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**Federal State Autonomous Educational Institution of Higher Education  
Peoples' Friendship University of Russia named after Patrice Lumumba  
RUDN University**

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educational division (faculty/institute/academy) as higher education programme developer

## **COURSE SYLLABUS**

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### **MECHANIZATION OF CROP PRODUCTION**

course title

**Recommended by the Didactic Council for the Education Field of:**

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#### **35.04.04 AGRONOMY**

field of studies / speciality code and title

**The course instruction is implemented within the professional education programme of higher education:**

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#### **GENERAL AGRICULTURE**

higher education programme profile/specialisation title

## 1. COURSE GOAL(s)

The course "Mechanization of Crop Production" is part of the Master's programme "General Agriculture" in the field of study 35.04.04 "Agronomy" and is studied in the 1st semester of the 1st year. The discipline is implemented by the Department of Transport Machinery and Technologies. The discipline consists of 9 sections and 32 topics and is aimed at studying mechanized technologies and technical means for their implementation in the crop production industry.

### The course aims to:

1. Address the development of students' awareness in modern mechanized technologies for crop cultivation and production;
2. Familiarize students with the theoretical background, terminology, and concepts of agricultural machinery, energy means (tractors), and specialized equipment for soil tillage, sowing, care, harvesting, and fertilizer application;
3. Deepen students' knowledge in the classification, general structure, and operating principles of various agricultural machines and implements;
4. Enhance students' skills in forming general professional and professional competencies in the field of mechanization of technological processes for cultivating agricultural crops and producing crop products through practical laboratory work.

The goal of mastering the discipline is the formation of students' general professional and professional competencies in the field of mechanization of technological processes for cultivating agricultural crops and producing crop products. This subject provides an advanced study of mechanization strategies and technologies for their implementation in agricultural production.

## 2. REQUIREMENTS FOR LEARNING OUTCOMES

Mastering the course "Mechanization of Crop Production" is aimed at the development of the following competences (or parts thereof) in students:

*Table 2.1. List of competences that students acquire through the course study*

<b>Competence code</b>	<b>Competence descriptor</b>	<b>Competence formation indicators (within this course)</b>
GC-2	Ability to manage a project at all stages of its life cycle	GC-2.1 Develops a project concept within the framework of the designated problem, formulating the goal, objectives, relevance, significance (scientific, practical, methodological, etc., depending on the type of project), expected results and possible areas of their application;
GPC-5	Ability to carry out feasibility studies of projects in professional activities	GPC-5.2 Analyzes the main production and economic indicators of the project in agronomy;

<b>Competence code</b>	<b>Competence descriptor</b>	<b>Competence formation indicators (within this course)</b>
PC-1	Ability to organize experiments (field trials) to assess the effectiveness of innovative technologies (technology elements), varieties, and hybrids under production conditions	PC-1.1 Develops a research program to study the effectiveness of innovative technologies (technology elements), varieties, and hybrids; develops methodologies for conducting experiments; masters new research methods;

### 3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The course refers to the core component of Block 1 "Disciplines (Modules)" of the higher educational programme curriculum.

Within the higher education programme, students also master other disciplines and/or internships that contribute to the achievement of the expected learning outcomes as results of the course study.

*Table 3.1. The list of the higher education programme components/disciplines that contribute to the achievement of the expected learning outcomes as the course study results*

<b>Competence code</b>	<b>Competence descriptor</b>	<b>Previous courses/modules*</b>	<b>Subsequent courses/modules*</b>
GC-2	Ability to manage a project at all stages of its life cycle		Technological Training; Undergraduate Practice / Pre-graduation Practice; Soil Fertility Management; Crop Production
GPC-5	Ability to carry out feasibility studies of projects in professional activities		Postharvest Management
PC-1	Ability to organize experiments (field trials) to assess the effectiveness of innovative technologies (technology elements), varieties, and hybrids under production conditions		Scientific Research Work; Technological Training; Undergraduate Practice / Pre-graduation Practice; Crop Production; Pests and Diseases; Breeding and Seed Production; Plant Protection; Soil Fertility Management

\* To be filled in according to the competence matrix of the higher education programme.

### 4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

The total workload of the course "Mechanization of Crop Production" amounts to 3 credits (108 academic hours).

