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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

Science of Dental materials

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

2025

1. COURSE GOAL(S)

The goal of the course "Science of Dental Materials" is to equip students with the main knowledge and skills necessary to work with dental materials.

2. REQUIREMENTS FOR LEARNING OUTCOMES

Mastering the course (module) is aimed at the development of the following competences /competences in part: GPC – 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)
GPC-6.	Ability to prescribe, monitor the effectiveness and safety of drug and non-drug treatment in solving professional problems.	GC-6.2. Selects medical instruments (including dental materials) to provide a comprehensive treatment plan for dental problems. Keep track of how the patient's treatment is doing.
GPC-8.	Ability to solve professional problems using basic physico-chemical, mathematics, and natural scientific concepts and procedures.	GC-8.1. Applies fundamental physical and chemical 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*
GPC - 6.	Ability to prescribe, monitor the effectiveness and safety of drug and non-drug treatment in solving professional problems.	Introduction to the specialty. Ethical and deontological principles in dentistry. Medical computer science. History of medicine.	ALL dental clinical disciplines.
GPC - 8.	Ability to solve professional problems using basic physico-chemical, mathematics, and natural scientific concepts and procedures.	Introduction to the specialty. Ethical and deontological principles in dentistry. Medical computer science. History of medicine.	ALL dental clinical disciplines

4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

The total workload of the course is 4 credits (144 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	
Contact academic hours	90	90	
including:			
Lectures (LC)	18	18	
Lab work (LW)	72	72	
Seminars (workshops/tutorials) (S)			
Self-studies	51	51	
Evaluation and assessment (exam/passing/failing grade)	3	3	
Course workload	academic hours	144	144
	credits	4	4

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. Materials science in orthopedic dentistry.	Topic 1. Dental materials science as an applied science of materials used in the work of a dentist. Characteristics of materials used in dentistry, classification, physico-chemical properties. Basic dental materials, metals, ceramics and polymers, physico-chemical properties.	L. LW. SS.
	Topic 2. Basic and auxiliary materials in orthopedic dentistry. Dental impression materials. Classification, composition, physico-chemical properties. The requirements imposed on them. Standard impression spoons.	L. LW. SS.
	Topic 3. Gypsum, physico – chemical properties, composition. Standardization according to GOST (microscopy (alpha, beta)). The methodology of work. Features of hardening with inhibitors and catalysts.	L. LW. SS.
	Topic 4. Dental wax. Requirements for them, classification, physico-chemical properties, composition. Standardization according to GOST.	L. LW. SS.

	Topic 5. Plastics, their application in orthopedic dentistry, classification, physico-chemical properties, composition. The technology of working with plastic, safety precautions.	L. LW. SS.
	Topic 6. Metals and alloys used in orthopedic dentistry. Classification, physico-chemical properties.	L. LW. SS.
	Topic 7. Dental porcelain. Silicas. Classification, physico-chemical properties, composition. Application in dentistry.	L. LW. SS.
	Topic 8. Colloquium on the section.	L. LW. SS.
Section 2. Materials science in therapeutic dentistry.	Topic 9. Classification of materials used in therapeutic dentistry. Classification of sealing materials, quality standards, physico-chemical and biological properties, composition. Requirements for sealing materials. Phenolate cements. Materials for temporary dental fillings. Materials for insulating and therapeutic pads, physico-chemical properties, preparation methods.	L. LW. SS.
	Topic 10. Classification of mineral cements, physico-chemical properties, preparation methods.	L. LW. SS.
	Topic 11. Classification of polymer cements, physico-chemical properties. The method of preparation.	L. LW. SS.
	Topic 12. Composite sealing materials of chemical and light curing. Classification, physico-chemical properties, composition.	L. LW. SS.
	Topic 13. Adhesive system for composites (generation of adhesive systems), physico-chemical properties, composition.	L. LW. SS.
	Topic 14. Metals and their alloys used for dental fillings. Classification, physico-chemical properties, composition. The method of making amalgam. Safety and sanitary requirements when working with amalgam.	L. LW. SS.
	Topic 15. Materials used for filling root canals. Classification of silers and fillers, indications for use	L. LW. SS.
Section 3. Materials science in surgical dentistry.	Topic 16. Materials in surgical dentistry. Materials for surgical sutures. Surgical needles. The requirements imposed on them. Dental implants, materials used for their manufacture.	L. LW. SS.
	Topic 17. Colloquium on sections 2 and 3.	L. LW. SS.
	Topic 18. The final lesson. A credit class.	L. LW. SS.

