

**NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF
UKRAINE**

Machines and equipment design department

APPROVED

Faculty of design and engineering

10 June 2025

**CURRICULUM OF ACADEMIC DISCIPLINE
CONSTRUCTING MACHINES**

(title)

Area of knowledge: G "Engineering, production and construction"

Specialty: G19 "Construction and civil engineering"

Academic programme "Construction and civil engineering"

Orientation of the program: educational and professional

Faculty of design and engineering

Developed by: doctor of technical sciences, professor Romasevych Yu.O., Doctor of technical sciences, professor Loveikin V.S.

Kyiv – 2025

Description of the discipline

Constructing Machines

(title)

The discipline "Constructing Machines" is taught in accordance with the curriculum for bachelors specialty G19 "Civil Engineering". Constructing Machines are an integral part of the system of machines that provide mechanization of work in civil engineering. Constructing machines facilitate and increase the productivity of workers and increase the efficiency of the operations in civil engineering. The course plays an important role in the formation of an engineer in civil engineering. It is directly related to production. The knowledge gained in the study of the discipline "Constructing Machines" students use in training-laboratory and practical classes, during all types of practices, and then as a specialist, constantly in their work and life.

Area of knowledge, specialty, academic programme, academic degree	
Academic degree	<i>Bachelor</i>
Specialty	<i>G19 «Construction and civil engineering»</i>
Academic programme	<i>Construction and civil engineering</i>
Characteristics of the discipline	
Type	<i>Mandatory</i>
General volume of hours	<i>120</i>
Number of credits ECTS	<i>4</i>
Number of modules	<i>3</i>
Course project	<i>-</i>
Control form	<i>Exam</i>
Indicators of the discipline for full-time forms of university study	
Year of study	<i>2</i>
Term	<i>3</i>
Lectures	<i>30 h.</i>
Practical classes and seminars	<i>-</i>
Laboratory classes	<i>30 h.</i>
Self-study	<i>60 h.</i>
Number of hours per week for full-time students	<i>4 h.</i>

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

The general aim of the course is to teach students the basics of knowledge about hoisting, conveying, earthworks, concrete and manual machines. The main purpose of the course - is the study of structures, calculation, design, rules of safe operation of hoisting, conveying, earthworks, concrete and manual machines.

Competences acquired:

integral competence: the ability to solve complex specialized construction and civil engineering problems in the learning process, which involves the application of a complex of theories and methods for determining the strength, stability, deformability, modeling, strengthening of building structures; subsequent safe operation, reconstruction, erection and installation of buildings and engineering structures; application of computer-aided design systems in the construction industry.

general competences (GC):

GC 02 – Knowledge and understanding of the subject area and professional activity.

GC 06 – Ability to search, process and analyze information from various sources.

GC 07 – Interpersonal skills.

special (professional) competencies (SC):

SC04 – Ability to select and use appropriate equipment, materials, tools and methods for the design and implementation of technological processes in construction production.

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

SC08 – Awareness of the principles of designing residential areas.

Expected learning outcomes (ELO):

ELO04 – Design and implement technological processes in construction production, using appropriate equipment, materials, tools and methods.

ELO 07 – Collect, interpret and apply data, including by searching, processing and analyzing 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 – Perform justification for the economic feasibility of alternative design, construction, reconstruction and operation of buildings and structures, use methods of investment assessment of construction objects.

2. Programme and structure of the discipline

Modules and topics	Number of hours						
	Weeks	Total	Including				
			l	p	lab	ind	s.st.
<i>Module 1. Conveying machinery</i>							
Topic 1. Introduction. Characteristics of construction machines	1	2	2	-	-	-	-
Topic 2. Belt and Bucket conveyors	2-4	20	4	-	8	-	8
Topic 3. Screw Conveyors	5-7	18	4	-	4	-	10
Total on 1st module	-	40	10	-	12	-	18
<i>Module 2. Hoisting machinery</i>							
Topic 4. Overhead cranes	7-8	16	2	-	4	-	10
Topic 5. Tower cranes and Derricks	9	12	4	-	-	-	8
Topic 6. Ropes, Blocks-and-Tackles and Load-Handling Devices	10-12	12	4	-	8	-	-
Total on 2nd module	-	40	10	-	12	-	18
<i>Module 3. Earthworks, Concrete and Manual Machines</i>							
Topic 7. Earthworks Machines	12-13	16	4	-	-	-	12
Topic 8. Concrete Machines	13-14	16	4	-	-	-	12
Topic 9. Manual Machines	14-15	8	2	-	6	-	-
Total on 3rd module	-	40	10	-	6	-	24
Total hours	120		30	-	30	-	60

3. Topics of lectures

№	Topic	Hours
1	Introduction. Characteristics of construction machines	2
2	Belt and Bucket conveyors	4
3	Screw Conveyors	4
4	Overhead cranes	2
5	Tower cranes and Derricks	4
6	Ropes, Blocks-and-Tackles and Load-Handling Devices	4
7	Earthworks Machines	4
8	Concrete Machines	4
9	Manual Machines	2

