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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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### **INFORMATION TECHNOLOGIES**

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 "Information Technologies" 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 Agrobiotechnology Department. The discipline consists of 4 sections and 11 topics and is aimed at studying information processing in agriculture.

### The course aims to:

1. Address the development of students' awareness in modern approaches to information processing and management in agricultural production;
2. Familiarize students with the theoretical background, terminology, and concepts of information systems, data structures, and database management;
3. Deepen students' knowledge in classification of information systems, methods of data access, and evolution of database technologies;
4. Enhance students' skills in applying information technologies for solving professional tasks in agronomy through practical seminars and case studies.

The goal of mastering the discipline is to form basic concepts of obtaining and processing information for its analysis by humans and making decisions based on it for performing management tasks related to production activities in the field of agriculture. This subject provides an introduction to information technologies with the advanced learner in mind and guides students to learn how to effectively use digital tools for agricultural data management.

## 2. REQUIREMENTS FOR LEARNING OUTCOMES

Mastering the course "Information Technologies" 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*

Competence code	Competence descriptor	Competence formation indicators (within this course)
GC-1	Ability to carry out critical analysis of problematic situations based on a systemic approach and to develop an action strategy	GC-1.1 Performs search for necessary information, its critical analysis, and summarizes the results of the analysis to solve the assigned task;
		GC-1.2 Uses a systemic approach to solve assigned tasks;
GC-7	Ability to search for necessary information sources and data, perceive, analyze, memorize, and transmit information using digital tools, as well as using algorithms when working with data from various sources to effectively use the obtained information for problem-solving; able to evaluate information and its reliability, and build logical	GC-7.1 Evaluates information and its reliability, builds logical conclusions based on incoming information and data;
		GC-7.2 Has practical experience in searching, perceiving, storing, analyzing, and transmitting information and data using digital tools, algorithms, and application software to solve assigned tasks;

<b>Competence code</b>	<b>Competence descriptor</b>	<b>Competence formation indicators (within this course)</b>
	conclusions based on incoming information and data	
GPC-1	Ability to solve tasks related to the development of the professional field and/or organization based on analysis of achievements in science and production	GPC-1.3 Applies available technologies, including information and communication technologies, to solve tasks of professional activity in agronomy;
GPC-3	Ability to use modern methods of solving tasks when developing new technologies in professional activities	GPC-3.2 Uses information resources, achievements of science and practice when developing new technologies in agronomy;
GPC-7	A bility to use tools for working with large arrays of structured and unstructured information; use modern digital methods for processing, analyzing, interpreting, and visualizing data to solve assigned tasks in professional and research activities in the field of agronomy;	GPC-7.1 Masters tools for working with large arrays of structured and unstructured information;
		GPC-7.2 Uses modern digital methods for processing, analyzing, interpreting, and visualizing data to solve assigned tasks;
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-7	Ability to search for necessary information sources and data, perceive, analyze, memorize, and transmit information using digital tools, as well as using algorithms when working with data from various sources to effectively use the obtained information for problem-solving; able to evaluate information and its reliability, and build logical conclusions based on incoming information and data		Plant Protection; Pests and Diseases; Soil Fertility Management; Undergraduate Practice / Pre-graduation Practice; Scientific Research Work
GC-1	Ability to carry out critical analysis of problematic situations based on a systemic approach and to develop an action strategy		Technological Training; Undergraduate Practice / Pre-graduation Practice; Scientific Research Work; Pests and Diseases; Soil Fertility Management; Postharvest Management; Crop Production
GPC-1	Ability to solve tasks related to the development of the professional field and/or organization based on analysis of achievements in science and production		Crop Production; Postharvest Management; Soil Fertility Management; Pests and Diseases; Scientific Research Work; Undergraduate Practice / Pre-graduation Practice; Technological Training
GPC-3	Ability to use modern methods of solving tasks when developing new technologies in professional activities		Technological Training; Undergraduate Practice / Pre-graduation Practice; Soil Fertility Management
GPC-7	Ability to use tools for working with large arrays of structured and unstructured information; use modern digital methods for		Plant Protection; Pests and Diseases; Scientific Research Work; Technological Training; Undergraduate Practice / Pre-graduation Practice

