

**MINISTRY OF HEALTH OF UKRAINE  
HIGHER STATE EDUCATIONAL INSTITUTION OF UKRAINE  
"BUKOVINIAN STATE MEDICAL UNIVERSITY"**

**"APPROVE"**

Vice-Rector of scientific and pedagogical work

Associate Professor

Gerush I.V.

25 / 08 / 2020 p.

**STUDENT GUIDE  
(SYLLABUS)  
to study the discipline  
Elective course**

**«Materials science in orthopedic dentistry»**

(name of the discipline)

**Knowledge area** 22 Health care  
(code and name of knowledge area)

**Specialty (direction)** 221 Dentistry  
(code and name of specialty)

**Educational degree** master  
(master, bachelor, junior bachelor)

**Course** II

**Form of education** full-time  
(full-time, correspondence, remote)

**Department** Orthopedic dentistry  
(name of the department)

Approved at the methodical session of the department of orthopedic dentistry  
" 17 " June 2020 (Protocol № 21 )

Head of the Department, M.D., professor [Signature] Belikov O.B.

Approved by the subject methodical commission of disciplines of dental specialization  
" 24 " June 2020 (Protocol № 5 )

Head of the subject methodical  
commission  
[Signature] Kuzniak N.B.

## 1. GENERAL INFORMATION ABOUT SCIENTIFIC AND PEDAGOGICAL WORKERS WHO TEACH THE SUBJECT

<b>Department</b>	Orthopedic Dentistry
<b>Surname, name of scientific and pedagogical staff, scientific degree, academic status</b>	Belikov Oleksandr - head of the department, professor, doctor of medicine, <a href="mailto:belikov@bsmu.edu.ua">belikov@bsmu.edu.ua</a> ; Gavaleshko Vasil Petrovich – assistant of the department, candidate of medical sciences <a href="mailto:gavaleshko@bsmu.edu.ua">gavaleshko@bsmu.edu.ua</a>
<b>Web page of the department on the official website of the university</b>	<a href="https://www.bsmu.edu.ua/ortopedichnoyi-stomatologiyi/">https://www.bsmu.edu.ua/ortopedichnoyi-stomatologiyi/</a>
<b>Department website</b>	<a href="http://ortstom.bsmu.edu.ua/">http://ortstom.bsmu.edu.ua/</a>
<b>E-mail</b>	<a href="mailto:dantist@bsmu.edu.ua">dantist@bsmu.edu.ua</a>
<b>Address</b>	Chernivtsi, Marka Vovchka str., 2
<b>Contact phone</b>	+38 (0372) 52-98-69

## 2. GENERAL INFORMATION ABOUT THE DISCIPLINE

<b>Status of the discipline</b>	Normative
<b>Number of credits</b>	3.5
<b>Total amount of hours</b>	105
<b>Lectures</b>	20
<b>Practical classes</b>	30
<b>Individual work</b>	55
<b>Type of final control</b>	Test

## 3. DESCRIPTION OF THE DISCIPLINE (ANNOTATION)

Materials science in orthopedic dentistry, as an elective course allows you to study the relationship of composition, structure, properties, technology of production and use of materials for dentistry, as well as patterns of changes in the properties of materials under the influence of physical, mechanical and chemical factors. These are factors that act in specific conditions of the oral cavity during the functioning of the dental system.

## 4. POLICY OF THE SUBJECT

### 4.1 List of normative documents:

- Regulations on the organization of the educational process (<https://www.bsmu.edu.ua/wp-content/uploads/2020/03/polozhennya-pro-organizacziyu-osvitnogo-proczesu-u-vdnzu-bukovinskij-derzhavnij-medichnij-universitet.pdf>);
- Instructions for assessing the educational activities of BSMU students in the implementation of the European credit transfer system of the educational process (<https://www.bsmu.edu.ua/wp-content/uploads/2020/03/bdmu-instrukcziya-shhodo-oczinyuvannya-%D1%94kts-2014-3.pdf>);

