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Federal State Autonomous Educational Institution for Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
(RUDN University)

Institute of Medicine

(name of the main educational unit)

COURSE SYLLABUS

“MATERIALS SCIENCE”

(Subject / Course title)

Recommended by the Didactic Council for the Education Field of:

31.05.03. Dentistry

(Code and Higher Education Field)

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

Dentistry

(Name of specialization EP of HE)

2024 г.

1. THE GOALS OF MASTERING THE DISCIPLINE

The purpose of mastering the discipline "Materials Science" is for students to master basic knowledge and practical skills, work with dental materials.

2. REQUIREMENTS to LEARNING OUTCOMES

The development of the discipline "Materials Science " is aimed at the formation of the following competencies (parts of competencies): GPC – 6 (6.2.), GPC – 8 (8.1.).

Table 2.1. The list of competencies formed by students during the development of the discipline (the results of the development of the discipline).

Code	Competencies	Indicators of competence achievement
GPC - 6.	The ability to prescribe, monitor the effectiveness and safety of non-drug and drug treatment in solving professional tasks.	GPC -6.2. Selection of medical devices (including dental materials) for the preparation of a comprehensive treatment plan for dental diseases. Monitoring the further course of the patient's treatment.
GPC - 8.	The ability to use basic physico-chemical, mathematical and natural science concepts and methods in solving professional problems.	GPC -8.1. Application of basic fundamental physico-chemical knowledge to solve professional problems.

3. THE PLACE OF DISCIPLINE IN THE STRUCTURE OF THE EP of HE.

The discipline "Materials Science" refers to the mandatory part: block B.1 of the EP of HE.

Within the framework of the EP of HE, students also master other disciplines that contribute to achieving the planned results of mastering the discipline "Materials Science".

Table 3.1. The list of components of the EP of HE that contribute to achieving the planned results of mastering the discipline

Code	Competencies	Previous disciplines	Subsequent disciplines
GPC - 6.	The ability to prescribe, monitor the effectiveness and safety of non-drug and drug treatment in solving professional tasks.	Introduction to the specialty. Ethics and deontology in dentistry. Medical informatics. The history of medicine.	ALL dental clinical disciplines.
GPC - 8.	The ability to use basic physico-chemical, mathematical and natural science concepts and methods in solving professional problems.	Introduction to the specialty. Ethics and deontology in dentistry. Medical informatics. The history of medicine.	ALL dental clinical disciplines.

4. THE SCOPE OF THE DISCIPLINE AND TYPES OF ACADEMIC WORK

The total labor intensity of the discipline " Materials Science" is 4 credits.

Table 4.1. Types of educational work according to the periods of mastering the EP of HE for **FULL-time** education.

Type of educational work		Quantity of hours	Semesters
			2
Classroom classes (total)		90	90
Including:			
<i>Lectures</i>		18	18
<i>Lab work (LW)</i>		72	72
Self-study (total)		54	54
Total labor intensity	academic hour	144	144
	credit	4	4

5. THE CONTENT OF THE DISCIPLINE

Table 5.1. The content of the discipline (module) by type of academic work.

Name of the discipline section	№ Topic	The content of the section (topics)	Type of ac. work
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. Sitallas. 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. MATERIAL AND TECHNICAL SUPPORT OF THE DISCIPLINE:

Classroom for Academic Activity Type	Equipping the audience	Specialized educational/laboratory equipment, Software and materials for the development of the discipline.
Lecture Classroom	The lecture-type classroom is equipped with a set of specialized furniture; a blackboard (screen) and multimedia presentation equipment.	A set of specialized furniture. <i>Technical support:</i> – multimedia projector, – Internet connection. <i>Software:</i> – Microsoft products (the operating system, a suite of office applications, including MSOffice/ Office 365, Teams.)

<p>Lab/ Seminars classroom</p>	<p>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>	<p>A set of specialized furniture.</p> <p><i>Technical support:</i></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>
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		<p>Instruments used in therapeutic, orthopedic and surgical dentistry.</p> <p>Consumables: gypsum, wax, casts, sealing materials, etc.</p> <p><i>Information stands and expositions:</i></p> <p>– information stand in Russian and English;</p> <p>– visual aids, posters, models.</p>
Computer classroom	Not provided	
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. EDUCATIONAL, METHODOLOGICAL AND INFORMATION SUPPORT OF THE DISCIPLINE.

Main reading (sources):

1. John F. McCabe, A. W. (2008). Applied Dental Materials. Blackwell Munksgaard.
2. Phillips'. Science of Dental Materials. 12. б.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/>

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. Sitallas.	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 MATERIALS AND A POINT-RATING SYSTEM FOR ASSESSING THE LEVEL OF COMPETENCE FORMATION IN THE DISCIPLINE MATERIALS SCIENCE

Evaluation materials and a point-rating system for assessing the level of competence formation (part of competencies) based on the results of mastering the discipline "Materials Science " are presented in the application to this Work Program of the discipline.

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