

Silabus
educational component of the UA
(elective discipline)

Operating materials

Name of the discipline:	Operating materials
Level of higher education:	first (bachelor's)
Course page in Moodle:	https://dl.khadi.kharkov.ua/course/view.php?id=706
The volume of the educational component	4 credits (120 hours)
Form of final control	Offset
Consultations:	on schedule
Name of the department:	Department of construction and road machines named after A.M. Kholodov
Language of instruction:	Ukrainian
Course leader:	Kosolapov Viktor Borysovych, PhD, Associate Professor
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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 the ability to use operational materials and basic methods and their control.

Subject: pedagogically-adapted system of concepts about the principles of production of fuels and lubricants, their main operational qualities and marking, tribotechnics, selection of operational materials for machine tools.

The main tasks of studying the discipline are:

- formation of students' knowledge, skills and ideas on the tribological foundations of the creation of operational materials, on the forms of manifestation of the laws of changes in their properties during the operation of paper machine tools;
- mastering the skills of analyzing the qualities of operational materials;
- mastering the skills of selecting operating materials for the most typical components and mechanisms of construction and road machines.

Prerequisites for studying the educational component:

Chemistry; General structure of construction and road machines; 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.

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.

Ability to implement engineering developments in industrial engineering, taking into account technical, organizational, legal, economic and environmental aspects throughout the life cycle of the machine: from design, construction, operation, maintenance, diagnostics and disposal

Ability to make effective decisions on the choice of structural materials, equipment, processes and combine theory and practice to solve engineering problems.

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.

Search for the necessary scientific and technical information in available sources, in particular in a foreign language, analyze and evaluate it.

Select and apply the necessary equipment, tools and techniques.

Thematic plan

no. of topics	Name of topics (LC, LR, PR, NW, SR)	Number of hours	
		face-to-face	correspondence
1	LC Introduction. Oil and its refined products: essence, content, problems	2	1
	LP1 Determination of the water content in the working fluid of the hydraulic drive of the machine tool	2	1
	SR Crude oil and refined products	2	10
2	LC Fuel for internal combustion engines.	6	1
	SR Alternative fuels for internal combustion engines	4	15
3	LC Motor oils	6	1
	LR2 Determination of the kinematic viscosity of motor oils	4	1
	SR Methods of selection of motor oils	4	15
4	LC Transmission oils	6	1
	LR3 Determination of flash point of lubricants	2	1
	LR.4. Determination of the content of metal wear products in gear oils	2	1
	SR Methodology for selection of transmission oils	8	20
5	LC Plastic lubricants	4	1
	SR Features of selection of greases	10	20
6	LC Brake fluid and engine coolant	4	1
	SR Methodology for selection of brake and engine coolant fluids	10	20
7	LC Working fluids for hydraulic drives of paper machines	3	

	LR5 Determination of oil contamination by photometric method	2	
	ЛР6 Determination of the purity class of working fluids of hydraulic drives of paper machines by microscopic analysis	4	
	SR Method for determination of oil contamination by photometric method	10	5
8	SR Means for diagnosing the physical and chemical properties of operational materials	14	5
9	SR Organization of fueling facilities. Ways to save fuel and lubricants	10	
	LC Conclusions	1	
Toget her	LC	32	6
	LR	16	4
	SR	72	110

Individual educational and research task (if available):

Teaching methods:

MH1 - verbal method (lecture, explanation, story);

MH2 - practical method (laboratory classes);

MH3 - visual method (illustration method, demonstration method)

MH4 - work with literature (educational and methodical; work with textbooks and manuals; search for information on the task);

MH5 - video method in combination with the latest information technologies and computer-based learning tools (remote, multimedia, web-oriented, etc.);

MN6 - independent work;

Forms and methods of evaluation

FMO2 - final control (semester exam)

FMO3 - oral control (conversation)

FMO5 - test control

FMO7 - practical test (protection of laboratory work)

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 subsequent conversion to a 100-point scale.

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 .

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

- "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.

3The final score for the current activity is recognized as the arithmetic mean of points for each lesson, 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 A higher education student receives a credit at the last class of the discipline based on the results of the current assessment. The average grade for the current activity is converted into points on a 100-point scale, according to the conversion table (Table 1).

Higher education applicants who have a current average grade in the discipline below "3" (60 points) in the last class can increase their current score by taking tests in the discipline.

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.

2 The condition for receiving credit is:

- working off all missed classes;
- the average current grade in the discipline is not lower than "3" (60 points).

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

3.1 Additional points are added to the sum of points gained by the applicant for higher education for current educational activities (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.

3.2 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.

3.3 The number of additional points cannot exceed 20 points.

4 The learning outcome is evaluated (select the required):

- on a two-point scale (passed/not passed) according to Table 2;

The final score together with additional points cannot exceed 100 points.

Table 2 - Scale of points conversion to the national evaluation system

On a 100-point scale	On the national scale
from 60 points to 100 points	enrolled
less than 60 points	unaccounted for

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.pd), "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), "Moral and ethical code of participants in the educational process of KNADU" (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 on-line testing.

Recommended literature:

1. Kosolapov V.B. Substantiation of the influence of the parameters of the working fluid of the hydraulic drive of the forwarder manipulator on its productivity / V.B. Kosolapov, S.V. Litovka // Bulletin of the Kharkiv Petro Vasylenko National Technical University of Agriculture, "Woodworking technologies and systems engineering of the forest complex" issue 189 Kharkiv: KhNTUA, 2017 Issue. 189.- C 155-161
2. Kosolapov V.B. Evaluation of the influence of working fluid operating time on the output parameters of the hydraulic motor of the front loader transmission / Viktor B. Kosolapov // Bulletin of KhNADU. 2021. № 92 т. 1 - C. 160 - 166.
3. Operating materials: textbook for universities Ukhanov A. P., Ukhanov D. A., Glushchenko A. A., Khokhlov A. L. Lan Publishing House 2021 528 p.
4. Sirenko G.O. Physicochemistry of fuels and lubricants: [monographic textbook (special course of lectures)] G.O. Sirenko, V.I. Kirichenko, I.V. Sulima: Suprun V. P., 2017 - p.
5. Kirichenko V. I., Sirenko G. O., Kirichenko V. V. Modern fuels and lubricants: state and progress of development part II. Lubricants - Ivano-Frankivsk : Suprun V. P., 2017. 288 p.
6. Chemotology and engineering support for the use of gas and fuels and lubricants: Study guide / S.V. Boychenko, L.M. Chernyak, I.A. Lyubinin [- K.: NAU, 2014. - 276 p.

Additional sources:

1. File archive of the Department of DBM of KNADU: <http://files.khadi.kharkov.ua/mekhanichnij-fakultet/budivelnikh-i-dorozhnikh-mashin.html>
2. NTB HNADU: <http://library.khadi.kharkov.ua/golovna/>
3. KhNADU training website <https://dl2022.khadi.kharkov.ua/course/view.php?id=727>

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