- Regulations on the procedure for reworking missed and uncredited classes (<https://www.bsmu.edu.ua/wp-content/uploads/2019/12/reworks.pdf>);
- Regulations on the appeal of the results of the final control of knowledge of higher education (<https://www.bsmu.edu.ua/wp-content/uploads/2020/07/polozhennya-pro-apelyacziyu-rezultativ-pidsumkovogo-kontrolyu-znan.pdf>);
- Codex of Academic Integrity ([https://www.bsmu.edu.ua/wp-content/uploads/2019/12/kodeks\\_academic\\_faith.pdf](https://www.bsmu.edu.ua/wp-content/uploads/2019/12/kodeks_academic_faith.pdf));
- Moral and ethical codex of students ([https://www.bsmu.edu.ua/wp-content/uploads/2019/12/ethics\\_code.docx](https://www.bsmu.edu.ua/wp-content/uploads/2019/12/ethics_code.docx));
- Regulations on the prevention and detection of academic plagiarism (<https://www.bsmu.edu.ua/wp-content/uploads/2019/12/antiplagiat-1.pdf>);
- Regulations on the procedure and conditions for students to choose elective courses ([https://www.bsmu.edu.ua/wp-content/uploads/2020/04/nakaz\\_polozhennyz\\_vybirkovi\\_dyscypliny\\_2020.pdf](https://www.bsmu.edu.ua/wp-content/uploads/2020/04/nakaz_polozhennyz_vybirkovi_dyscypliny_2020.pdf));
- Rules of internal labor regulations of the Higher State Educational Institution of Ukraine "Bucovynian State Medical University" (<https://www.bsmu.edu.ua/wp-content/uploads/2020/03/17.1-bdmu-kolektivnij-dogovir-dodatok.doc>).

**4.2 Policy on adherence to the principles of academic integrity of higher education students:**

- independent performance of educational tasks of current and final controls without the use of external sources of information;
- cheating during control of knowledge is prohibited;
- independent performance of individual tasks and correct registration of references to sources of information in case of borrowing of ideas, statements, information.

**4.3 Policy on adherence to the principles and norms of ethics and deontology by higher education students:**

- actions in professional and educational situations from the standpoint of academic integrity and professional ethics and deontology;
- compliance with the rules of internal regulations of the university, to be tolerant, friendly and balanced in communication with students and teachers, medical staff of health care institutions;
- awareness of the importance of examples of human behavior in accordance with the norms of academic integrity and medical ethics.

**4.4 Attendance policy for higher education students:**

- attendance at all training sessions (lectures, practical (seminar) classes, final modular control) is mandatory for the purpose of current and final assessment of knowledge (except for respectable reasons).

**4.5. Deadline policy and completion of missed or uncredited classes by higher education students:**

- reworks of missed classes are held according to the schedule of missed or uncredited classes and consultations.

**5. PRECISIONS AND POST-REQUIREMENTS OF THE EDUCATIONAL DISCIPLINE (INTERDISCIPLINARY RELATIONS)**

<b>List of disciplines, on which the study is based academic discipline</b>	<b>List of disciplines, for which the basis is laid as a result of studying the discipline</b>
medical chemistry, biological and bioorganic chemistry	therapeutic dentistry
medical physics	Orthodontics
medical biology	orthopedic dentistry
medical chemistry, biological and bioorganic chemistry	Implantology

## **6. PURPOSE AND TASKS OF THE EDUCATIONAL DISCIPLINE:**

**6.1 The purpose of teaching the discipline** is to create a set of "ideal" materials for the restoration of teeth and the dental system. This is aimed at studying the composition, structure and properties of materials for dentistry, as well as patterns of change of these properties under the influence of physical, mechanical and chemical factors. The main method and tool of this study in dental materials science is to determine the set of properties of materials that are of fundamental importance for their use in the oral cavity. In-depth study of mechanical, technological, physical, chemical and biological properties of materials for the manufacture of orthopedic structures, their structure, properties and the relationship between them, examines the dependence of structure and properties on methods of production and processing of materials and their change under external influences factors: power, thermal, radiation, etc.

