Silabus
educational component of the UA
(elective discipline)

Design of road construction enterprises

Name of the discipline:	**Design of road construction enterprises**
Level of higher education:	**first (bachelor's)**
Course page in Moodle:	https://dl2022.khadi.kharkov.ua/course/view.php?id=727
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:	**English**
Course leader:	**Zaur MUSAYEV, PhD, Associate Professor**
Contact phone number:	**+38 (057) 358-77-97**
E-mail:	**kaf_bdm@ukr.net**

Summary of the educational component:
Subject*:* pedagogically - adapted system of concepts about the principles of parameter selection and solving typical problems in the design of road construction enterprises.
The main tasks of studying the discipline are:
– formation of students' knowledge and understanding of the basic principles of organization of road construction enterprises and relevant methods of design work;
– mastering the skills of analysis for the selection of equipment for road construction enterprises
– mastering the methodology for the selection of equipment for road construction enterprises.

Prerequisites for studying the educational component:
General structure of construction and road machines; Theoretical mechanics; 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 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 assess the technical and economic efficiency of typical systems and their components based on the application of analytical methods, analysis of analogues and the use of available data.

Ability to make effective decisions on the choice of construction 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.

Select and apply the necessary equipment, tools and methods.

Skills and abilities to select the structure of the mechatronic system, algorithms of its functioning for the given parameters of the processes of lifting and transporting, construction, road and land reclamation machines, taking into account advanced scientific achievements in the fields of electronics, mechanics, control systems.

Thematic plan

no. of topics	Title of topics (LC, LR SR)	Number of hours	
		face-to-face	correspondence
1	LC Features of the design of production enterprises of road construction	1	0,5
	PR Determination of the plant operation mode (ABZ, CBR)	4	
	SR Features of the design of road construction production enterprises	3	10
2	LC Structure of the production base of road construction. Organization and design methods, main stages of designing of road construction production enterprises	2	0,5
	PR		2
	SR Organization and methods of design, the main stages of design of production enterprises of road construction	7	10
3	LC Indicators of technical and economic efficiency, technical level, quality of the enterprise	2	1
	PR		-
	SR Indicators of technical and economic efficiency, technical level, quality of work of the enterprise	3	10
4	LC Requirements for road construction production enterprises, their location and equipment selection.	3	1
	PR Selection of the main parameters of storage warehouses (CBR)	4	
	SR Requirements for road construction production enterprises, their location and equipment selection.	9	12

5	LC Design of asphalt concrete plants (ACP). General provisions about asphalt concrete mixture, classification, technology of its preparation. Classification of plants, main shops and equipment of asphalt mixers, their features. Initial data for the design of asphalt mixing plants. Design of technological process of asphalt mixtures manufacturing. Design of transport equipment of asphalt concrete plant	3	-
	PR 3. Determination of the main parameters of the drying unit ABZ	4	2
	SR Design of asphalt concrete plants (ACP). General provisions about asphalt concrete mixture, classification, technology of its preparation. Classification of plants, main shops and equipment of asphalt mixers, their features. Initial data for the design of asphalt mixing plants. Design of technological process of asphalt mixtures manufacturing. Design of transport equipment of asphalt concrete plant	10	10
6	LC Design of production plants for the preparation of organic asphalt binders. General information about bases of organic binders, classification of organic binders. Technological process of transportation, unloading, storage and preparation of bitumen. Classification of bitumen-melting units, determination of their quantitative composition. Features, stages of designing a bitumen shop, bitumen base. Selection of equipment. General plan of the asphalt plant. Location of the asphalt plant	2	
	WP 4 Determination of the main parameters of the unit for mixing asphalt-concrete (cement-concrete) mixtures	4	
	SR Technological process of transportation, unloading, storage and preparation of bitumen. Classification of bitumen-melting units, determination of their quantitative composition. Features, design stages of bitumen shop, bitumen base. Selection of equipment. General plan of the asphalt plant. Location of the asphalt plant	17	20
7	LC Design of cement concrete plants (CCP). General information (provisions) about cement concrete mixtures, their properties. Machines and equipment for the preparation of cement-concrete mixtures, classification, scope. Design of the equipment of the concrete mixing plant. Design of warehouse facilities, transport equipment. Calculation of the need for energy resources at the CBR. Design of the master plan of the concrete plant	1	-
	PR		
	SR Designing of the equipment of the Central Bank. Design of warehouse facilities, transport equipment. Calculation of the need for energy resources at the Central Depot. Designing of the general plan of the central depot	20	20
8	LC Ending Prospects for the development of the structure of industrial enterprises of road construction. Directions of improvement of knowledge in the field of design of industrial enterprises in the management in modern conditions.	2	-
	PR		

	SR Directions of improvement of knowledge in the field of design of production enterprises in the management in modern conditions.	19	20
Together	LC	16	4
	PR	16	4
	SR	88	102

Teaching methods:

MH1 - verbal method (lecture, explanation, story);
MH2 - practical method (practical 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 credit)
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 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 class, for individual work, current control works according to the formula:

$$K^{nomoч} = \frac{K1 + K2 + ... + Kn}{n},$$

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

$K1, K2, ..., Kn$ - 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	

Summative 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 2).

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 amount of points gained by the applicant for 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 significance:

-prize places in the discipline at the international / all-Ukrainian competition of scientific student works - 20 points;

-prize places in the discipline at national competitions - 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 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.

4The result of the training is evaluated:

-on a two-point scale (passed/not passed) according to Table 3;

- on a 100-point scale (knowledge assessment scale) according to Table 4.

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

Table 3- 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

Table 4- Scale of assessment of knowledge of applicants according to 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

Score in points	Assessment on the national scale		Evaluation on the ECTS scale	
	examination	offset	Evaluation	Criteria.
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 has been mastered partially, some practical skills have not been formed, many of the training tasks provided by the training program have not been completed, or the quality of some of them is estimated by the number of points close to the minimum.
35-59	**Unsatisfactory**	**Not enrolled**	**FX**	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)

Score in points	Assessment on the national scale		Evaluation on the ECTS scale	
	examination	offset	Evaluation	Criteria.
0-34	**Unacceptable.**		**F**	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;
- 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), "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 of 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. 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.
2. 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.
3. 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. Bilyakovych, M.P. Kuzminets [et al. - 324 c.
4. 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.,

5. Emelianov V.P., Rukavyshnikov Y.V. Construction machinery and road machines. - Kharkiv: KhNADU, 2011.- 336 p.

Additional sources:

1. KhNADU Media Library (25 Yaroslav Mudryi St., Kharkiv)[electronic resource] (http://files.khadi.kharkov.ua/)
2. NTB KhNADU (25 Yaroslav Mudryi St., Kharkiv)[electronic resource] . (http://library.khadi.kharkov.ua/)
3. KhNADU training website https://dl2022.khadi.kharkov.ua/course/view.php?id=727

Developer(s)
silabus of the discipline _____ __Zaur MUSAYEV__
name signature

Head of the Department of DBM _____ __Natalia FIDROVSKA__
name signature