Operating systems administration

Name of discipline:	**Operating systems administration**
Course page in Moodle:	https://dl2022.khadi-kh.com/course/index.php?categoryid=39
The scope of the educational component	**4 credits (120 hours)**
Form of final control	**offset**
Consultations:	**on schedule**
Department name:	**Department of Computer Technologies and Mechatronics**
Teaching language:	**English**
Course leader:	**Lebedynskyi Andrii Volodymyrovych, Doctor of Philosophy, Associate Professor of the Department of CTM**
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Summary of the educational component:
The goal is to train highly qualified specialists who will have knowledge of the principles of operation of operating systems and apply knowledge in software development, have skills in operating system interaction with application software and administration of Windows and Linux operating systems, as well as be able to reasonably choose an operating system to solve certain problems. tasks.

Subject: structure and functioning of centralized operating systems, processes for managing the processor, memory, input-output devices, the main characteristics of distributed systems, processes and synchronization of processes in distributed systems.

The main tasks of studying the academic discipline are:
 − formation of a systematic idea of the concepts, principles and models underlying the construction of operating systems;
 − the basics of building operating systems, their architecture, requirements for them, the history of their development and modern approaches to their implementation;
 − principles of implementation of file systems, the structure of modern file systems;
 − obtaining practical training in the field of selection and application of operating systems for the tasks of automating information processing and management, as well as programming in modern operating environments.
 − problems of implementation of network functions of operating systems and ways of organizing distributed file systems;

Prerequisites for studying the educational component:
 Algorithmization and programming; Basics information systems;
Competencies acquired by the applicant:
General competencies **:**
 Ability for abstract thinking, analysis and synthesis;
 Knowledge and understanding of the subject area and understanding of professional activity;
 Ability to learn and acquire modern knowledge;
 Ability to search, process and analyze information from various sources;

Ability to generate new ideas (creativity);
Ability to evaluate and ensure the quality of work performed.

Special (professional) competencies:

The ability to think logically, draw logical conclusions, use formal languages and models of algorithmic calculations, design, develop and analyze algorithms, evaluate their effectiveness and complexity, solvability. Yes undecidability algorithmic problems for adequate modeling of subject areas and creation of software and information systems.

Ability to systemic thinking, application methodology system analysis for the study of complex problems of different nature, methods formalization and decision systemic tasks, what have contradictory goals, uncertainty Yes risks.

Ability to apply methodologies, technologies and tools for managing the life cycle processes of information and software systems, information technology products and services in accordance with customer requirements.

The ability to use methods and means of ensuring information security, develop and operate special software for protecting information resources of critical information infrastructure facilities.

Learning outcomes in accordance with the educational program:

To use knowledge of regularities of random phenomena, their properties and operations on them, models of random processes and modern software environments for solving problems of statistical data processing and building predictive models.

Use methods of numerical differentiation and integration of functions, solving ordinary differential and integral equations, features of numerical methods and the possibility of adapting to engineering problems, have skills in software implementation of numerical methods.

Use the methodology of system analysis of objects, processes and systems for the tasks of analysis, forecasting, control and design of dynamic processes in macroeconomic, technical, technological and financial objects.

Use tools for developing client-server applications, design conceptual, logical and physical database models, develop and optimize queries to them, create distributed databases, data warehouses and marts, knowledge bases, including those on cloud services, using web languages -programming.

Have the skills to manage the life cycle of software, information technology products and services in accordance with the requirements and restrictions of the customer, be able to develop project documentation (feasibility study, terms of reference, business plan, agreement, agreement, contract).