### **6.2 The main tasks of studying the discipline are:**

- be able to interpret the mechanical, technological, physical, chemical and biological properties of materials for the manufacture of orthopedic structures;
- give a theoretical justification for the choice of certain materials depending on the type of prosthesis; explain the importance of certain materials for the manufacture of orthopedic structures;
- analyze the requirements for materials; analyze the composition, properties and applications of certain groups of dental materials.
- mastering the skills of selecting such material that would meet all the requirements, did not have a negative effect on the tissues of the prosthetic bed and the patient's body as a whole, could replace missing teeth, making this replacement invisible and convenient for the patient.
- justification of the choice of certain materials depending on the type of prosthesis, the value of certain materials for the manufacture of orthopedic structures.
- analysis of requirements for basic and auxiliary materials used in orthopedic dentistry, composition, properties and application of certain groups of dental materials, methods of application of auxiliary materials in the manufacture of dentures.
- study of positive and negative properties of auxiliary materials for the manufacture of dentures.

## **7. COMPETENCIES, THE FORMATION OF WHICH IS CONTRIBUTED BY THE DISCIPLINE:**

In accordance with the requirements of the standard, the discipline provides students with the acquisition of competencies:

### **7.1 Integral competence:**

Ability to solve complex problems and problems in the field of health care in the specialty "Dentistry" in a professional activity or in the studying process, which involves research and / or innovation and is characterized by uncertainty of conditions and requirements.

### **7.2 General competencies:**

GK1. Ability to abstract thinking, analysis and synthesis.

GK2. Knowledge and understanding of the subject area and understanding of professional activity.

GK3. Ability to apply knowledge in practice.

GK4. Ability to communicate in English both orally and in writing.

- GK5. Skills in the use of information and communication technologies.
- GK6. Ability to search, process and analyze information from various sources.
- GK7. Ability to adapt and act in a new situation.
- GK8. Ability to identify, make and solve problems.
- GK9. Ability to be critical and self-critical.
- GK10. Ability to work in a team.
- GK11. The desire to preserve the environment.

### **7.3 Professional (special) competencies:**

- PC1. Ability to understand the subject area of the discipline
- PC2. Understanding the relationship of composition, structure, properties, technologies production and application of materials for dentistry
- PC3. Understanding the patterns of changes in the properties of materials under the influence of physical, mechanical and chemical factors.

## **8. RESULTS OF STUDYING**

As a result of studying the discipline student must:

### **8.1 To know:**

- current trends in the industry and indicators that characterize them
- features of professional activity of the dentist
- methods of knowledge realization in solving practical problems
- state language, including professional orientation.
- speak foreign languages at a level sufficient for professional communication
- methods of knowledge realization in solving practical problems
- methods of knowledge implementation in identifying, setting and solving professional problems and activities
- methods of knowledge realization in the choice of communication strategy with patients and colleagues
- methods of collective interaction
- methods of interpersonal interaction with colleagues and patients
- moral and ethical principles of a medical specialist and the rules of professional subordination.
- their social and civil rights and responsibilities
- content of the discipline, key concepts
- physico-chemical properties of dental materials.
- physico-chemical composition and properties of dental materials.

### **8.2 Be able to:**

- analyze professional information, make informed decisions, acquire modern knowledge
- perform a learning process that requires updating and integration of knowledge
- use professional knowledge to solve practical problems
- use information technology in the professional field to search, process and analyze new information from various sources
- use information and communication technologies in the professional field, which requires updating and integration of knowledge
- use professional knowledge to adapt and act to a new situation.
- use professional knowledge to identify, formulate and solve problems of professional activity
- use knowledge to choose a strategy for communicating with patients and colleagues

