

**Silabus**  
**educational component of the UA**  
(elective discipline)

**Operation and maintenance of machines**

Name of the discipline:	<b>Operation and maintenance of machines</b>
Level of higher education:	<b>first (bachelor's)</b>
Course page in Moodle:	<a href="https://dl2022.khadi.kharkov.ua/course/view.php?id=727">https://dl2022.khadi.kharkov.ua/course/view.php?id=727</a>
The volume of the educational component	<b>4 (120 hours)</b>
Form of final control	<b>Offset</b>
Consultations:	<b>on schedule</b>
Name of the department:	<b>Department of construction and road machines named after A.M. Kholodov</b>
Language of instruction:	<b>Ukrainian</b>
Course leader:	<b>Kosolapov Viktor B., PhD, Associate Professor</b>
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**Summary of the educational component:**

**The aim is to** train specialists in the field of organization and maintenance of machine parks in the conditions of modern construction production, the formation of practical skills and abilities for independent selection of parameters and solving typical problems of operation and maintenance of machines ...

**Subject:** pedagogically adapted system of concepts about the principles of parameter selection and solving typical problems of operation and maintenance of machines.

**The main tasks of studying the discipline are:**

- formation in students of a set of knowledge and ideas about the main operational properties of machines, the influence of operating modes and operating conditions on the performance of machines ;
- mastering the skills of analyzing the impact of the main indicators of machines on the efficiency of their use;
- mastering the methodology for the selection of projects of road construction mechanization bases for specific fleets of road construction machines.

**Prerequisites for studying the educational component:**

General structure of machines; General structure of machine tools and machine tools; Theory of mechanisms and machines; Machine parts; Hydraulics, hydraulic and pneumatic drives.

**Competencies acquired by the applicant:**

**General competencies:**

- Ability to abstract thinking
- Ability to apply knowledge, demonstrating a professional approach in their activities, which allows solving problems in the field of lifting and transport, construction, road and land reclamation machines.
- Ability to gather and interpret information and make judgments on relevant social, scientific or ethical issues.

Ability to communicate information, ideas, problems and solutions in a form accessible to both specialists and non-specialists.

Ability to generate new ideas (creativity)

**Special (professional) competencies:**

Ability to apply standard analytical methods and computer software to solve engineering problems in the field of lifting and transport, construction, road and land reclamation engineering.

Ability to apply fundamental scientific facts, concepts, theories, principles to solve professional problems and practical problems of industrial engineering.

Knowledge, skills and abilities to develop and implement scientific projects and programs in the field of lifting and transport, construction, road, land reclamation machinery and equipment.

**Learning outcomes in accordance with the educational program:**

Knowledge and understanding of the principles of technological, fundamental and engineering sciences underlying lifting and transport, construction, road and land reclamation engineering.

Knowledge and understanding of mechanics and lifting and transport, construction, road and land reclamation engineering and prospects for their development.

Analyze engineering objects, processes and methods.

**Thematic plan**

no. of topics	Name of topics (LC, LR, PR, NW, SR)	Number of hours	
		face-to-face	correspondence
1	LC Introduction A road as an engineering structure	2	0,5
	LR	-	-
	SR Road as an engineering structure	2	1
2	LC Execution of earthworks by bulldozers...	2	0,5
	LR Determination of the maximum thickness of chips cut by bulldozer	4	2
	SR Execution of excavation works by bulldozers	2	9
3	LC Performing excavation works with scrapers	2	1
	LR Determination of the maximum thickness of chips cut by the scraper	4	-
	SR Performance of excavation works by scrapers	4	8
4	LC Performance of earthworks by graders	2	1
	LR	-	-
	SR Performance of excavation works by graders	3	10
5	LC Excavation works by excavators	2	-
	LR Determining the length of the scraper bucket filling area	2	-
	LR Determination of the duration of the bulldozer cycle	2	-
	SR Excavation works by excavators	3	9
6	LC Estimates of machine efficiency by time and productivity	2	1
	LR Determining the duration of the scraper cycle	4	2
	SR Estimates of machine efficiency by time and productivity	2	5

7	LC Planning of maintenance and restoration of operability of construction, road and lifting and transport machines and equipment	3	
	LR	-	-
	SR Planning of maintenance and restoration of operability of construction, road and lifting and transport machines and equipment	9	8
8	LC Rules for the operation of construction, road and lifting and transport machines	1	-
	LR	-	-
	SR Rules for the operation of construction, road and lifting and transport machines	3	2
<b>Toget her</b>	LC	16	4
	LR	16	4
	SR	28	52
	Preparation and passing the exam	30	30

**Individual educational and research task** (if available):

### **Teaching methods:**

MH1 - verbal method (lecture);  
 MH2 - practical method (practical classes);  
 MH4 - work with educational and methodical literature;  
 MN8 - project method.

