Federal State Autonomous Educational Institution of Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
NAMED AFTER PATRICE LUMUMBA
RUDN University
Institute of Medicine

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

COURSE SYLLABUS

BIOSTATISTICS

Recommended by the Didactic Council for the Education Field of:

31.05.01 General Medicine

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

General Medicine

2026

1. COURSE GOAL(s)

The course "Biostatistics" is part of the specialist program "General Medicine" in the field of study 31.05.01 "General Medicine" and is studied in the 3rd semester of the 2nd year. The discipline is delivered by the Department of Medical Informatics and Telemedicine. The discipline consists of 3 sections and 12 topics and is aimed at studying the main statistical methods used for processing medical data.

The purpose of studying the course is to develop in students an understanding and holistic perception of the basic concept of biostatistics and the concept of evidence in medicine, the clinical and statistical significance of research results; to acquire knowledge of modern information technologies and trends in their development; to build skills in constructing information models, analyzing the obtained results in pharmacological, biomedical, experimental and clinical studies; to develop skills in presenting data and analyzing the results of one's own research using methods of descriptive and analytical statistics; and to master statistical terminology.

2. REQUIREMENTS FOR LEARNING OUTCOMES

Mastering the course "Biostatistics" is aimed at developing the following competencies (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)
GPC-10	Able to solve standard tasks of professional activity using information and bibliographic resources, biomedical terminology, information and communication technologies, taking into account the basic requirements of information security	**GPC -10.1** Able to use modern information and communication tools and technologies in professional activities;
		GPC -10.2 Able to comply with information security rules in professional activities;
		GPC -10.3 Able to use information and communication technologies, including application software, using artificial intelligence technologies, when solving professional tasks
PC-6	Able to maintain medical records and organize the activities of the middle-level medical personnel under his/her supervision	PC -6.2 Able to analyze morbidity, disability and mortality indicators to characterize the health of the attached population;

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The course refers to the core/variable/elective* component of B block of the higher educational programme curriculum.

* - Underline whatever applicable.

Within the higher education programme students also master other (modules) 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

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
GPC-10	Able to solve standard tasks of professional activity using information, bibliographic resources, biomedical terminology, information and communication technologies, taking into account the basic requirements of information security	Medical Informatics;	Anesthesiology, Resuscitation, Intensive Care; Telemedicine; Methods of Analysis of Biomedical Data. Artificial Intelligence in Implementing Practical Healthcare Tasks; Data Analysis and Visualization; Evidence-based Medicine; Fundamentals of Research Work;
PC-6	Able to maintain medical records and organize the activities of the middle-level medical personnel under his/her supervision	Introductory practice in primary professional skills: patient care (simulation center); Introductory practice in primary professional skills: patient care; Internship for primary professional skills: assistant junior medical personnel;	Public Health and Healthcare, Health Economics; Outpatient Therapy; Faculty Therapy; Faculty Surgery; Obstetrics and Gynecology; Urology; Infectious Diseases; Endoscopic Urology; Methods of Analysis of Biomedical Data. Artificial Intelligence in Implementing Practical Healthcare Tasks; General Surgery; Allergology; Radiation Diagnostics; Oncology, Radiation Therapy; Ophthalmology; Propaedeutics of Internal Diseases; Hospital Therapy; Hospital Surgery, Pediatric Surgery; Pediatrics; Anesthesiology, Resuscitation, Intensive Care; Telemedicine; Forensic Medicine; General practice internship: assistant physician in outpatient clinic; Internship for primary professional skills: assistant procedural nurse; Obstetrics and gynecology internship: assistant gynecologist; Therapeutic internship: assistant physician; Obstetrics and gynecology internship: assistant obstetrician; Surgical internship: assistant surgeon;

* 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 "**Biostatistics"** is 2 credits (72 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	
			3	
Classroom learning *, ac.h.*		**34**	**34**	
Lectures (LC)		0	0	
Lab work (LW)		0	0	
Seminars (workshops/tutorials) (S)		34	34	
Self-studies		**26**	**26**	
Evaluation and assessment (exam/passing/failing grade)		*12*	*12*	
Course workload	ac.h.	**72**	**72**	
	credits	**2**	**2**	

5. THE COURSE MODULES AND CONTENTS

Table 5.1. The content of the discipline and types of academic activities

Course module title	Course module contents (topics)	Academic activities types
Section 1 Fundamentals of Biomedical Research	1.1 Planning of biomedical research Planning of biomedical research. Types of statistical tables.	S
	1.2 Types of studies Classification of studies: by purpose, by nature of acquired knowledge, by methods of data collection and analysis, by time perspective, by control of variables, by depth of analysis.	S
Section 2 Descriptive Statistics	2.1 Graphical representation of data Main types of graphical representation of data. Principles of effective visualization. Visualization tools.	S
	2.2 Estimation of distribution parameters Types of estimates. Main parameters and their estimates. Methods for obtaining estimates.	S
Section 3 Statistical Data Analysis	3.1 Statistical hypothesis testing Types of statistical hypotheses. Algorithm for testing statistical hypotheses. Type I and Type II errors. Statistical criteria and their types.	S
	3.2 Comparison of groups Parametric and nonparametric methods of group comparison. Student's t-test, Mann-Whitney U test. Wilcoxon test (for paired samples).	S
	3.3 Analysis of variance (ANOVA) Basic principles of analysis of variance. Types of analysis of variance.	S