- use knowledge to choose a communication strategy during interpersonal interaction
- use in professional activities the moral and ethical principles of the medical worker and the rules of professional subordination.
- Carry out professional activities in compliance with safety rules
- analyze environmental quality indicators
- to form their civic and social position
- analyze the basic theories and concepts of the discipline
- use the acquired knowledge to solve practical problems
- use the acquired knowledge to solve practical problems

### **8.3. To demonstrate:**

- methods of application of auxiliary materials (gypsum, silicones);
- methods of application of insulating materials;
- methods of application of molding materials;
- methods of application of modeling materials;
- methods of preparation of self-hardening plastics;
- method of preparation of hot polymerization plastics for fixed and removable prosthetics;
- selection and justification of the use of abrasive tools;
- methods of application of various fixing materials.

## **9. INFORMATIONAL SCOPE OF THE DISCIPLINE**

The study of the discipline is allocated 105 academic hours, or 3.5 ECTS credits.

The curriculum is structured in a module:

### **Module 1 "Materials science in orthopedic dentistry"**

**Topic 1.** Fundamentals of dental materials science. Choosing the "ideal" material for prosthetics. Classification of materials used in orthopedic dentistry. Classifications of dental materials by chemical nature and purpose. Basic properties of materials and their significance for restorative dentistry. Mechanical (stress and deformation), physical (rheological, thermal, optical), chemical (polymer destruction, metal corrosion, destruction of ceramics) properties of materials. Principles of adhesion.

**Topic 2.** Dental materials based on polymers (plastics). Composition and structure of acrylic plastic. Properties of plastics (biocompatibility, dimensional stability and strength, mechanical and physical properties). Polymer base materials. Polymeric materials for artificial teeth.

**Topic 3.** Metals and metal alloys. Basic requirements for alloys. Alloys of precious and precious metals (alloys with high gold content, alloys with medium and low gold content, silver-palladium alloys), their characteristics and clinical application. Characteristics of base metal alloys (cobalt-chromium alloys, chromium-nickel alloys, titanium alloys), their characteristics and clinical application. Stainless Steel.

**Topic 4.** Dental ceramics and sieves for the manufacture of metal-ceramic structures of dentures .. Composition and properties of dental porcelain. Classification of modern dental ceramics (K. with a reinforced ceramic frame, K. for fixing with polymeric adhesives, metal ceramics).

**Topic 5.** Artificial teeth. Selection of artificial teeth in the manufacture of removable dentures.

**Topic 6.** Gypsum. Chemical composition of gypsum. Classification of gypsum. Areas of application. Properties of gypsum (dimensional stability, compressive strength, tensile strength, hardness and wear resistance) and their clinical significance. Advantages and disadvantages of gypsum for making models.

**Topic 7.** Modeling materials. Characteristic properties (melting range, thermal expansion, mechanical properties, fluidity, residual stress (stress), plasticity.) Classification, composition and purpose of dental waxes.

**Topic 8.** Supporting materials. The concept of abrasive and abrasive treatment. Properties of abrasives. Factors influencing the efficiency of abrasive processing. Grinding and polishing. Abrasive tools and means for carrying out these manipulations.

**Topic 9.** Molding materials. Masses for the manufacture of refractory models. Refractory metals. Separating and covering materials. Fluxes and bleaches.

**Topic 10.** Fixing materials. General requirements for fixing materials. Choice of material for fixing. Water-based fixing cements. Zinc polycarboxylate cements. Traditional and polymer-modified glass ionomer fixing cements. Polymer cements.