4. Topic of laboratory (practical, seminars) classes

№	Topic	Hours
1	Belt conveyor	4
2	Bucket conveyor	4
3	Screw Conveyor	4
4	Ropes, Blocks-and-Tackles	8
5	Jacks	2
6	Telpher	2
7	Manual Machines	6

5. Topics of self-study

№	Topic	Hours
1	Determination of the force in the belt (method of bypassing the contour). Calculation of the power of the conveyor drive.	8
2	Types of the screws and their operation. Calculation of the power of the conveyor drive.	10
3	Types of brakes for crane mechanisms. Calculation of brakes for hoist mechanism.	10
4	Hydraulic and screw jacks operation. Force analysis. Selection and calculation. Advantages and drawbacks.	8
5	Earthworks Machines. Their technical features and use.	12
6	Classifications of machines for concrete compaction. Their technical features and use.	12

6. Methods of assessing expected learning outcomes:

When teaching this discipline, the following diagnostic tools are used: oral interview; exam; module tests; defense of laboratory work.

7. Teaching methods:

When teaching this discipline, the following methods are used: problem-based learning method; practice-oriented learning method; research-based learning method; educational discussions and debates method; teamwork and brainstorming method.

8. Results assessment

The knowledge of a higher education applicant is assessed on a 100-point scale, which is translated into a national assessment in accordance with the current "Regulations on Examinations and Tests at the NUBiP of Ukraine."

8.1 Distribution of points by types of educational activities

Educational activity	Results	Assessment
Module 1. Conveying machinery		
Lab 1	ELO04, ELO 10, ELO 16. To know the features of conveying machines and be able to calculate the capacity. To be able to select proper conveying machine for technological process.	10
Lab 2		10
Self-preparation work 1		20
Lab 3		10
Self-preparation work 2		20
Module 1 test	-	30
Overall on 1st module	-	100
Module 2. Hoisting machinery		
Lab 4	ELO04, ELO 7, ELO 10, ELO 16. To know the features of hoisting machines and be able to calculate the hoisting ability and capacity. To be able to select proper hoisting machine for technological process.	15
Self-preparation work 3		20
Self-preparation work 4		20
Lab 5		15
Module 2 test	-	30
Overall on 2nd module	-	100
Module 3. Earthworks, Concrete and Manual Machines		
Self-preparation work 3	ELO04, ELO 7, ELO 10, ELO 16. To know the features of earthworks, concrete and manual machines and be able to calculate the capacity of concrete mixers, pumps, earthworks machines etc. To be able to select proper earthworks, concrete and manual machines for technological process	25
Self-preparation work 4		25
Lab 5		20
Module 3 test	-	30
Overall on 3rd module	-	100
Class work	-	$(M1+M2+M3)/3 \cdot 0,7 \leq 70$
Exam	-	30
Total	-	$(\text{Class work} + \text{Exam}) \leq 100$

8.2 Scale for assessing student's knowledge

Student's rating, points	National grading (exam/credits)
90-100	excellent
74-89	good
60-73	satisfactory
0-59	unsatisfactory

8.3 Assessment policy

<i>Deadlines and exam retaking rules</i>	works that are submitted late without valid reasons will be assessed with a lower grade. Module tests may be retaken with the permission of the lecturer if there are valid reasons (e.g. a sick leave).
<i>Academic integrity rules</i>	cheating during tests and exams is prohibited (including using mobile devices). Term papers and essays must have correct references to the literature used
<i>Attendance rules</i>	attendance is compulsory. For good reasons (e.g. illness, international internship), training can take place individually (online by the faculty dean's consent)

9. Teaching and learning aids

1. Course on E-learn: <https://elearn.nubip.edu.ua/enrol/index.php?id=2261>
2. lecture notes and their presentations (in electronic form);
3. methodological materials for studying the academic discipline for higher education students.

10. Recommended sources of information

1. Douglas D. Gransberg. Construction Equipment Management for Engineers, Estimators, and Owners. Publisher: CRC Press, 2016 (2nd Edition).
2. Michael Schaufelberger, Koay Teong Wan. Construction Equipment and Methods: Planning, Innovation, Safety. Publisher: Routledge, 2017.
3. Roy Chudley and Roger Greeno. Construction Technology. (6th Edition). Publisher: Routledge, 2016
4. edX – “Construction Equipment and Techniques”, offered by: Delft University of Technology (TU Delft). <https://www.edx.org>
5. Coursera – “Construction Management Specialization”, offered by: Columbia University. <https://www.coursera.org>
6. MIT OpenCourseWare – “Construction Engineering and Project Management”, offered by: Massachusetts Institute of Technology (MIT). <https://ocw.mit.edu>
7. Caterpillar Performance Handbook (Edition 48 or later). Publisher: Caterpillar Inc., updated annually. <https://www.cat.com>
8. Komatsu Product & Application Handbook. Publisher: Komatsu Ltd., current editions from 2016–2024. <https://www.komatsu.com>
9. European Construction Equipment (CECE) Market Reports. Publisher: CECE, Annual Reports since 2016. <https://www.cece.eu>