NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF UKRAINE

Department of machine and equipment design

"APPROVED"
Acting Dean of the Faculty of Construction and Design
_____ Oleksandr BANNIY
"___" _____ 2024

"APPROVED"
at the meeting of
department of machine and equipment design
Minutes №10 of "16" May 2024
Head of the Department
_____ Viatcheslav LOVEIKIN

"REVIEWED"
Guarantor of the AP «Civil Engineering»
_____ Yevhen DMYTRENKO

CURRICULUM OF ACADEMIC DISCIPLINE

CONSTRUCTING MACHINES

Field of knowledge 19 – Architecture and construction
Specialty: 192 – Civil Engineering
Academic programme: Civil Engineering
Faculty of Construction and Design
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Description of the discipline

CONSTRUCTING MACHINES

The main tasks in the field of construction machines include increasing the efficiency of capital investments, directing them to solving the priority needs of construction development, reconstruction and technical conversion of existing enterprises. Also students study increasing the role and responsibility of all sections of construction, the use of structural materials, heat treatment, methods of calculation and design of general purpose parts, the use of modern methods of calculating belt gears, the selection of rolling bearings, drawing up kinematic diagrams of machine drives, the use of methods for the selection of standard electric motors, gearboxes, mechanical clutch.

Academic degree, specialty, academic programme		
Academic degree	bachelor	
Specialty	192 – Civil Engineering	
Academic programme	Civil Engineering	
Characteristics of the discipline		
Type	compulsory	
Total number of hours	120	
Number of ECTS credits	4	
Number of modules	2	
Course project (work) (if any)	-	
Form of assessment	exam	
Indicators of the discipline for full-time and part-time forms of university study		
	Full-time	Part-time
Year of study	2	-
Semester	4	
Lectures	30 h.	-
Practical classes and seminars	-	-
Laboratory classes	30 h.	-
Self-study	60 h.	-
Number of hours per week for full-time students	4 h.	-

1. Aim, objectives, competences and expected learning outcomes of the discipline

The aim of the discipline is the formation of students' systems of knowledge regarding: the classification of construction machinery and equipment as a system based on the distribution of a set of their characteristics. Taking this into account, a common feature is selected for classification - this is the type of work performed or purpose. This structure is due to the need for gradual assimilation of the material.

The task of the discipline is as follows: to study the specifics of calculating and designing general-purpose parts: gears and gears with a flexible connection, shafts and axles, rolling and sliding bearings, to learn the specifics of designing body parts and frames, to learn to independently select machine elements.

Competence acquisition:

integral competence (IC): The ability to solve complex specialized construction and civil engineering tasks in the learning process, which involves the application of a set of theories and methods for determining the strength, stability, deformability, modeling, strengthening of building structures; further safe operation, reconstruction, construction and installation of buildings and engineering structures; application of automated design systems in the field of construction

general competences:

GC02. Knowledge and understanding of the subject area and professional activity.

GC06. Ability to search, process and analyze information from various sources.

GC07. Interpersonal skills

professional (special) competences (GC):

SC04. Ability to choose and use appropriate equipment, materials, tools and methods for designing and implementing technological processes of construction production.

SC07. Ability to bear responsibility for making and making decisions in the field of architecture and construction in unpredictable work contexts.

SC08. Awareness of the principles of designing rural areas.

Expected learning outcomes (ELO):

ELO 04. Design and implement technological processes of construction production, using appropriate equipment, materials, tools and methods.

ELO 07. Collect, interpret and apply data, including through the search, processing and analysis of information from various sources.

ELO 10. Make and implement rational decisions on the organization and management of construction processes during the construction of construction objects and their operation.

ELO 16. To carry out justifications regarding the economic feasibility of variant design, construction, reconstruction and operation of buildings and structures, to use methods of investment evaluation of construction objects.

2. Programme and structure of the discipline for:

- full-time (part-time) form of study;
- reduced full-time (part-time) form of study.

Modules and topics	Number of hours						
	full-time						
	total	including					
		l	p	lab	ind	s.st	weeks
1	2	3	4	5	6	7	8
Module 1. Machines for performing preparatory operations							
Topic 1. Machines for earthworks	10	2	-	-	-	8	1
Topic 2. Machines for work with concrete	8	2	-	-	-	6	2
Topic 3. Construction manual tools	8	2	-	-	-	6	3
Total for module 1	26	6	-	-	-	20	-
Module 2. Conveying machines							
Topic 1. Characteristics of transport machines	6	2	-	-	-	4	4
Topic 2. Basics of calculation of mechanical transport machines with flexible traction bodies	10	2	-	2	-	6	4-6
Topic 3. Design features of conveyors with a flexible traction element	16	2	-	10	-	4	6-7
Topic 4. Features of designs and calculations of conveyors without a flexible traction element	20	4	-	10	-	6	7-8
Total for module 2	52	10	-	22	-	20	-
Module 3. Load-lifting machines							
Topic 1. Characteristics of lifting machines	6	2	-	-	-	4	9-10