## 10. STRUCTURE OF EDUCATIONAL DISCIPLINE

№	Tema	Lectures	Practical classes	ISW
1	Classification of materials used in orthopedic dentistry. Mechanical (stress and deformation), physical (rheological, thermal, optical), chemical (destruction of polymers, corrosion of metals, destruction of ceramics) properties of materials. Principles of adhesion.	4	4	5
2	Dental materials based on polymers. Composition and structure of acrylic plastic. Properties of plastics (biocompatibility, dimensional stability and strength, mechanical and physical properties). Polymer base materials. Polymeric materials for artificial teeth. Artificial teeth. Selection of artificial teeth in the manufacture of removable dentures.	2	4	5
3	Metals and metal alloys. Basic requirements for alloys. Alloys of precious and precious metals (alloys with high gold content, alloys with medium and low gold content, silver-palladium alloys), their characteristics and clinical application. Base metal alloys (cobalt-chromium alloys, chromium-nickel alloys, titanium alloys), their characteristics and clinical application. Stainless steel.	2	4	10
4	Dental ceramics. Composition and properties of dental porcelain. Classification of modern dental ceramics (K. with a reinforced ceramic frame, K. for fixing with polymeric adhesives, metal ceramics).	2	4	5
5	Imprint materials. Classifications of impression materials and requirements to them (accuracy, dimensional stability, changes in manipulations, additional factors). Characteristics of certain groups of impression materials and their purpose. Representatives. Gypsum. Chemical composition of gypsum. Classification of gypsum. Areas of application. Properties of gypsum (dimensional stability, compressive strength, tensile strength, hardness and wear resistance) and their clinical significance. Advantages and disadvantages of gypsum for making models.	2	4	5

6	Modeling materials. Characteristic properties (melting range, thermal expansion, mechanical properties, fluidity, residual stress (stress), ductility.) Classification, composition and purpose dental waxes.	2	4	5
7	Supporting materials. The concept of abrasive and abrasive treatment. Properties of abrasives. Factors influencing the efficiency of abrasive processing. Grinding and polishing. Abrasive tools and tools for implementation of these manipulations. Molding materials. Masses for the manufacture of refractory models. refractory metals. Separating and covering materials. Fluxes and bleaches.	4	4	10
8	Fixing materials. General requirements for fixing materials. Choice of material for fixing. Water-based fixing cements. Zinc phosphate, polycarboxylate cements. Traditional and polymer-modified glass ionomer fixing cements. Polymer cements.	2	2	5
<b>Total</b>		<b>20</b>	<b>30</b>	<b>55</b>

## 11. THEMATIC PLAN OF LECTURES

№	Name of topic	Hours
1	Classification of materials used in orthopedic dentistry. Mechanical (stress and deformation), physical (rheological, thermal, optical), chemical (polymer destruction, metal corrosion, destruction of ceramics) properties of materials.	2
2	Dental materials based on polymers. Composition and structure of acrylic plastic. Properties of plastics (biocompatibility, dimensional stability and strength, mechanical and physical properties). Polymer base materials. Polymeric materials for artificial teeth.	2
3	Metals and metal alloys. The main requirements for alloys are their characteristics and clinical application.	2
4	Dental ceramics. Composition and properties of dental porcelain. Classification of modern dental ceramics.	2
5	Artificial teeth. Selection of artificial teeth in the manufacture of removable dentures.	2
6	Imprint materials. Classifications of impression materials and requirements to them (accuracy, dimensional stability, changes at manipulations, additional factors). Characteristics of certain groups of impression materials and their purpose. Representatives. Gypsum. Chemical composition of gypsum. Classification of gypsum. Areas of application. The concept of models. Types of models.	2
7	Modeling materials. Characteristic properties (melting range, thermal expansion, mechanical properties, fluidity, residual stress (stress), ductility.) Classification, composition and purpose dental waxes.	2
8	Supporting materials. The concept of abrasive and abrasive treatment. Properties of abrasives. Factors influencing the efficiency of abrasive processing. Grinding and polishing. Abrasive tools and means for carrying out these manipulations.	2



9	Molding materials. Masses for the manufacture of refractory models. Alloy metals. Separating and covering materials. Fluxes and bleaches.	2
10	Fixing materials. General requirements for fixing materials. Choice of material for fixing. Fixing cements.	2
<b>Total</b>		<b>20</b>