Thematic plan

Topic №	Name of topics (LC, LW, PW, SC, IW)	Number of hours	
		full-time	correspondence
1	LC General information about operating systems	2	
	PW (LW, SC) Timing of the "operating system"	2	
	PW (LW, SC) Microsoft Windows operating system. Installation.	2	
	IW Processing lecture materials and laboratory work.	8	
2	LC Network operating systems	2	
	PW (LW, SC) User accounts and users of the Windows operating system. File permissions	2	
	PW (LW, SC) Linux User Accounts	2	
	IW Processing lecture materials and laboratory work.	8	
3	LC Processes and flow management	2	
	PW (LW, SC) Forwarding commands, pipelines, filters. Batch files. Batch File Commands	2	
	PW (LW, SC) Commands for Installing and Upgrading Linux Packages	2	
	IW Processing lecture materials and laboratory work.	8	
4	LC OS features for different classes of computer systems	2	
	PW (LW, SC) Virtualization. Virtualization support systems VMWare , Oracle virtual box	2	
	PW (LW, SC) Linux system installation server to the virtual machine.	2	
	IW Processing lecture materials and laboratory work.	8	
5	LC Computer system architecture.	2	
	PW (LW, SC) Linux operating system. Installation. The structure of the file system.	2	
	PW (LW, SC) An Overview of Linux Features.	2	
	IW Processing lecture materials and laboratory work.	10	
6	LC Memory management	2	
	PW (LW, SC) Processes in Linux OS and their management.	2	
	PW (LW, SC) Additional Linux System Utilities	2	
	IW Processing lecture materials and laboratory work.	10	
7	LC I/O control	2	
	PW (LW, SC) Methods of interaction of processes.	2	
	PW (LW, SC) Process management in operating systems	2	
	IW Processing lecture materials and laboratory work.	10	
8	LC File systems	2	
	PW (LW, SC) Commands for Windows file system (cmd).	2	
	PW (LW, SC) Commands for working with Linux OS files (bash).	2	
	IW Processing lecture materials and laboratory work.	10	
together	LC	16	
	PW (LW, SC)	32	
	IW	72	

Individual educational and research task:
Detailed consideration by students of individual theoretical provisions of the academic discipline and the formation of the skills and abilities of their practical application by performing the assigned tasks.

Teaching methods:
1) verbal: 1.1 traditional: lectures, explanations, storytelling;
1.2 interactive (non-traditional): problematic lectures, discussions the like;
2) visual: method of illustrations, method demonstrations
3) practical: 3.1 traditional: practical exercises, seminars;
3.2 interactive (non-traditional): trainings, "round table", brainstorming method attacks.

Grading system and requirements:

Current academic performance
1 The current success of applicants in performing educational types of work in training sessions and performing tasks of independent work is assessed using a four-point rating scale, followed by a listing on a 100-point scale. When assessing the current performance, all types of work provided for by the curriculum are taken into account. program.
1.1 Lecture classes are evaluated by determining the quality of performance of specified tasks.
1.2 Practical occupation evaluated quality performance control or individual task, implementation and design of practical work.
1.3 Laboratory classes are evaluated by the quality of the reports on the implementation of laboratory works.
1.4 Seminars are evaluated by the quality of the performance of an individual task/abstract.
2 The assessment of the current performance of applicants for higher education is carried out at each practical lesson (laboratory or seminary) on a four-point scale ("5", "4", "3", "2") and is recorded in the academic journal. academic performance.

– "excellent": the applicant perfectly mastered the theoretical material, demonstrates deep knowledge of the relevant topic or academic discipline, basic provisions;

– "good": the applicant has mastered the theoretical material well, owns the main aspects from the primary sources and recommended literature, and argues it well; has practical skills, expresses his views on certain problems, but allows certain inaccuracies and errors in the logic of the presentation of theoretical content or in the analysis practical;

– "satisfactory": the applicant basically mastered the theoretical knowledge of the educational topic or discipline, is guided by primary sources and recommended literature, but unconvincingly answers, confuses the concept, uncertainly answers additional questions, does not have stable knowledge; answering questions practical nature

reveals inaccuracies in knowledge, does not know how to evaluate facts and phenomena, connect them with the future profession;

– "unsatisfactory": the applicant has not mastered the educational material of the topic (discipline), does not know scientific facts, definitions, almost does not orient himself in primary sources and recommended literature, lacks scientific thinking, practical skills formed.

3 The final score for the current activity is recognized as the arithmetic mean of the scores for each lesson, individual work, current control work according to the formula:

$$F^{curr} = \frac{F1 + F2 + ... + Fn}{n},$$

where F^{curr} – the final assessment of academic performance based on the results of the current control;

$F1, F2, ... , Fn$ – performance evaluation of the n-th measure of current control;

n is the number of current control measures.

