

Документ подписан простой электронной подписью
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**Federal State Autonomous Educational Institution of Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
RUDN University**

Agrarian -Technological Institute

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

COURSE SYLLABUS

Information Technology

course title

Recommended by the Didactic Council for the Education Field of:

35.04.04 Agronomy

field of studies / speciality code and title

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

General Agriculture

higher education programme profile/specialisation title

1. COURSE GOAL(s)

The purpose of mastering the discipline "Information Technology" is included in the master's degree program "General Agronomy" in the direction of 04/35/04 "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 purpose of mastering the discipline is to form basic ideas about obtaining and processing information for human analysis and decision -making based on it to perform managerial tasks related to production activities in the field of agriculture.

2. REQUIREMENTS FOR LEARNING OUTCOMES

Mastering the discipline "Information Technology" is aimed at the formation of the following competencies (part of the competencies) among 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	Able to carry out a critical analysis of problematic situations based on a systematic approach, develop a strategy for action	GC-1.1 Searches for the necessary information, critically analyzes it and summarizes the results of the analysis to solve the task.; GC-1.2 Uses a systematic approach to solve its tasks;
GC-7	Able to search for the necessary sources of information and data, perceive, analyze, memorize and transmit information using digital means, as well as using algorithms when working with data obtained from various sources in order to effectively use the information received to solve problems, evaluate information, its reliability, build logical conclusions based on incoming information and data	GC-7.1 Evaluates information, its reliability, and draws 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 applications to solve tasks.;
OPK-1	Able to solve the tasks of developing the field of professional activity and (or) organization based on the analysis of scientific and industrial achievements	OPK-1.3 Uses available technologies, including information and communication technologies, to solve the tasks of professional activity in agronomy;
OPK-3	Able to use modern problem solving methods in the development of new technologies in professional activities	OPK-3.2 Uses information resources, achievements of science and practice in the development of new technologies in agronomy;
OPK-7	Able to master tools for working with large amounts of structured and unstructured information, use modern digital methods of data processing, analysis, interpretation and visualization in order to solve the tasks of professional and research activities in the field of agronomy	OPK-7.1 Owns tools for working with large amounts of structured and unstructured information OPK-7.2 Uses modern digital methods of data processing, analysis, interpretation and visualization in order to solve the tasks set tasks;

PC-1	Able to organize experiments (field experiments) to evaluate the effectiveness of innovative technologies (technology elements), varieties and hybrids in production conditions	PC-1.1 Develops a research program to study the effectiveness of innovative technologies (technology elements), varieties and hybrids, develops experimental methods, and develops new research methods;
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3.COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

Mastering the discipline " Information Technology" is aimed at forming the following competencies (part of the competencies) among students:

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

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
GC-1	Able to carry out a critical analysis of problematic situations based on a systematic approach, develop a strategy for action		
GC-7	Able to search for the necessary sources of information and data, perceive, analyze, memorize and transmit information using digital means, as well as using algorithms when working with data obtained from various sources in order to effectively use the information received to solve problems, evaluate information, its reliability, build logical conclusions based on incoming information and data		
OPK-1	Able to solve the tasks of developing the field of professional activity and (or) organization based on the analysis of scientific and industrial achievements		
OPK-3	Able to use modern problem solving methods		

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
	in the development of new technologies in professional activities		
OPK-7	Able to master tools for working with large amounts of structured and unstructured information, use modern digital methods of data processing, analysis, interpretation and visualization in order to solve the tasks of professional and research activities in the field of agronomy		
PC-1	Able to organize experiments (field experiments) to evaluate the effectiveness of innovative technologies (technology elements), varieties and hybrids in production conditions		

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

4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

Possible wording

The total labor intensity of the discipline " Information Technology" is 3 credits for full-time education.

Table 4.1 – Types of educational work by periods of mastering the OP HE for full-time education

Type of academic activities		Total academic hours	Semesters/training modules			
			1	2	3	4
<i>Contact academic hours</i>		<i>34</i>	<i>34</i>			
including:						
Lectures (LC)						
Lab work (LW)						
Seminars (workshops/tutorials) (S)		<i>34</i>	<i>34</i>			
<i>Self-studies</i>		<i>38</i>	<i>38</i>			
<i>Evaluation and assessment (exam/passing/failing grade)</i>		<i>36</i>	<i>36</i>			
Course workload	academic hours_	108	108			
	credits	3	3			

5. COURSE CONTENTS

Table 5.1. Course contents and academic activities types

Course module title	Course module contents (topics)	Academic activities types
Module 1: The role of information technology in the development of modern society. The concept of an information system (IS).	1.1 Brief historical background. Information and management. The main processes of information transformation. Stages of information technology development. Computer information technologies and their types.	LC; S
	1.2 The concept of information systems. The composition and general structure of information systems. The main purpose of information systems. The needs of information systems. Synthesis and decomposition of IC. IP models. The IP lifecycle.	
	1.3 Classification of information systems. Factual and documentary information systems. Geographic information systems. Information technology. Types of information technologies	
Module 2: Storage structures and access methods	2.1 Data Processing Systems (DMS). File systems for data processing and their development trends. Data structures for FSOD and access methods. The model of a simple sequential file. The index organization of the file.	LC; S
	2.2 Methods of searching in the index. Organization of direct access. Hashing algorithms. Overflow handling. List organization	LC; S
	2.3 Binary tree. Balanced trees. B-the tree. Access methods for multiple keys. A multi-disk file. The inverted file. A two-connected tree.	LC; S
Module 3: The evolution of information systems and databases	3.1 Early approaches to database organization. Inverted list systems, hierarchical and network databases. Examples. Strengths and weaknesses of early systems. The main features of systems based on inverted lists	LC; S
	3.2 Hierarchical systems. Hierarchical data structures. Network systems. Network data structures. Data manipulation. Integrity constraints	LC; S
Module 4: The database concept.	4.1 Basic concepts of databases. Database properties. Requirements for the organization of the database. The data bank. Components of the data bank. The administrator of the data bank	LC; S
	4.2 Database Management System (DBMS). Levels of data representation. The database lifecycle. The database design process. The principle of top-down design with successive iterations.	LC; S
	4.3 Project expertise. Requirements analysis.	LC; 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)
Seminary	An auditorium for seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification, equipped with a set of specialized furniture and multimedia presentation equipment	
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. 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. 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. — Text : electronic // Lan : electronic library system. — URL: <https://e.lanbook.com/book/370976>

Additional readings:

1. 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. — Text : electronic // Lan : electronic library system. — URL: <https://e.lanbook.com/book/453380>

Internet sources

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) <http://lib.rudn.ru/MegaPro/Web>
 - EL "University Library Online" <http://www.biblioclub.ru>
 - EL "Yurayt" <http://www.biblio-online.ru>
 - EL "Student Consultant" www.studentlibrary.ru

- EL "Lan" <http://e.lanbook.com/>

2.Databases and search engines:

- electronic foundation of legal and normative-technical documentation
<http://docs.cntd.ru/>

- Yandex search engine [https:// www .yandex.ru/](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 *:*

The set of lectures on the course « Information Technology »

* 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:

position, department	name and surname
position, department	name and surname
position, department	name and surname

HEAD OF EDUCATIONAL DEPARTMENT:

name of department	name and surname
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HEAD OF HIGHER EDUCATION PROGRAMME:

position, department	name and surname
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