Table 4.1. Types of academic activities during the periods of higher education programme mastering (full-time training)\*

Type of academic activities	Total academic hours	Semesters/training modules
		1
<i>Contact academic hours</i>	51	51
including:		
Lectures (LC)	17	17
Lab work (LW)	34	34
Seminars (workshops/tutorials) (S)	0	0
<i>Self-studies</i>	39	39
<i>Evaluation and assessment (exam/passing/failing grade)</i>	18	18
<b>Course workload</b>	academic hours	<b>108</b>
	credits	<b>3</b>

\* To be filled in regarding the higher education programme correspondence training mode.

## 5. COURSE CONTENTS

Table 5.1. Course contents and academic activities types

Course module title	Course module contents (topics)	Academic activities types
Module 1: General Provisions	Topic 1.1. History of the development of mechanization in agriculture	LC, LW
	Topic 1.2. Comprehensive mechanization of crop production	LC, LW
Module 2: Energy Means in Crop Production	Topic 2.1. Classification of agricultural tractors	LC, LW
	Topic 2.2. General structure of agricultural tractors	LC, LW
	Topic 2.3. Self-propelled agricultural machines	LC, LW
Module 3: Technologies and Technical Means for Soil Tillage	Topic 3.1. Technologies and tools for primary soil tillage	LC, LW
	Topic 3.2. Technologies and tools for surface soil tillage	LC, LW
Module 4: Technologies and Technical Means for	Topic 4.1. Technologies for sowing and planting agricultural crops	LC, LW

<b>Course module title</b>	<b>Course module contents (topics)</b>	<b>Academic activities types</b>
Sowing and Planting Agricultural Crops	Topic 4.2. Types, general structure and principle of operation of continuous seeding drills	LC, LW
	Topic 4.3. Types, general structure and principle of operation of precision seeders	LC, LW
	Topic 4.4. Types, general structure and principle of operation of potato planting and seedling planting machines	LC, LW
Module 5: Technologies and Technical Means for Care of Crops and Plantings	Topic 5.1. Main techniques and technologies for care of crops and plantings of agricultural crops	LC, LW
	Topic 5.2. Types, general structure and principle of operation of tools for inter-row cultivation of soil on crops and plantings of row crops	LC, LW
	Topic 5.3. Types, general structure and principle of operation of machines for chemical control of weeds, diseases and pests on crops of agricultural crops	LC, LW
Module 6: Technologies and Technical Means for Harvesting Agricultural Crops	Topic 6.1. Technologies for harvesting grain crops, corn and sunflower for grain	LC, LW
	Topic 6.2. Types, general structure and principle of operation of grain harvesters	LC, LW
	Topic 6.3. Technologies for potato harvesting	LC, LW
	Topic 6.4. Types, general structure and principle of operation of potato harvesting equipment	LC, LW
	Topic 6.5. Technologies for harvesting open-field vegetables	LC, LW
	Topic 6.6. Types, general structure and principle of operation of equipment for harvesting open-field vegetable crops	LC, LW
	Topic 6.7. Technologies for fodder harvesting	LC, LW
	Topic 6.8. Types, general structure and principle of operation of equipment for harvesting grass for hay	LC, LW
	Topic 6.9. Types, general structure and principle of operation of equipment for harvesting grass for haylage	LC, LW
	Topic 6.10. Types, general structure and principle of operation of silage harvesting equipment	LC, LW
Module 7: Technologies and Technical Means for Fertilizer Application	Topic 7.1. Types and technologies for applying organic and organo-mineral fertilizers	LC, LW
	Topic 7.2. Types, general structure and principle of operation of machines for applying solid and liquid organic fertilizers	LC, LW
	Topic 7.3. Classification and technologies for applying mineral fertilizers	LC, LW
	Topic 7.4. Types, general structure and principle of operation of machines for applying mineral fertilizers	LC, LW

Course module title	Course module contents (topics)	Academic activities types
Module 8: Technologies and Technical Means for Post-Harvest Processing and Storage	Topic 8.1. Technologies for post-harvest processing and storage of harvest	LC, LW
	Topic 8.2. Types, general structure and principle of operation of machines for post-harvest processing and storage of harvest	LC, LW
Module 9: Basics of Operation	Topic 9.1. Technical and economic indicators of the work of machine-tractor aggregates in crop production	LC, LW
	Topic 9.2. Formation of machine-tractor aggregates	LC, LW

\* - to be filled in only for **full**-time training: *LC* - lectures; *LW* - lab work; *S* - seminars.

