semester check of the success is equal to or greater than 60. The minimum possible number of points for the current and modular control during the semester – 35 and the minimum possible number of points accumulated on the take is 25.

Final assessment of the discipline is calculated taking into account the points obtained during the exam and the points obtained during the current control of the accumulation system. The total result in scores per semester is: "60 and more points are credited", "59 and less points are not counted" and recorded in the Zalkova "Bill of Record of success" of the academic discipline.

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 - 60 points; the minimum amount that allows a student to take the exam - 35 points);

2) final / semester control, which is conducted in the form of a semester exam, 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:

- to use modern diagnostic tools for computer equipment, communication facilities and service
- to use the physical principles of electronic analogue and digital elements and components that make up the basis of constructionsandmodern computer equipment and logical foundations of digital technology
- to use the logical basics of digital technology
- to know the methods of analyzing and calculating the parameters of the circuitry of computerized means
- to know the methods of analyzing the conditions of digital and analog circuits of computer equipment, as well as the procedure for the synthesis of digital circuits with data properties .
- to know the order of estimation of characteristics of elements and knots, detection and troubleshooting in elements and circuits of computer Technics
- to know the Basics of Computer Engineering (computer circuitry, computer architectures, microprocessor systems)

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.

Practical (seminar, laboratory) classes: the maximum number of points is 48, and the minimum - 29.

Independent work: consists of time that the applicant spends on preparation for laboratory work and preparation for the exam in 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.

The examination paper covers the program of the discipline and provides for the determination of the level of knowledge and the degree of mastery of competencies by students.

Each exam paper 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 paper is as follows: the first task is the implementation of the initial logical design of CPU circuit, evaluated by 16 points; the second task is devoted to the numerical calculations is evaluated by 18 points; the third task is to perform the circuit engineering of analog nodes is evaluated by 6 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 performance”.

A student should be considered certified if the sum of points obtained from 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 scores obtained during the exam and the scores 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.

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 test
90 – 100	A	exellent	passed
82 – 89	B	good	
74 – 81	C		
64 – 73	D	satisfactory	
60 – 63	E		
35 – 59	FX	unsatisfactory	not passed

Rating plan of the discipline

Theme	**Forms of education**		**Forms of control**	**Max. mark**
Theme 1	***Auditorial work***			
	Lecture number 1	Theme 1. *Forms of information submission*	Working at lecture	**1**
	Laboratory lesson number 1	*Research methods task logic functions / Investigation of ways of assigning logical functions*	Active participation in the performance of laboratory research / laboratory work protection	**4**
	Independent work			
	Preparation classes	Search, selection and review of the literature on a given topic		
Theme 2	***Auditorial work***			
	Lecture number 2	Theme 2. *Logical bases of elements / Logical basics of building elements*	Working at lecture	**1**
	Laboratory lesson number 2	*Minimization of logic functions using Karnaugh maps / Minimize logical functions with Kharno cards*	Active participation in the performance of laboratory research / laboratory work protection	**4**
	Independent work			
	Preparation classes	Search, selection and review of the literature on a given topic		
Theme 3	***Auditorial work***			
	Lecture number 3	Theme 3. *Circuitry combination units / Circuitry of combination nodes*	Working at lecture	**1**

	Laboratory lesson number 3	*Analysis of combinational digital device / Combinational digital device analysis*	Active participation in the performance of laboratory research / laboratory work protection	**4**
	Independent work			
	Preparation classes	Search, selection and review of the literature on a given topic		
Theme 4	***Auditorial work***			
	Lecture number 4	Theme 4. *RS-trigger / Circuitry of digital elements. RS trigger*	Working at lecture	**1**
	Laboratory lesson number 4	*Research methods of synthesis and combination digital devices*	Active participation in the performance of laboratory tests	**4**
	Independent work			
	Preparation classes	Search, selection and review of the literature on a given topic		
Theme 5	***Auditorial work***			
	Lecture number 5	Theme 5. *JK-trigger / Circuitry of digital elements. JK trigger*	Working at lecture	**1**
	Laboratory lesson number 4	*Research methods of synthesis and combination digital devices / Investigation of methods of synthesis of combination digital devices*	Active participation in the performance of laboratory research / laboratory work protection	**4**
	Independent work			
	Preparation classes	Search, selection and review of the literature on a given topic		
Theme 6	***Auditorial work***			
	Lecture number 6	Theme 6. *Digital circuitry elements. D-trigger / Circuitry of digital elements. D-trigger*	Working at lecture	**1**
	Laboratory work number 5	*Synthesis of asynchronous triggers / Synthesis of asynchronous triggers*	Active participation in the performance of laboratory tests	**4**
	Independent work			
	Preparation classes	Search, selection and review of the literature on a given topic		