Grades are converted into points on a conversion scale (Table 1).

Table 1 - Recalculation of the average score for current activities on a multi-point scale

4-point scale	one hundred-point scale	4 point scale	one hundred-point scale	4 point scale	one hundred-point scale	4 point scale	100 point scale
5	100	4.45	89	3.90	78	3.35	67
4.95	99	4.4	88	3.85	77	3.3	66
4.9	98	4.35	87	3.80	76	3.25	65
4.85	97	4.3	86	3.75	75	3.2	64
4.8	96	4.25	85	3.7	74	3.15	63
4.75	95	4.20	84	3.65	73	3.1	62
4.7	94	4.15	83	3.60	72	3.05	61
4.65	93	4.10	82	3.55	71	3	60
4.6	92	4.05	81	3.5	70	from 1.78 to 2.99	from 35 to 59
						re-test	
4.55	91	4.00	80	3.45	69	0 to 1.77	0 to 34
4.5	90	3.95	79	3.4	68	re-study	

Final grade

1 Exam held after studying all topics disciplines and develops by applicants for higher education during the examination session after the end of all classroom classes

2 Applicants for higher education who have completed all types of work provided for by the curriculum are allowed to take the exam. disciplines:

   - attended all classroom activities (lectures, seminars, practical);
   - timely completed all missed lessons;
   - scored the minimum number of points for current academic performance (at least 36 points, which corresponds to the national scale "3");

If current academic performance with disciplines below 36 points applicant higher education has the opportunity to increase its current score to the minimum before the start of the examination sessions.

3 Assessment of applicants' knowledge during the exam is carried out on a 100-point scale.

Assessment of applicants' knowledge by testing is carried out on a scale:
- "Excellent": at least 90% correct answers;
- "Very good": 82% to 89% correct answers;
- "Good": 74% to 81% correct answers;
- "Satisfactory": 67% to 73% correct answers;
- "Satisfactory enough": 60% to 66% correct answers;
- "Unsatisfactory": less than 60% correct answers.

4 The final grade for an academic discipline is determined as a weighted average grade that takes into account the overall grade for current performance and the grade for passing the exam.

5 The calculation of the total final grade for the study of the academic discipline is carried out according to formula:

$$FG^{\,exam} = 0,6 * F^{\,curr} + 0,4 * E$$

where $FG^{\,exam}$ is the final assessment of academic performance in disciplines, form final controls for which there is an exam;

$F^{\,curr}$ - the final assessment of success based on the results of the current control (on a 100-point scale);

E - assessment based on the results of passing the exam (on a 100-point scale).

$0.6 \text{ and } 0.4$ − odds ratio points per current academic performance and passing the exam.

6 For the performance of individual independent work and participation in scientific events, applicants are awarded additional points.

6.1 Additional points are attached to the sum of points scored by the earner of higher education for the current educational activity (for disciplines, final form control for which there is a credit), or to the final grade in the discipline, the final form of control for which is exam.

6.2 The number of additional points that are awarded for different types of individual tasks depends on their volume and significance:
- prizes in the discipline at the international / all-Ukrainian competition of scientific student works - 20 points;
- prize-winning places in the discipline at the All-Ukrainian Olympiads - 20 points;
- participation in international / all-Ukrainian competition scientific student works – 15 points
- participation in international / all-Ukrainian scientific conferences of students and young scientists - 12 points;
- participation in all-Ukrainian Olympiads in the discipline - 10 points
- participation in olympiads and scientific conferences of KhNADU in the discipline - 5 points;
- performance of individual research (training and research) tasks of increased complexity - 5 points**.**

6.3 The number of additional points cannot exceed 20 points.

7 The total final grade of the study of the academic discipline cannot exceed 100 points.

The overall final assessment of the study of the academic discipline is determined according to the scale given in table 2.