6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

Type of academic activities	Classroom equipment	Specialised educational / laboratory equipment, software, and materials for
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		course study (if necessary)
Lecture	The lecture-type classroom is equipped with a set of specialized furniture; a blackboard (screen) and multimedia presentation equipment.	<p>A set of specialized furniture.</p> <p><u>Technical support:</u></p> <ul style="list-style-type: none"> – multimedia projector, – Internet connection. <p><u>Software:</u></p> <ul style="list-style-type: none"> – Microsoft products (the operating system, a suite of office applications, including MSOffice/ Office 365, Teams.)
Lab-work/ Seminars	Classrooms are located in buildings: ATI and GUM-SOC. In the ATI building: audiences 249, 250, 251, 252 (the phantom class) и 253. In the GUM-SOC building: audiences 232-235 (the phantom class).	<p>A set of specialized furniture.</p> <p><u>Technical support:</u></p> <p>Dental simulation units.</p> <p>DLP Optoma H114 Projector.</p> <p>Lenovo Think Centre M71z automated workplace.</p> <p>Laptop Asus X756UVIntel.</p> <p>Projector AcerP1285.</p> <p>Display Elite Screens Spectrum Electric100V.</p> <p>Laptop ASUS X751LDV.</p> <p>Monoblock Dell Optiplex 3030.</p> <p>PC TMO3300 i3 254.</p> <p>Polymerization lamps "Woodpecker".</p> <p>Control units with a micromotor tip.</p> <p>Multimedia projector Sony VPL-C6.</p> <p>Electric screen Projecta PSECO001 Elproelectrol 160x160 sm.</p> <p>MOULAGES patient's head for phantom work in the package.</p> <p>Dental chair with electric drive and programmable position.</p> <p>The doctor's units are included.</p> <p>Screen 17" BenQ sc.1472.</p>

		<p>The screen is on a tripod Projecta, 180x180.</p> <p>Control units of the dental unit for 2 tips and a spray.</p> <p>Blocks of tips "DART 1440".</p> <p>Models of the upper and lower jaw with an articulator.</p> <p>A cupboard for storing sterile instruments.</p> <p>Instruments used in therapeutic, orthopedic and surgical dentistry.</p> <p>Consumables: gypsum, wax, casts, sealing materials, etc.</p> <p><u>Information stands and expositions:</u></p> <p>– information stand in Russian and English;</p> <p>– visual aids, posters, models.</p>
Self-studies classroom	Classrooms 249, 250, 251, 252, 253 in ATI building. Classrooms 232-235 in GUM-SOC building, Classrooms equipped with a set of specialized furniture and computers with access to EIOS. Halls. The scientific library in the Main building of the RUDN.	

7. RESOURCES RECOMMENDED FOR COURSE STUDY

Main readings:

1. John F. McCabe, A. W. (2008). Applied Dental Materials. Blackwell Munksgaard.
2. Phillips'. Science of Dental Materials. 12. 6.м. : pageburst, 2013. ISBN: 978-1-4377-2418-9.

Internet-(based) sources:

1. Electronic libraries with access for RUDN students:
 - Electronic library system РУДН – ЭБС РУДН <http://lib.rudn.ru/MegaPro/Web>
 - ELS « University Library Online » <http://www.biblioclub.ru>
 - ELS Yurayt <http://www.biblio-online.ru>
 - ELS «Student's Consultant » www.studentlibrary.ru
 - ELS «Lan» <http://e.lanbook.com/>

- ELS « Troitsky most»

2. Databases and search engines:

- electronic fund of legal and regulatory and technical documentation <http://docs.cntd.ru/>
- the Yandex search engine <https://www.yandex.ru/>
- the Google search engine <https://www.google.ru/>
- abstract database SCOPUS <http://www.elsevierscience.ru/products/scopus/>

Learning toolkits for self- studies in the RUDN LMS TUIS

1. A course of lectures and presentations on the discipline "Materials science".

№	Lecture topics	Hours
1.	Dental materials science. Characteristics of materials used in dentistry. Basic dental materials, metals, ceramics, polymers.	2
2.	Dental impression materials. Gypsum, physico–chemical properties. Dental wax.	2
3.	Polymer materials, their application in dentistry, classification, physico-chemical properties, composition. The technology of working with plastic, safety precautions.	2
4.	Metals and alloys used in dentistry. Dental porcelain. Silicas.	2
5.	Classification of materials used in therapeutic dentistry. Classification. Cements: mineral and phenolic.	2
6.	Polymer cements. Materials for temporary sealing, insulating and therapeutic pads.	2
7.	Composite sealing materials of light curing. Classification. physico-chemical properties, composition. Adhesive system. Polymer sealing materials (compomers, ormokers). Metals and their alloys used for dental fillings.	2
8.	Materials used for filling root canals. Classification of silers and fillers, indications for use.	2
9.	Materials in surgical dentistry. Materials for surgical sutures. Surgical needles. Dental implants, materials used for their manufacture.	2
	In total:	18

2. Laboratory classes in the discipline "Materials Science".

3. Educational materials and workbooks on all topics of the discipline "Materials Science".

4. Glossary and other educational materials.

Learning toolkits for self- studies in the RUDN LMS TUIS!

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

Evaluation materials and point-rating system* for assessing the level of competence formation (GPC – 6, GPC–8) based on the results of mastering the discipline «Science of Dental Materials» are presented in the Appendix to this Work Program of the discipline.

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:

Senior lecturer of the Department
of Propaedeutics of Dental Diseases,
Candidate of Medical Sciences

Manvelyan A.S.

Position, grade

Signature

Name

Main lecturer of the Department
of Propaedeutics of Dental Diseases,
Candidate of Medical Sciences

Gurieva Z.A.

Position, grade

Signature

Name

HEAD OF THE DEPARTMENT:

Head of the Department of
Propaedeutics of Dental Diseases,
Doctor of Medical Sciences.,
Professor

Razumova S.N.

Position, grade

Signature

Name

HEAD OF THE HIGHER EDUCATION PROGRAM:

Deputy Director of the Medical
Institute, Professor

Razumova S.N.

Position, grade

Signature

Name