		Preparation for laboratory classes		
Theme 7	***Auditorial work***			
	Lecture number 7	Theme 7. *Universal shift register K155YR1 / Universal shift register K155IR1*	Working at lecture	**1**
	Laboratory work number 5	*Synthesis of asynchronous triggers / Synthesis of asynchronous triggers*	Active participation in the performance of laboratory research / laboratory work protection	**4**
	Independent work			
	Preparation classes	Search, selection and review of the literature on a given topic		
		Preparation for laboratory classes		
Theme 8	***Auditorial work***			
	Lecture number 8	Theme 8. *Classification meter / Classification of meters*	Working at lecture	**1**
	Laboratory lesson number 6	*Studying the properties register / Investigation of the properties of registers*	Active participation in the performance of laboratory tests	4
	Independent work			
	Preparation classes	Search, selection and review of the literature on a given topic		
Theme 9	***Auditorial work***			
	Lecture number 9	Theme 9. *Subject analog circuitry units / Circuitry of analog nodes*	Working at lecture	**1**
	Laboratory lesson number 6	*Studying the properties register / Investigation of the properties of registers*	Active participation in the performance of laboratory research / laboratory work protection / control work	**4**
	Independent work			
	Preparation classes	Search, selection and review of the literature on a given topic		
e m	***Auditorial work***			

	Lecture number 10	Theme 10. *Digital Computer / Digital computers*	Working at lecture	**1**
	Laboratory work number 7	*Software research software and hardware configuration of Modern PC / Software tools to study the software and hardware configuration of a modern PC*	Active participation in the performance of laboratory research / laboratory work protection	**4**
	Independent work			
	Individual work	Search, selection and review of the literature on a given topic		
Theme 11	***Auditorial work***			
	Lecture number 11	Topic 11. *The storage device / Memories devices*	Working at lecture	**1**
	Laboratory work number 8	*Software tools for measuring performance of modern PCs*	Active participation in the performance of laboratory research / laboratory work protection	**4**
	Independent work			
	Individual work	Search, selection and review of the literature on a given topic		
Theme 12	***Auditorial work***			
	Lecture number 12	Theme 12. *Subject CPUs / Processors*	Working at lecture	**1**
	Laboratory work number 9	*Study of the characteristics of modern processors / Research of characteristics of modern processors*	Active participation in the performance of laboratory research / laboratory work protection	**4**
	Independent work			
	Individual work	Search, selection and review of the literature on a given topic		
Exam				**40**

Recommended Literature

Main

1. Computer circuitry and architecture of computers. Multimedia Interactive electronic edition of the combined use/way. Yevseyev S. P., King O. Г. – Kh.: KHU. Kuzitsa Village, 2018. – 1070 MB. ISBN 978-966-676-704-5

2. Prykhodko V. M. Computer circuitry/V. M. Prykhodko, S. V. Yevseev, K. V. Sadovyi. – Kh.: Hneu Type, 2011 – 300 C.

3. Yevseyev S. P. Architecture of microprocessor and Components OF computer/S. P. Yevseev, o. A. Smirnov, O. G. Korol, O. V. Kovalenko//Kirovograd: type. Lysenko v. F. – 2015 – 550 S.

4. Irvin of Yazyck Asassembler for Intel processors, 4-th иzdanye.: Lane. – M.: Izlitelsky House "Williams", 2005 – 912 S.

Additional

5. Babich M. P. Kompûternaâ Diagmotehnika. Methods of the project and projecting: Uchebnoe Pobovanie./M. P. Babych. – Mk-Press, 2004 – 575 S.

6. 9. Tanenbaum E. Archtecture of the computer: Lane. S. E. Tanen-Baum. – 5-E. – St. Petersburg. [etc.] : Пиter, 2007. – 698 S.

Information resources

7. Catalog obrazovatelnyh Resources (Federal Internet offensive). – Access mode: www.catalog.alledu.ru/predmet/

8. Computer Architecture. – Access mode: http://vssit.ucoz.ru/index/0-4

9. http://lib.kstu.kz:8300/tb/books/@Elektronnie_sredstva_IIT/plaiin/thyory/connent.htmp