### **Forms and methods of evaluation**

FMO2 - final control (semester exam, course work)  
 FMO3 - oral control (conversation)  
 FMO5 - test control  
 FMO7 - practical examination (protection of practical works)

### **Evaluation system and requirements:**

#### **Current academic performance**

**1** The current performance of applicants for the performance of educational activities in the classroom and for the performance of independent work is assessed using a four-point grading scale with the subsequent conversion to a 100-point scale. When assessing current progress, all types of work provided by the curriculum are taken into account.

**1.1** Lecture classes are evaluated by determining the quality of specific tasks.

**1.2** Laboratory classes are evaluated by the quality of the reports on the implementation of laboratory work .

**2** Evaluation of the current progress of higher education students is carried out at each laboratory lesson on a four-point scale ("5", "4", "C", "2") and recorded in the academic record book.

- "excellent": the applicant has flawlessly mastered the theoretical material, demonstrates deep knowledge of the relevant topic or discipline, the main provisions;

- "good": the applicant has mastered the theoretical material well, knows the main aspects of the primary sources and recommended literature, reasonably presents it; has practical skills, expresses his thoughts on certain problems, but makes certain inaccuracies and errors in the logic of the presentation of theoretical content or in the analysis of practical content;

- "satisfactory": the applicant has basically mastered the theoretical knowledge of the subject or discipline, is oriented in the primary sources and recommended literature, but unconvincingly answers, confuses concepts, hesitates to answer additional questions, does not have stable knowledge; answering questions of a practical nature, shows inaccuracy in knowledge, is unable to evaluate facts and phenomena, to relate them to the future profession;

- "unsatisfactory": the applicant has not mastered the educational material of the topic (discipline), does not know scientific facts, definitions, is almost not oriented in primary sources and recommended literature, there is no scientific thinking, practical skills are not formed.

**3 The** final score for the current activity is recognized as the arithmetic mean of points for each class, for individual work, current control works according to the formula:

$$K^{nomou} = \frac{K1 + K2 + \dots + Kn}{n},$$

where  $K^{nomou}$  is the final assessment of success based on the results of the current control;

$K1, K2, \dots, Kn$  - assessment of the success of the  $n$  current control measure;

$n$  - number of current control measures.

Scores are converted into points according to the conversion scale (Table 1).

**Table 1** - Conversion of the average score for the current activity into a multi-point scale

4-point scale	100-point scale	4-point scale	100-point scale	4-point scale	100-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
						reassembly	
4,55	91	4,00	80	3,45	69	from 0 to 1.77	from 0 to 34
4,5	90	3,95	79	3,4	68	re-examination	

## Final evaluation

**1 The** exam is conducted after studying all topics of the discipline and is passed 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 by the curriculum in the discipline are allowed to take the exam:

- attended all classroom classes (lectures, laboratory work);
- timely made up for all missed classes;
- scored the minimum number of points for current academic performance (at least 36

points, which corresponds to the national scale of "3");

If the current performance in the discipline is below 36 points, the applicant for higher education has the opportunity to increase his current score to the minimum before the start of the examination session.

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

Assessment of knowledge of applicants by testing is carried out on a scale:

- "Excellent": at least 90% of correct answers;
- "Very good": from 82% to 89% of correct answers;
- "Good": from 74% to 81% of correct answers;
- "Satisfactory": from 67% to 73% of correct answers;
- "Satisfactory enough": from 60% to 66% of correct answers;
- "Unsatisfactory": less than 60% of correct answers.

**4** The final grade in the discipline is determined as a weighted average grade, taking into account the overall grade for the current performance and the grade for the exam.

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

$$IK^{ek3} = 0,6 \cdot K^{nomoy} + 0,4 \cdot E,$$

where  $IK^{ek3}$  - final grade in disciplines, the form of final control for which is an exam;

$K^{nomoy}$  - final assessment of success based on the results of the current control (on a 100-point scale);

$E$  - grade based on the results of the exam (on a 100-point scale).

0,6 i 0,4 - coefficients of the ratio of points for current performance and passing the exam.

**6** Additional points are awarded for individual independent work and participation in scientific events.

**6.1** Additional points are added to the sum of points gained by the applicant for higher education for the current educational activity (for disciplines, the final form of control for which is a test), or to the final grade in the discipline, the final form of control for which is an exam.

**6.2** The number of additional points 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 places in the discipline at the national competitions - 20 points;
- participation in the international / all-Ukrainian competition of scientific student works - 15 points
- participation in international/national scientific conferences of students and young scientists - 12 points;
- participation in national competitions in the discipline - 10 points
- participation in Olympiads and scientific conferences of KhNADU in the discipline - 5 points;
- performance of individual research (educational and research) tasks of increased complexity - 5 points.

**6.3** The number of additional points cannot exceed 20 points.

**7** The total final grade for the discipline cannot exceed 100 points.

The overall final grade for the study of the discipline is determined according to the scale given in Table 2.

