

**Syllabus**  
**educational component of the Ministry of Education**

**Technical operation of construction and road machines**

Subjects:	<b>Technical operation of construction and road machines</b>
Level of higher education:	<b>second (master)</b>
Course page in Moodle:	<a href="https://dl2022.khadi.kharkov.ua/course/view.php?id=908">https://dl2022.khadi.kharkov.ua/course/view.php?id=908</a>
The scope of the educational component	<b>4 credits (120 hours)</b>
Final control form	<b>Test</b>
Consultations:	on schedule
Name of the department:	department of construction and road machines
Teaching language:	English
Course leader:	Razaryonov Leonid Volodymyrovych, associate professor
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**Brief content of the educational component:**

**The goal is** providing students with knowledge of the operation and maintenance of construction and road machinery, and the skills to independently solve typical problems in the maintenance and repair of machines and equipment, construction and use of road machines.

**Subject:**Preparation and formation of students' skills to independently solve production functions and typical activity tasks in the direction of operation of a road construction organization or its divisions.

**The main tasks of studying an academic discipline are:**

- justification and presentation of the unified theoretical and methodological foundations of the technical operation of road machines and equipment;
- study of the main operational indicators;
- study of the influence of operating modes and operating conditions on the working process of machines;
- formation of directions for improvement and development of operation of construction machines in road construction;
- formation of skills in the organization of independent research work and presentation of the results of scientific research

**Prerequisites for studying the educational component:**

Higher mathematics, Theoretical mechanics, Quality of machines, Road machines, Design and testing of hydraulic drives

**Competencies acquired by the acquirer:**

**General competences:**

- Ability to use information and communication technologies.
- Ability to search, process and analyze information from various sources.
- Ability to adapt and act in a new situation
- Ability to generate new ideas (creativity)

**Special (professional) competences:**

Ability to create, improve and apply quantitative mathematical, scientific and technical methods and computer software, to apply a systematic approach to solving engineering problems of industrial engineering, in particular, in conditions of technical uncertainty.

Awareness of promising tasks of modern production, aimed at meeting the needs of consumers, mastering the trends of innovative development technologies of the industry.

The ability to use knowledge in solving tasks to improve the quality of lifting and transport, construction, road, reclamation machines and equipment and its control.

**Learning outcomes:**

To know and understand the processes of industrial mechanical engineering, to have skills in their practical use.

To prepare the production and operate the products of industrial engineering during their life cycle

Knowledge and understanding of mechanics and mechanical engineering and their development prospects.

Skills in solving tasks to improve the quality of lifting and transport, construction, road, reclamation machines and equipment.

**Thematic plan**

Topic No	Name of topics (LK, LR, PR, SZ, SR)	Number of hours	
		ocular	extramural
1	LK Basic principles of BDM operation	2	
	PR Calculation of the company's annual operating fund	2	
	SR Introduction. Historical process of development of exploitation.)	2	
2	LK General methodology of designing enterprises for the maintenance of BDM.	4	
	PR Calculation of labor intensity for a fleet of machines	4	
	SR Main indicators of machines	7	
3	LK Development of a technical task for the design of enterprises of technical operation of BDM.	4	
	PR Calculation and design of the repair workshop	4	
	SR Mechanization Bases	10	
4	LK Development of the PPR schedule, its essence and purpose	4	
	PR Calculation and construction of a schedule of PR		
	SR Use of the PPR schedule by enterprises	8	
5	LK Development of a repair workshop and a general plan of the enterprise	4	
	PR Calculation of the required number of workers and equipment.	-	
	SR Basic principles and methods of design and repair unit.	7	
6	LK Designation of field service parks. Layout of general plans schemes of field parks. Classification of mobile vehicles. Their purpose and application in road construction.	2	
	PR Calculation of mobile vehicles for BDM services in field conditions	2	
	SR Mobile vehicles for maintenance and repair of BDM and PTM	10	

