Silabus
educational component of the UA
(elective discipline)

Construction machinery, road machines and equipment

Subjects:	**Construction machinery, road machines and equipment**
Level of higher education:	**first (bachelor's)**
Course page in Moodle:	**https://dl.khadi.kharkov.ua/course/view.php?id=703**
The scope of the educational component	**3 credits (90 hours)**
Final control form	**Offset**
Consultations:	**on schedule**
Name of the department:	**department of construction and road machines**
Teaching language:	**English**
Course leader:	**Oleksandr Viktorovych Shchukin, Ph.D., Associate professor**
Contact phone number:	**+38(057)7073689**
Email:	**kaf_bdm@ukr.net ,alexhome88@gmail.com**

Summary of the educational component:
The aim is to form future specialists' knowledge in mechanization and automation of construction processes, study of modern construction, road machinery and equipment, their operation and application in construction.
Subject: theoretical and methodological foundations, guidelines for the development of construction, road machinery and equipment.

The main tasks of studying an academic discipline are:
- studying the general nomenclature of machines used to perform the main types of construction work; design, operating principles and technical and economic indicators of the most common construction and road machines.
- acquiring skills in using information sources with technical characteristics of construction machines; determining the performance of machines by their technical parameters; reading kinematic diagrams of mechanisms, components, assemblies and machines in general.
- acquaintance with the general trends in the development of construction and road machinery, the possibilities of their use in individual technological processes.

Prerequisites for studying the educational component:
Higher mathematics. Theoretical mechanics. Physics. Resistance of materials.

Competencies acquired by the applicant:

General competencies:
Ability to abstract thinking, analysis and synthesis.
Knowledge and understanding of the subject area and professional activities.
Ability to use information and communication technologies.
Ability to search, process and analyze information from various sources.

Special (professional) competencies:

Ability to use conceptual scientific and practical knowledge of mathematics, chemistry and physics to solve complex practical problems in the field of construction and civil engineering.

Ability to select and use appropriate equipment, materials, tools and methods for the design and implementation of technological processes of construction production.

Learning outcomes in accordance with the educational program:

Design and implement technological processes of construction production, using appropriate equipment, materials, tools and methods.

Apply modern information technologies to solve engineering and management problems of construction and civil engineering.

To collect, interpret and apply data, including by searching, processing and analyzing information from various sources.

Be able to use methods of calculation justification in solving design and production problems in the design, construction and operation of roads and airfields.

Thematic plan

Topic No	Name of topics (LC, LW, PW, IT, IW)	Number of hours	
		full-time	extramural
1	2	3	4
1	LC. General information about machines and mechanisms, their purpose, structure and application. Types of productivity.	2	–
	IW. Study of kinematic schemes of mechanisms of construction and road machines.	4	–
2	LC. Bulldozers General structure, construction features. Productivity.	2	–
	PW. Traction calculation of a bulldozer.	2	–
	IW. Determining the performance of a bulldozer.	4	–
3	LC. Scrapers. Classification, construction features. Productivity.	2	–
	PW. Determination of scraper productivity.	2	–
	IW. Traction calculation of the scraper.	4	–
4	LC. Motor graders. Classification, general structure. Productivity.	2	–
	IW. Motor grader. Definition of productivity.	2	–
5	LC. Single bucket loaders. General structure. Productivity.	2	–
	IW. Forklift: Defining Performance.	6	–
6	LC. Excavators. Classification, features, definition of productivity.	2	–
	PW. Determining the productivity of a single-bucket excavator "reverse shovel".	2	–
7	LC. Lifting and transporting machines. Types, purpose and productivity.	2	–
	IW. Construction cranes: indexing.	6	–

1	2	3	4
8	LC. Machines for crushing and sorting building materials. Purpose and principle of operation.	2	–
	PW. Determination of crusher and screen productivity.	2	–
9	LC. Cats Design features, general structure. Definition of productivity.	2	–
	PW. Calculation of roller productivity.	2	–
10	LC. Asphalt pavers. General structure. Productivity	4	–
	PW. Determining the productivity of the asphalt paver.	2	–
11	LC. Road cutters. Classification. Design features. Productivity	2	–
	PW. Calculation of road cutter productivity	2	–
12	LC. Self-tarring machines. Features of application. Productivity.	2	–
	IW. Study of the hydraulic system of the self-tarring machine.	6	–
13	LC. Machines and equipment for preparing asphalt concrete mixtures. Technological schemes. General structure.	4	–
	IW. Calculation of the main parameters of the drying drum and paddle mixer.	6	–
14	LC. Machines and equipment for road maintenance and repair. Classification and application features.	2	–
	IW. Layout and determination of operational performance of watering and washing machines and sweeping machines.	6	–
Total	LC	32	–
	PW (LW, IT)	16	–
	IW	42	–

Teaching methods.
1. Verbal method (lecture, explanation, story);
2. Practical method (practical classes, exercises);
3. Visual method (method of illustrations, method of demonstrations);
4. Work with literature (educational, methodological, normative, work with textbooks and manuals; search for information on the task);
5. Video method in combination with the latest information technologies and computer learning tools (distance, multimedia);
6. Independent work.

Forms and methods of evaluation
1. Final control (offset);
2. Oral control (conversation);
3. Written control (individual tasks);
4. Test control (standardized tests, final comprehensive tests);
5. Practical check (protection of practical works);
6. Methods of self-control and self-assessment.