**Table 2** - Scale for assessing the knowledge of students based on the results of the final control of the discipline

Score in points	Assessment on the national scale		Evaluation on the ECTS scale	
	examination	offset	Evaluation	Criteria.
90-100	That's great.	Enrolled	A	The theoretical content of the course is mastered completely, without gaps, the necessary practical skills of working with the mastered material are formed, all the training tasks provided by the training program are completed, the quality of their implementation is estimated by the number of points close to the maximum
80-89	Okay.	Enrolled	B	The theoretical content of the course is mastered completely, without gaps, the necessary practical skills of working with the mastered material are basically formed, all the training tasks provided by the training program are completed, the quality of most of them is estimated by the number of points close to the maximum
75-79			C	The theoretical content of the course is fully mastered, without gaps, some practical skills of working with the mastered material are insufficiently formed, all the training tasks provided by the curriculum are completed, the quality of any of them is not assessed by the minimum number of points, some types of tasks are performed with errors
67-74	Satisfactory		D	The theoretical content of the course is partially mastered, but the gaps are not significant, the necessary practical skills of working with the mastered material are basically formed, most of the training tasks provided by the curriculum are completed, some of the completed tasks may contain errors
60-66			E	The theoretical content of the course is partially mastered, some practical skills have not been formed, many of the training tasks provided by the curriculum have not been completed, or the quality of some of them is estimated by the number of points close to the minimum.

Score in points	Assessment on the national scale		Evaluation on the ECTS scale	
	examination	offset	Evaluation	Criteria.
<b>35-59</b>	<b>Unsatisfactory</b>	<b>Not enrolled</b>	<b>FX</b>	The theoretical content of the course is partially mastered, the necessary practical skills have not been formed, most of the learning tasks provided by the curriculum have not been completed, or the quality of their implementation is estimated by the number of points close to the minimum; with additional independent work on the course material, it is possible to improve the quality of learning tasks (with the possibility of repeating)
<b>0-34</b>	<b>Unacceptable.</b>		<b>F</b>	The theoretical content of the course has not been mastered, the necessary practical 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 training tasks (with a mandatory repeated course)

#### Policy of the course:

- the course involves teamwork, the environment in the classroom is friendly, creative, open to constructive criticism;
- mastering the discipline involves mandatory attendance of lectures and practical classes, as well as independent work;
- independent work involves the study of individual topics of the discipline, which are submitted in accordance with the program for independent study, or were considered briefly;
- all tasks provided by the program must be completed in due time;
- if the applicant for higher education is absent from classes for a valid reason, he/she presents the completed tasks during independent preparation and consultation of the teacher;
- laboratory works must be defended no later than one week before the start of the examination session (**indicated if available**);
- while studying the course, higher education students must adhere to the rules of academic integrity set out in the following documents: "Rules of academic integrity of participants of the educational process of KNADU" ([https://www.khadi.kharkov.ua/fileadmin/P\\_Standart/pologeniya/stvnz\\_67\\_01\\_dobroch\\_1.pdf](https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_dobroch_1.pdf)), "Academic integrity. Checking the text of academic, scientific and qualification papers for plagiarism" ([https://www.khadi.kharkov.ua/fileadmin/P\\_Standart/pologeniya/stvnz\\_85\\_1\\_01.pdf](https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_85_1_01.pdf)), "Moral and ethical code of participants of the educational process of KNADU" ([https://www.khadi.kharkov.ua/fileadmin/P\\_Standart/pologeniya/stvnz\\_67\\_01\\_MEK\\_1.pdf](https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_MEK_1.pdf)).
- in case of detection of the fact of plagiarism, the applicant receives 0 points for the task and must repeat the tasks provided in the silabus;
- cheating during tests and exams is prohibited (including using mobile devices). Mobile devices are allowed to be used only during online testing.

## **Recommended literature:**

### **Basic literature**

1. Kosolapov V.B. Operation of construction and road machines: Study guide / V.M. Krasnokutsky, V.B. Kosolapov - Kharkiv: KHNADU, 2014.
2. Khmara L.A. Road machines: Machines for construction, repair and maintenance of highways: textbook. Part II / L. A. Khmara, O. S. Shipilov, V. D. Musiyko [et al.
3. Polyansky S.K., Bilyakovich M.O. Technical operation of road construction machines and special vehicles. Study guide. Part 2. Filling and lubrication. Management of technical condition of machines. - K.: "Slovo" - 2011. - 448 p.

### **Supporting literature**

1. Khmara L.A. Road machines: Asphalt concrete plants and asphalt mixing plants: textbook. Part III / L.A. Khmara, O.S. Shipilov, V.D. Musiyko, M.P. Kuzminets;. - Kyiv-Dnipropetrovsk: NTU, 2015. - 248 c.
2. Khmara L.A. Machines and equipment of the industry of production of building materials, products and structures: atlas of structures / L.A. Khmara, M.O. Bilyakovich, M.P. Kuzminets [et al. - 324 c.
3. Kuzenko L.M. Road construction machines: textbook / L.M. Kuzenko, D.V. Kuzenko, Z.Z. Vantukh, Y. Panyura - Kyiv: Condor Publishing House, 2021. - 236 p.,

### **Additional sources:**

distance course:

<https://dl2022.khadi.kharkov.ua/course/view.php?id=727>

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