7	LK Optimizing the availability of spare parts. Reverse funds of nodes and aggregates of BDM. Methods of calculating the number of spare parts. Supply of PMM, electricity, coolants, water.	2	
	PR Calculation of the composition of PZM	2	
	SR Foreign method of delivery of spare parts	6	
8	LK Diagnostics of machines. The essence of the diagnostic system Methods of diagnosing BDM	4	
	PR Calculation of the area of the enterprise.	2	
	SR Foreign method of delivery of spare parts	10	
9	LK Brand service BDM.	2	
	SR Foreign method of delivery of spare parts	5	
10	LK Aims and objectives of tests. Preparation for tests. Types of tests.	2	
	SR Preparing the machine for commissioning.	5	
11	Conclusions. Summarizing the results Overview of the course of the lecture	2	
	SR The latest technologies in the maintenance of BDM and PTM	4	
<b>Toget her</b>	LK	32	
	PR	16	
	SR	72	

**Individual educational and research task**(in the presence):

#### **Teaching methods:**

MH1–verbal method (lecture, conversation, educational discussion, explanation, story);  
 MH2 – practical method (practical classes, performing exercises, performing situational tasks; writing);  
 MH3 – visual method (illustration method, demonstration method);  
 MH4 – working with educational and methodical literature, searching for information by task;  
 MH5 – video method in combination with the latest information technologies and computer learning tools (distance, multimedia, web-oriented, etc.);  
 MH6 – independent work;

#### **Assessment forms and methods**

FMO2 - final control (credit)  
 FMO3 - oral control (conversation)  
 FMO4 – written control (individual tasks)  
 FMO5 – test control (standardized tests, final complex tests)  
 FMO7 – practical examination (protection of practical works)  
 FMO8 - methods of self-control and self-assessment

## Evaluation system and requirements:

### Current performance

1 The current success rate of applicants for the performance of educational types of work in training sessions and for the performance of independent work tasks is evaluated using a four-point rating scale with subsequent transfer to a 100-point scale. During the evaluation of the current performance in are counted all types of work provided by the curriculum program

1.1 Lecture classes are evaluated by determining the quality of performance of specified tasks.

1.2 Practical classes are evaluated by the quality of performance of a control or individual task, performance and design of practical work.

1.3 Laboratory classes are evaluated by the quality of reports on the performance of laboratory work.

1.4 Seminar classes are evaluated by the quality of the performance of an individual task/abstract.

2 Evaluation of the current success rate of higher education applicants is carried out at each practical session (laboratory or seminary) on a four-point scale ("5", "4", "3", "2") and are entered in accounting journal academics success

– "excellent": acquirer flawlessly mastered the theoretical material, demonstrates deep knowledge of relevant topic or academic discipline, main provisions;

– "good": the applicant has mastered the theoretical material well, possesses the main aspects from primary sources and recommended literature, presents it in an argumentative manner; has practical skills, expresses his thoughts on certain problems, but certain inaccuracies and errors are assumed in the logic of the presentation of theoretical content or in the analysis of practical ones;

– "satisfactory": the applicant has basically mastered the theoretical knowledge of the educational topic or discipline, orients himself in primary sources and recommended literature, but answers unconvincingly, confuses concepts, answers additional questions uncertainly, does not have stable knowledge; when answering questions of a practical nature, reveals inaccuracy 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, hardly orients himself in primary sources and recommended literature, lacks scientific thinking, practical skills are not formed.

3 Final score by current activity is recognized as an arithmetic average sum points for each lesson, for individual work, current control works by the formula:

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

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

$K1, K2, \dots, Kn$  - evaluation of success  $n$ -th measure of current control;

$n$  - the number of measures of current control.

Grades are converted in points according to the calculation scale (table 1).

**Table 1**–Recalculation of the average grade for the current activity into a multi-point scale

4-point scale	100 points scale	4-ball scale	100 points scale	4-ball scale	100 points scale	4-ball scale	100 points 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	repeated study	

### Final assessment

**1** Graduate of higher education gets credit onto the last occupation with disciplines by the results of the current assessment. The average grade for the current activity is converted in points on a 100-point scale, according to the table recalculation (Table 1).

Graduates of higher education, which have an average current assessment with disciplines below than "3" (60 points), onto the last classes can increase their current score by taking quizzes with disciplines.