Topic 2. Parts and components of lifting machines	14	4	-	4	-	6	10-12
Topic 3. Mechanisms of lifting machines	12	4	-	4	-	4	12-14
Topic 4. Devices of lifting machines	10	4	-	-	-	6	14-15
Total for module 3	42	14	-	8	-	20	-
Total hours	120	30	-	30	-	60	-

3. Topics of laboratory (practical, seminar) classes

№	Topic title	Hours
1	Laboratory 1. Study of the design and determination of the parameters of the conveyor belt	2
2	Laboratory 2. Study of the design and definition of the basic parameters of the scraper conveyor	4
3	Laboratory 3. Study of the design and definition of the basic parameters of the bucket conveyor	6
4	Laboratory 4. Study of the design and definition of the basic parameters of the screw conveyor	10
5	Laboratory 5. Studying of constructions and determination of parameters of welds and winches with manual and machine drives	4
6	Laboratory 6. Study of constructions and study of the parameters of the components of the lifting mechanism of load-lifting cranes	4

4. Topics for self-study

№	Topic title	Hours
1	Structure and features of the use of excavators and graders during construction work	4
2	Construction and performance calculations of a concrete pump	3
3	Construction and rules of use of perforators	3
4	Basic calculations of transport machines	2
5	Belt conveyors in construction industry	3
6	Bucket conveyors in construction industry	2
7	Screw conveyors in construction industry	3
8	Overhead cranes	2
9	Principles of using tower cranes in construction industry	3
10	Peculiarities of mechanisms for changing departure, lifting cargo and moving cranes	2
11	Brakes of cranes	3

5. Tools for assessing expected learning outcomes:

- exam;
- credit;
- module tests;
- abstracts;
- presentation of laboratory and practical works.

6. Teaching methods:

When teaching this discipline, the following are used: verbal method (lecture, discussion, interview, etc.); practical method (laboratory classes); visual method (illustration method, demonstration method); work with educational and methodical literature (noting, summarizing, annotating, reviewing, writing an abstract); video method (remote, multimedia, web-oriented, etc.); independent work (task performance); individual research work of students of higher education.

7. Assessment methods

When teaching this discipline, the following are used: exam; test; oral or written survey; unit testing; abstracts; protection of laboratory works; presentations and speeches at scientific events.

8. Distribution of points received by students

The assessment of students' knowledge and skills is conducted by means of a 100-point scale and is converted into national grades according to Table 1 of the current *Exam and Credit Regulations at NULES of Ukraine*.

Student's rating, points	National grading of exams and credits	
	exams	credits
90-100	excellent	pass
74-89	good	
60-73	satisfactorily	
0-59	unsatisfactorily	fail

To determine a student's rating in the discipline $\mathbf{R_{DIS}}$ (up to 100 points), the received assessment rating $\mathbf{R_A}$ (up to 30 points) is added to the academic performance raiting $\mathbf{R_{AP}}$ (up to 70 points): $\mathbf{R_{DIS}} = \mathbf{R_{AP}} + \mathbf{R_A}$.

9. Teaching and learning aids

1. https://elearn.nubip.edu.ua/course/view.php?id=3462
2. textbooks, manuals, tutorials;
3. guidelines for studying a discipline by full-time and part-time students.

10.Recommended sources of information

1. Будівельні машини і обладнання: навч. посібник / М.К. Сукач. К.: КНУБА, 2020. − 390 с.

2. С. В. Шаповал, О. М. Болотських. Будівельна техніка та виробнича база будівництва. Харків – ХНУМГ ім. О. М. Бекетова – 2020. – 140 с
3. Прокопенко Т.О. Теорія систем і системний аналіз: навч. посібн. [Електронний ресурс]. М-во науки і освіти України, Черкаський держ. технол. університет, ЧДТУ, 2022. 139 с.
4. Construction Equipment Management: Advanced Topics in Optimization and Scheduling. Authors: Miguel A. Munoz and Amitabh Kumar. Publisher: Wiley. 2021.
5. Construction Equipment Management: Principles, Procedures, and Best Practices. Authors: R. L. Peurifoy, Clifford J. Schexnayder, and Aviad Shapira. Publisher: McGraw-Hill Education. 2022.
6. ДСТУ Б В.2.8-10-98. Будівельна техніка, оснастка, інвентар та інструмент. Стропи вантажні. Класифікація, параметри та розміри, технічні вимоги
7. В. Яременко, А. Куценко, М. Бондар. Будівельна механіка. - Центр навчальної літератури, 2019 – 644 с.
8. Дорожньо-будівельні машини: навчальний посібник / Л.М. Кузенко, Д.В. Кузенко, З.З. Вантух, Я.Й. Панюра. – Київ: Видавничий дім «Кондор», 2021. – 236 с.
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10. org2.knuba.edu.ua›mod/resource/view.php
11. pgs.at.ua›load/budivelne_materialoznavstvo/1-1-0-3