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**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

Mathematics

course title

Recommended by the Didactic Council for the Education Field of:

31.05.03 Dentistry

field of studies / speciality code and title

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

Dentistry

higher education programme profile/specialisation title

1. COURSE GOAL(s)

The goal of the course “Mathematics” is to give students the basic volumetric knowledge of mathematics necessary for the development of all natural science disciplines, as well as a broad natural science worldview among students

2. REQUIREMENTS FOR LEARNING OUTCOMES

Mastering the course (module) “Mathematics” is aimed at the development of the following competences: GC-1, GC-6, GPC-8.

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 problem situations based on a systematic approach, develop an action strategy	GC-1.1. Analyzes the problem situation as a system, identifying its components and relationships between them GC-1.2. Identifies gaps in information needed to solve a problem situation and designs processes to address them GC-1.3. Critically evaluates the reliability of information sources, works with conflicting information from different sources GC-1.4. Develops and substantively argues a strategy for solving a problem situation based on a systematic and interdisciplinary approach
GC-6	Able to identify and implement the priorities of their own activities and ways to improve them based on self-assessment and lifelong learning	GC-6.1. Evaluates his resources and their limits (personal, situational, temporary), uses them optimally for the successful completion of the assigned task
GPC-8	Able to use the basic physico-chemical, mathematical and natural science concepts and methods in solving professional problems	GPC-8.1. Applies basic fundamental physical and chemical knowledge to solve professional problems GPC-8.2. Applies applied natural science knowledge to solve professional problems GPC-8.3. Applies fundamental mathematical knowledge to solve professional problems

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The course refers to the core/variable/elective* component of (B1) 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*
GC-1	Able to carry out a critical analysis of problem situations based on a systematic approach, develop an action strategy	-	Physics, Pediatric dentistry, Obstetrics, Gnathology and Temporo-Mandibular Joint's Functional Diagnostics, Prosthodontics (Simple Prosthetics), Prosthodontics of Edentulous Patient, Prosthodontics (Complex Prosthetics), Pediatric Maxillofacial Dentistry, Maxillofacial Prosthodontics, State Exam
GC-6	Able to identify and implement the priorities of their own activities and ways to improve them based on self-assessment and lifelong learning	-	Chemistry, State Exam
GPC-8	Able to use the basic physico-chemical, mathematical and natural science concepts and methods in solving professional problems	-	Physics, Obstetrics, State Exam

* 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 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			
		1			
<i>Contact academic hours</i>	34	34			
including:					
Lectures (LC)	17	17			
Lab work (LW)					
Seminars (workshops/tutorials) (S)	17	17			
<i>Self-studies</i>	20	20			

Type of academic activities		Total academic hours	Semesters/training modules			
			1			
<i>Evaluation and assessment (exam/passing/failing grade)</i>		18	18			
Course workload	academic hours	72	72			
	credits	2	2			

5. COURSE CONTENTS

Table 5.1. Course contents and academic activities types

Course module title	Course module contents (topics)	Academic activities types
Module 1: Repetition of basic information from the school course of algebra	Topic 1.1. What are the numbers - Numerical axis, module of the number - Transformations of numerical fractions - Numeric, alphabetic, algebraic expressions - Transformations of algebraic expressions Topic 1.2. Percentage, mass concentration - Proportion - Logarithm.	LC, S
Module 2: Linear algebra	Topic 2.1. Cartesian coordinate system. Solution of a system of two linear equations (SLE) by analytical and graphical methods Topic 2.2. Vectors and matrices. Solution of the systems linear equations by the Gauss-Jordan method Topic 2.3. Linear dependence of equations. General and particular solution of systems linear equations Topic 2.4. Multiplication of vectors and matrices Topic 2.5. Determinant and eigenvalues of a matrix	LC, S
Module 3: Differential calculus	Topic 3.1. Functions and their graphs Topic 3.2. Fundamentals of differential calculus. Analysis of graphs with the help of derivatives Topic 3.3. Fundamentals of integral calculus. Differential equations with separable variables	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)
Lecture	A lecture hall for lecture-type classes, equipped with a set of specialised furniture; board (screen) and technical means of multimedia presentations.	-
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.	-
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. S. Lang. Introduction to Linear Algebra. Second Edition. Springer, 1986. (Yale University)
2. Panfilov A. Qualitative analysis of differential equations, 2010.
3. Lipschutz. Theory and Problems of Linear Algebra. 1991.
4. Gelfand I.M., E.G. Glagoleva, E.E. Shnol. Functions and graphs. M.: MTsNMO, 2006.
5. Reichmist R.B. Function graphs. Moscow: Higher school, 1991.
6. Fikhtengolts G.M. Course of differential and integral calculus, v.1.
7. Kudryavtsev L.D. Course of mathematical analysis, v.1.
8. Piskunov N.S. Differential and integral calculus for VTUZs, v.1.
9. Danko P.E. and other Higher mathematics in exercises and tasks. M: Higher School, 1986.
10. Kurosh A.G. Course of higher algebra. Moscow: Nauka, 1968.
11. Mikheev V.I. Pavlyuchenko Yu.V. Higher Mathematics. Short course.
12. Klyushin V.L., Korshunov Yu.S. Fundamentals of higher mathematics. 4th edition, M.: RUDN University, 2013.
13. Klyushin VL Higher mathematics for economists. M.: Infra-M, 2009.
14. Klyushin V.L. Fundamentals of higher mathematics. M.: Publishing House of RUDN University, 2000 (1st ed.), 2005 (3rd ed.).
15. Bavrín I.I. A short course in higher mathematics for chemical-biological and medical specialties. Moscow: Fizmatlit, 2003.
16. Pavlushkov I.V. et al. Fundamentals of higher mathematics and mathematical statistics. M.: Geotar-Media, 2008.

Additional readings:

1. D.T. Writing. Abstract of lectures on higher mathematics. M.: Iris-press, 2018.
2. E.M. Karchevsky, M.M. Karchevsky. Lectures on linear algebra and analytic geometry. Kazan University, 2012.
3. E.E. Tyrtysnikov. Matrix analysis and linear algebra. M.: 2005.
4. Murray J. Mathematical biology. Volume 1. IKI Publishing House, 2009
5. Murray J. Mathematical biology. Volume 2. RHD Publishing House, 2011
6. K. Karo et al. Mechanics of blood circulation. M.: Mir, 1981.
7. Shnol E.E. Seven lectures on computational mathematics. M.: Editorial-URSS, 2004.
8. A.A. Kubasov. Chemical kinetics and catalysis, Part 1. M.: Publishing house of Moscow State University, 2004.

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/>
- EL "Trinity Bridge"

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 *:*

1. The set of lectures on the course "Mathematics".

* 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.

8. ASSESSMENT TOOLKIT AND GRADING SYSTEM* FOR EVALUATION OF STUDENTS' COMPETENCES LEVEL UPON COURSE COMPLETION

The assessment toolkit and the grading system* to evaluate the competences formation level (GC-1, GC-6, GPC-8) upon the course study completion are specified in the Appendix to the course syllabus.

* The assessment toolkit and the grading system are formed on the basis of the requirements of the relevant local normative act of RUDN University (regulations / order).

DEVELOPERS:

**Docent, Mathematical
institute**

position, department

signature

N.T. Gabdrakhmanova

name and surname

**HEAD OF EDUCATIONAL DEPARTMENT:
of Mathematical institute**

name of department

signature

A.B. Muravnik

name and surname

**HEAD
OF HIGHER EDUCATION PROGRAMME:
Deputy director for academic
affairs**

position, department

signature

S.N. Razumova

name and surname