Assessment of the knowledge of applicants through testing is carried out according to the following scale:

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

**2** Condition of receipt credit is:

- working out all the missed ones occupations;
- the average current grade in the discipline is not lower "3" (60 points).

**3** For performing individual independent work and participating in scientific events, winners are awarded additional points.

**3.1** Additional points are added to the total points scored cake of higher education for the current educational activity (for disciplines for which the final form of control is a credit), or to the final assessment with disciplines, 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 importance:

- prizes in the discipline at the international / all-Ukrainian competition of scientific student works - 20 points;
- prize places in the discipline at the All-Ukrainian Olympiads - 20 points;
- participation in the international / all-Ukrainian competition of 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 the Khnadu in the discipline - 5 points;
- performance of individual scientific research (educational research) tasks of increased complexity– 5 points.

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

**4**The learning result is evaluated:

- by two-point scale (enrolled/not enrolled) according to table 2;

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

**Table 2**–The scale for transferring points to the national evaluation system

On a 100-point scale	On a national scale
from 60 points to 100 points	counted
less than 60 points	not counted

### Course policy:

- the course involves working in a team, 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 academic discipline, which are presented in accordance with the program for independent study, or were considered briefly;
- all tasks provided by the program must be completed within the set time;
- if the student of higher education is absent from classes for a good reason, he presents the completed tasks during independent preparation and consultation of the teacher;
- the coursework must be protected no later than a week before the beginning of the examination session (indicated if available);
- while studying the course, students of higher education must adhere to the rules of academic integrity set forth in the following documents: "Rules of academic integrity of participants in the educational process of the Khnadu" ([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 in the educational process of the National Academy of Sciences" ([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 plagiarism, the applicant receives 0 points for the task and must repeat the tasks provided for in the syllabus;
- writing off during tests and exams is prohibited (including using mobile devices). Mobile devices are allowed to be used only during online testing.

### Recommended Books:

- 1 Krasnokutskyi V.M. Operation of construction and road machines; study guide / V.M. Krasnokutskyi, V.B. Kosolapov, L.V. Razaryonov. H.: I will. 2012. 352S
- 2 Avrunyn G.A. Operation of hydraulic equipment of construction and road machines: (tutorial) / G. A. Avrunin, I. G. Kyrychenko, V. B. Samorodov; under the editorship G. A.

Avrunina. – Kh.: Khnadu, 2013. – 438 p.

3. Khmara L.A. etc. Motor roads: Construction, repair, machines and mechanisms for performing works. / Tutorial. L.A. Khmara, O.S. Shipilov, V.D. Musiyko, M.P. Kuzminets, - K.; D.: NTU, 2011 – 416 p.

4. Khmara L.A. Road machines: Machines for the construction, repair and maintenance of highways: education. manual. Part II / L. A. Khmara, O. S. Shipilov, V. D. Musiyko [and others]. - Kyiv-Dnipropetrovsk: NTU. – 2013.-399 p.

5. Makii Yu.A., Tkachenko V.G., Zerkalov D.V. Mechanization of road construction. Tutorial. - K.: Osnova, 2004 - 200 p.

6. Volkov V.P. Laboratory workshop on technological operation of cars. / Volkov V.P., I.A. Marmut, V.D. Myhal. - H. Khnadu, 2013 - 372 p.

#### Information resources

1. NTB KHNADU (Kharkiv, 25 Yaroslav Mudry St.) [Electronic resource]. (<http://library.khadi.kharkov.ua/>)

2. Hydraulic machines and hydraulic units (<http://www.kpi.kharkiv.edu/gdm>)

3. Industrial and mobile hydraulics ([www.parker.com](http://www.parker.com)).

4. Website of the department of BDM of Khnadu (<http://portal.khadi.kharkov.ua>).

5. Educational website of the Khnadu  
<https://dl2022.khadi.kharkov.ua/course/view.php?id=908>

Developer(s)

of the syllabus of the educational discipline \_\_\_\_\_ \_Leonid RAZARYONOV\_\_

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