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
	processing, analyzing, interpreting, and visualizing data to solve assigned tasks in professional and research activities in the field of agronomy		
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 "Information Technologies" 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
		2
<i>Contact academic hours</i>	34	34
including:		
Lectures (LC)	0	0
Lab work (LW)	0	0
Seminars (workshops/tutorials) (S)	34	34
<i>Self-studies</i>	38	38
<i>Evaluation and assessment (exam/passing/failing grade)</i>	36	36
<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
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Course module title	Course module contents (topics)	Academic activities types
Module 1: The role of information technologies in the development of modern society. The concept of an information system (IS)	Topic 1.1. Brief historical background. Information and management.	S
	Topic 1.2. The concept of information systems. Composition and general structure of information systems.	S
	Topic 1.3. Classification of information systems. Factual and documentary information systems.	S
Module 3: Evolution of the development of information systems and databases	Topic 3.1. Early approaches to database organization. Systems based on inverted lists, hierarchical and network DBMS. Examples.	S
	Topic 3.2. Hierarchical systems. Hierarchical data structures. Network systems.	S
Module 4: Database concept (DB)	Topic 4.1. Basic concepts of databases. Properties of DB. Requirements for DB organization. Data bank. Components of a data bank. Data bank administrator.	S
	Topic 4.2. Database management system (DBMS).	S
	Topic 4.3. Design expertise.	S

\* - 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)
Seminar	A classroom for conducting seminars, group and individual consultations, current and mid-term assessment; equipped with a set of specialised furniture and technical means for multimedia presentations.	Set of specialised furniture; technical facilities: Interactive complex – Triumph Board interactive whiteboard with Optoma projector
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. Kolomeichenko, A. S. Information technologies / A. S. Kolomeichenko, N. V. Polshakova, O. V. Chekhov. — 3rd ed., ster. — St. Petersburg: Lan, 2022. — 212 p. — ISBN 978-5-507-45293-4.
2. Truflyak, E. V. Precision agriculture / E. V. Truflyak, N. Y. Kurchenko, A. A. Tenekov [et al.]; edited by E. V. Truflyak. — 4th ed., erased. — Saint Petersburg: Lan Publ., 2024. — 512 p. — ISBN 978-5-507-49080-6. — Electronic text // Lan: electronic library system. — URL: <https://e.lanbook.com/book/370976>

### *Additional readings:*

1. Kirilova, O. V. Information technologies in the digital economy of agriculture: a textbook / O. V. Kirilova. — Tyumen: State Agrarian University of the Northern Urals, 2022. — 119 p.
2. Engineering and technological solutions to the problems of agro-industrial complex and society development. Proceedings of the LVIII International scientific and practical conference of students, postgraduates and young scientists "Strategic resources of the Tyumen agroindustrial complex: people, science, technology": conference proceedings. — Tyumen: State Agrarian University of the Northern Urals, 2024. — 1457 p. — ISBN 978-5-98346-171-0. — Electronic text // Lan: electronic library system. — URL: <https://e.lanbook.com/book/453380>

### *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 "Trinity Bridge"

### **Databases and search engines:**

- Electronic foundation of legal and normative-technical documentation: <http://docs.cntd.ru/>
- Yandex search engine: <https://www.yandex.ru/>
- Google search engine: <https://www.google.ru/>
- Scopus abstract database: <http://www.elsevierscience.ru/products/scopus/>

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

1. The set of lectures on the course "Information Technologies".

\* 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:**

Professor, Agrobiotechnology Department

Zargar M.

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position, department

name and surname

**HEAD OF EDUCATIONAL DEPARTMENT:**

Director, Agrobiotechnology Department

Pakina E. N.

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name of department

name and surname

**HEAD  
OF HIGHER EDUCATION PROGRAMME:**

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position, department

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