Evaluation system and requirements:
Current performance

1The current success 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", "Z", "2") and are entered in accounting journal academic success

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

–"good": the applicant has mastered the theoretical material well, possesses the main aspects from primary sources and recommended literature, presents it in a reasoned way; 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 averagesum points for each lesson, for individual work, current control works according to the formula:

$$K^{pres} = \frac{K1 + K2 + \ldots + Kn}{n},$$

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

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

n – the number of measures of current control.

Grades are convertedinpoints 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 A student of higher education receives a credit in the last lesson in the discipline based on the results of the current assessment. The average score for the current activity is converted into points on a 100-point scale, according to the conversion table (table 1).

Graduates of higher educationeducation,who have an average current grade in the discipline lower than "3" (60 points), in the last session can increase their current grade by taking tests in the discipline.

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 The condition for obtaining credit is:

–making up for all missed classes;

–the average current grade in the discipline is not lower than "3" (60 points).

3 Additional points are awarded to winners for performing individual independent work.

3.1 Additional points are added to the total points scored cake of higher education for the current educational activity.

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 on a 100-point scale (for differentiated assessment) according to table 2.

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

Table 2 – The scale for evaluating the knowledge of the students based on the results of the final control of the academic discipline

Score in points	Evaluation on a national scale		Evaluation according to the ECTS scale	
	examination	test	Rating	Criteria
90-100	**Perfectly**	**Enrolled**	**A**	The theoretical content of the course has been mastered in its entirety, without gaps, the necessary practical skills for working with the mastered material have been formed, all educational tasks provided for in the training program have been completed, the quality of their performance has been assessed with a number of points close to the maximum
80–89	**Okay**	**Enrolled**	**B**	The theoretical content of the course has been mastered in its entirety, without gaps, the necessary practical skills for working with the mastered material have mainly been formed, all educational tasks provided for by the training program have been completed, the quality of most of them has been assessed with a number of points close to the maximum
75-79			**C**	The theoretical content of the course has been mastered in its entirety, without gaps, some practical skills of working with the mastered material have not been formed enough, all educational 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 types of tasks have been completed with errors

Score in points	Evaluation on a national scale		Evaluation according to the ECTS scale	
	examination	test	Rating	Criteria
67-74	**Satisfactorily**		**D**	The theoretical content of the course is partially mastered, but the gaps are not of a significant nature, the necessary practical skills for working with the mastered material are basically formed, most of the educational tasks provided by the training program have been completed, some of the completed tasks may contain errors
60–66			**E**	The theoretical content of the course has been partially mastered, some practical work skills have not been formed, many educational tasks provided by the training program have not been completed, or the quality of some of them has been assessed with a number of points close to the minimum.
35–59	**Unsatisfactorily**	**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 prescribed training programs of educational 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 performance of educational tasks (with the possibility of retaking)
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 educational tasks contain gross errors, additional independent work on the course material will not lead to any significant improvement in the quality of the performance of educational tasks (with a mandatory repeat course)

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;
- 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), "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 the National Academy of Sciences (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 literature:

1. Methodical instructions for solving tasks in practical works from the discipline "Construction machinery, road machines and equipment" for students of specialties 192 "Construction and civil engineering" – Kharkiv: Stil-izdat, 2018. – 49p.
2. Zhigulin O. A. Lifting and transport machines: a study guide / O. A. Zhigulin, I. I. Makhmudov, N. O. Zhigulina. – Nizhin, 2020. – 150 p.
3. Synthesis of earthmoving and road engineering / edited by M.K. Sukach – K.: Lira-K Publishing House, 2017. – 376 p.
4. Shevchenko V.O. Dynamics and durability of construction and road machines / V.O. Shevchenko, O.V. Yaryzhko, O.O. Reznikov; Education manual - KHNADU, – Kh., 2014 – 190 p.
5. Construction equipment: a textbook / edited by V. O. Onishchenko, S. L. Litvinenko. - 2nd ed., revision. and additional Grif MON. – Kyiv: Kondor Publishing House, 2017. – 424 p.
6. Road construction machines: study guide / L.M. Kuzenko, D.V. Kuzenko, Z.Z. Vantukh, Y.Y. Cheesecake – Kyiv: "Condor" Publishing House, 2021. – 236 p.
7. Machines for earthworks: a textbook / L. A. Khmara, S. V. Kravets, M. P. Skobluk [and others]; in general ed. L. A. Khmary, S. V. Kravtsia. – Kharkiv: Favor, 2014. – 548 p.
8. Construction cranes (structures, technical characteristics, selection and operation): training manual / L. A. Khmara, M. P. Kolisnyk, A. F. Shevchenko [and others]. - Dnipropetrovsk: IMA-press, 2015. – 356 p.
9. Construction machines and equipment: education manual / M.K. Sukach – K.: KNUBA, 2020. – 390 p.

Additional sources:

1.Educational website of the KHNADU:https://dl.khadi.kharkov.ua/course/view.php?id=703
2. File archive of the department of BDM of KHNADU:
http://files.khadi.kharkov.ua/mekhanichnij-fakultet/budivelnikh-i-dorozhnikh-mashin.html
3. NTB of KHNADU: http://library.khadi.kharkov.ua/golovna/

Developer(s) of the silabus
of the educational discipline _____ ___Aleksandr SHCHUKIN___
signature name

Head of the department _____ __Natalia FIDROVSKA___
signature name