	3.4 Regression analysis Main types of regression analysis. Algorithm for constructing linear regression. Model quality assessment.	S
	3.5 Correlation analysis Basic concepts of correlation analysis. Types of correlation. Parametric and nonparametric methods for calculating the correlation coefficient.	S
	3.6 Analysis of association of qualitative characteristics Types of qualitative characteristics. Basic methods of analysis. Chi-square test. Stages of qualitative data analysis.	S
	3.7 Survival analysis Main tasks of analysis. Survival function. Hazard (intensity) function. Data types. Censored data. Median survival. Survival analysis methods.	S
	3.8 Artificial intelligence for solving statistical data analysis problems Capabilities of AI for statistical data analysis. Popular tools and platforms. Main types of AI models for statistics.	S

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

6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENT

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)
Computer lab	Computer lab for classes, group and individual consultations, current monitoring and intermediate assessment, equipped with personal computers (20 pcs.), board (screen) and multimedia presentation equipment.	Specialized furniture; technical equipment: Epson EB-965H multimedia projector, Acer Aspire C24-865 all-in-one PCs (15 pcs.), with internet access. Software: Microsoft products (OS, office suite including MS Office/Office 365).
Seminar	Classroom for seminar-type classes, group and individual consultations, current monitoring and intermediate assessment, equipped with specialized furniture and multimedia presentation equipment.	
Self-studies	Classroom for independent work of students (can be used for seminars and consultations), equipped with specialized furniture and computers	Specialized furniture; technical equipment: Epson EB-965H multimedia projector, Acer Aspire C24-865 all-in-one PCs (15 pcs.), with

	with access to the electronic information and educational environment (EIEE).	internet access. Software: Microsoft products (OS, office suite including MS Office/Office 365).

7. RESOURCES RECOMMENDED FOR COURSE STUDY

Main readings:

1. . Statistical methods of analysis: study guide / E. A. Lukyanova, T.V. Lyapunova, E.M. Shimkevich. - Electronic text data. - Moscow: RUDN, 2020. - 117 p.: ill.
2. Applied Biostatistics. Study Planning. Data Description: educational manual / E.A. Lukyanova, T.V. Lyapunova, E.M. Shimkevich. - Electronic text data. - Moscow: RUDN, 2020. - 32 p.

Additional readings:

1. Statistics in biomedicine, pharmacy and pharmaceuticals: study guide / N.N. Zubov, V.I. Kuvakin, S.Z. Umarov [et al.]; edited by I.A. Narkevich. - Moscow: KNORUS, 2021. - 298 p.: ill.
2. Khalafyan A.A., Borovikov V.P., Kalaydina G.V. Probability theory, mathematical statistics and data analysis. Theory fundamentals and computer practice. Statistica. Excel [Text]: more than 150 problem-solving examples: study guide for bachelors of non-mathematical fields studying higher mathematics – economic, legal, information technology, technical, natural science, humanities / - Moscow: URSS, 2016. - 317 p.: ill., tables.

Internet resources:

1. RUDN ELS and third-party ELS accessible to university students under signed agreements:
   - RUDN Electronic Library System https://mega.rudn.ru/MegaPro/Web
   - "University Library Online" http://www.biblioclub.ru
   - "Yurayt" ELS http://www.biblio-online.ru
   - "Student Consultant" ELS www.studentlibrary.ru
   - "Znanium" ELS https://znanium.ru/

2. Databases and search engines:
   - Sage https://journals.sagepub.com/
   - Springer Nature Link https://link.springer.com/
   - Wiley Journal Database https://onlinelibrary.wiley.com/
   - Lens.org scientometric database https://www.lens.org

Educational and methodological materials for independent work of students:

Course of lectures on the discipline "Biostatistics".

- all educational and methodological materials for independent work are placed in accordance with the current procedure on the discipline page in the TUIS (Telecommunications Training Information System**).**

8. EVALUATION TOOLKIT AND GRADE SYSTEM FOR ASSESSMENT

Assessment and evaluation toolkit (ET), marking/grading criteria (point-rating system (PRS)* of competences in the discipline «Biostatistics» are presented in the Appendix to this course syllabus of the discipline.

* - ET and PRS are formed on the basis of the requirements of the relevant local regulatory act of the RUDN

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