## 6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

*Table 6.1. Classroom equipment and technology support requirements*

Type of academic activities	Classroom equipment	Specialised educational / laboratory equipment, software, and materials for course study (if necessary)
Lecture	A lecture hall for lecture-type classes, equipped with a set of specialised furniture; board (screen) and technical means of multimedia presentations.	
Lab work	A classroom for laboratory work, individual consultations, current and mid-term assessment; equipped with a set of specialised furniture and machinery.	Models of agricultural machines, posters, multimedia video materials, digital virtual twins of agricultural machines and implements
Self-studies	A classroom for independent work of students (can be used for seminars and consultations), equipped with a set of specialised furniture and computers with access to the electronic information and educational environment.	

\* The premises for students' self-studies are subject to **MANDATORY** mention

## 7. RESOURCES RECOMMENDED FOR COURSE STUDY

### *Main readings:*

1. Kartashevich, A. N. Tractors and Automobiles. Construction [Electronic resource]: teaching aid / A. N. Kartashevich, O. V. Pontalev, A. V. Gordeenko. — Electronic data. — Minsk: Novoe Znanie, 2020. — 313 p. — Access mode: <http://e.lanbook.com/book/43877>

2. Maksimov, I. I. Workshop on Agricultural Machines: Teaching Aid. – St. Petersburg: Lan Publishing House, 2021. – 416 p.: ill. Internet access: [http://e.lanbook.com/books/element.php?pl1\\_id=60045](http://e.lanbook.com/books/element.php?pl1_id=60045)

*Additional readings:*

1. Mechanization and Automation of Agricultural Production: teaching aid / compiler A. G. Grishin. — Gorno-Altaysk: GAU, 2020. — 385 p. — Electronic text // Lan: electronic library system. — URL: <https://e.lanbook.com/book/178004> (accessed: 17.03.2025). — Access mode: for authorized users.

2. Batraeva, O. S. Agricultural Machines: Laboratory Workshop: teaching aid / O. S. Batraeva, N. A. Telichkina. — Chelyabinsk: SUSAAU, 2022. — 118 p. — ISBN 978-5-88156-919-8. — Electronic text // Lan: electronic library system. — URL: <https://e.lanbook.com/book/363815> (accessed: 17.03.2025). — Access mode: for authorized users.

*Internet sources*

1. **1. Electronic libraries (EL) of RUDN University and other institutions, to which university students have access on the basis of concluded agreements:**

- RUDN Electronic Library System (RUDN ELS): <https://mega.rudn.ru/MegaPro/Web>
- EL "University Library Online": <http://www.biblioclub.ru>
- EL "Yurait": <http://www.biblio-online.ru>
- EL "Student Consultant": [www.studentlibrary.ru](http://www.studentlibrary.ru)
- EL "Znanium": <https://znanium.ru/>

**Databases and search engines:**

- Techexpert (information and reference system of GOSTs): <http://www.cntd.ru/>
- "Selkhoztehnika" (automated reference system): <http://www.agrobase.ru>
- Sage: <https://journals.sagepub.com/>
- Springer Nature Link: <https://link.springer.com/>
- Wiley Journal Database: <https://onlinelibrary.wiley.com/>
- Bibliometric database Lens.org: <https://www.lens.org>

*Training toolkit for self- studies to master the course \*:*

1. The set of lectures on the course "Mechanization of Crop Production".
2. The laboratory workshop on the course "Mechanization of Crop Production".

\* The training toolkit for self- studies to master the course is placed on the course page in the university telecommunication training and information system under the set procedure.

**DEVELOPERS:**

Head of the Department

Asoyan Artur Rafikovich

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position, department

name and surname

**HEAD OF EDUCATIONAL DEPARTMENT:**

Head of the Department

Asoyan Artur Rafikovich

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**HEAD  
OF HIGHER EDUCATION PROGRAMME:**

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Pakina E. N.

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