Table 2 - The scale for assessing the knowledge of applicants based on the results of the final control in the academic discipline

Score in points	National scale		ECTS score	
	exam	offset	Grade	Criteria
90-100	Excellent	Passed	**A**	The theoretical content of the course has been mastered completely, without gaps, the necessary practical skills for working with the mastered material have been formed, all the training tasks provided for by the training program have been completed, the quality of their implementation has been assessed by a number of points close to up to maximum
80–89	Good	Passed	**B**	The theoretical content of the course has been mastered completely, without gaps, the necessary practical skills for working with the mastered material are basically formed, all the training tasks provided for by the training program have been completed, the quality of most of them has been assessed number of points close to the maximum
75-79	Good		**C**	The theoretical content of the course has been mastered completely, without gaps, some practical skills in working with the mastered material are not sufficiently formed, all the training tasks provided for by the training program have been completed, the quality of none of them has been assessed with a minimum number of points, some kinds tasks completed with errors
67-74	Satisfactorily		**D**	The theoretical content of the course has been partially mastered, but the gaps are not significant, the necessary practical skills for working with the mastered material are basically formed, most of the training tasks provided for by the training program have been completed, some of the completed tasks, may contain errors
60–66	Satisfactorily		**E**	The theoretical content of the course has been partially mastered, some practical work skills have not been formed, many are provided for by the program education training tasks are not fulfilled, or the quality of some of them is estimated by a number of points close to to minimum.

Score in points	National scale		ECTS score	
	exam	offset	Grade	Criteria
35–59	Unsatisfactory	Not counted	FX	The theoretical content of the course has been partially mastered, the necessary practical work skills have not been formed, most of the provided training programs for training tasks have not been completed, or the quality of their implementation has been assessed with a number of points close to the minimum; with additional independent work on the course material, it is possible to improve the quality of the implementation of educational tasks (with the possibility of repeated drafting)
0–34	Unacceptable		F	The theoretical content of the course has not been mastered, the necessary practical work skills have not been formed, all completed training tasks contain gross errors, additional independent work on the course material will not lead to any significant improvement in the quality of performance. training tasks (with a mandatory refresher course)

Course policy:
– the course provides for teamwork, the environment in the classroom is friendly, creative, open to constructive critics;
– mastering the discipline involves mandatory attendance of lectures and practical classes, as well as independent work;
– independent work provides for the study of individual topics of the academic discipline, which are submitted in accordance with the program for independent processing, or were considered briefly;
– all tasks stipulated by the program must be completed within the established term;
– if an applicant for higher education is absent from classes for a good reason, he presents completed tasks during self-training and consultation teacher;
– coursework must be defended no later than one week before the start of the examination sessions;
– when studying the course, applicants for higher education must comply with the rules of academic virtue set forth in the following documents: "Rules of academic virtue for participants in the educational process of KHNADU" (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_dobroch_1.pdf),
"Academic Virtue. Checking the text of academic, scientific and qualifying works for plagiarism "(https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_85_1_01.pdf),
"The moral code of participants in the educational process of KHNADU (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_MEK_1.pdf).
– in case of detection of plagiarism, the applicant receives 0 points for the task and must re-perform the tasks provided for in syllabus;
– cheating during tests and exams is prohibited (including using mobile devices). Mobile devices are only allowed to be used while online testing.

Recommended literature:

1. Khmelyuk M.S. Abstract of lectures on the discipline "Operating systems"
2. Khmelyuk M.S. Guidelines for performing laboratory work for students in the discipline "Operating Systems", 67 p.
3. Shekhovtsov V. A. Operating systems - M .: BHV Publishing Group, 2005. - 576c.
4. Windows Server 2016 Unleashed (includes Content Update Program) / C. Amaris et al. Sams Publishing, 2017. 1584 p.
5. Gorbaty IV, Bondarev AP Telecommunication systems and networks. Principles of functioning, technologies and protocols - L.: Lvov Polytechnic, 2016. 336 p.

Additional sources:

1. Gabrusev V., Lapinsky V., Nesterenko O. Fundamentals of operating systems. Core, process, thread. Educational book - Bogdan. 2007. 96 s.
2. Stallings W. Operating systems. 2nd ed. Englewood Cliffs, NJ : Prentice Hall, 1995. 701 p.
3. Ramskyi Yu. S. Administruvannia kompiuternykh merezh ta system navch. posibnyk. 2017. 196 s.

Developer of
syllabus of discipline

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