## 12. THEMATIC PLAN OF PRACTICAL (SEMINAR) CLASSES

№ з/п	Тема заняття	Години
1	Fundamentals of dental materials science. Choosing the "ideal" material for prosthetics. Classification of materials used in orthopedic dentistry. Classifications of dental materials by chemical nature and purpose. Basic properties of materials and their significance for restorative dentistry. Mechanical (stress and deformation), physical (rheological, thermal, optical), chemical (polymer destruction, metal corrosion, destruction of ceramics) properties of materials. Principles of adhesion.	3
2	Dental materials based on polymers (plastics). Composition and structure of acrylic plastic. Properties of plastics (biocompatibility, dimensional stability and strength, mechanical and physical properties). Polymer base materials. Polymeric materials for artificial teeth.	3
3	Metals and metal alloys. Basic requirements for alloys. Alloys of precious and precious metals (alloys with high gold content, alloys with medium and low gold content, silver-palladium alloys), their characteristics and clinical application. Characteristics of base metal alloys (cobalt-chromium alloys, chromium-nickel alloys, titanium alloys), their characteristics and clinical application. Stainless steel.	3
4	Dental ceramics and sieves for the manufacture of metal-ceramic structures of dentures .. Composition and properties of dental porcelain. Classification of modern dental ceramics (C. with a reinforced ceramic frame, C. for fixing with polymeric adhesives, metal ceramics).	3
5	Artificial teeth. Selection of artificial teeth in the manufacture of removable dentures.	3
6	Gypsum. Chemical composition of gypsum. Classification of gypsum. Areas of application. Properties of gypsum (dimensional stability, compressive strength, tensile strength, hardness and wear resistance) and their clinical significance. Advantages and disadvantages of gypsum for making models.	3
7	Моделювальні матеріали. Характерні властивості (діапазон плавлення, термічне розширення, механічні властивості, текучість, залишковий стрес (напруга), пластичність.) Класифікація, склад та призначення зуботехнічних восків.	3
8	Supporting materials. The concept of abrasive and abrasive treatment. Properties of abrasives. Factors influencing the efficiency of abrasive processing. Grinding and polishing. Abrasive tools and means for carrying out these manipulations.	3
9	Molding materials. Masses for the manufacture of refractory models. Alloy metals. Separating and covering materials. Fluxes and bleaches.	3
10	Fixing materials. General requirements for fixing materials. Choice of material for fixing. Water-based fixing cements. Zinc phosphate, polycarboxylate cements. Traditional and polymer-modified glass ionomer fixing cements. Polymer cements.	3
<b>Total</b>		<b>30</b>

### 13. THEMATIC PLAN OF INDIVIDUAL WORK

<b>№</b>	<b>Name of topic</b>	<b>Hours</b>	<b>Type of control</b>
1	Dental materials science as an applied science of materials for dental purposes. The basic principle of classification of dental materials.	10	Current on practical classes
2	Biological assessment and biocompatibility of dental materials and methods of its assessment.	5	Current on practical classes
3	Quality criteria for dental materials. Systems of national and international standards.	5	Current on practical classes
4	Cement for tooth restoration. Metal filling materials (amalgam).	5	Current on practical classes
5	Classification and basic properties of composite materials	5	Current on practical classes
6	Adhesives and adhesive systems in restorative dentistry.	5	Current on practical classes
7	Materials for processing and sealing of root canals (requirements, characteristics, classifications, representatives)	10	Current on practical classes
8	Medicines for the prevention of dental diseases (diseases of the oral mucosa, periodontal disease).	10	Current on practical classes
<b>Total</b>		<b>55</b>	

### 14. INDIVIDUAL TASKS

- Speeches at the scientific student group.
- Participation in scientific conferences.
- Publication of reports in the form of abstracts and articles in periodicals (journals, collections of scientific papers).
- Production of visual aids according to educational programs (tables, models, visual aids, graphological schemes of practical classes).
- Writing essays

### 15. LIST OF THEORETICAL TASKS TO THE TEST

Mechanical properties of basic materials: hardness, strength, elasticity, ductility, fatigue.  
 Technological properties of basic materials: ductility, fluidity, viscosity, shrinkage, friction.  
 Physical properties of basic materials: density, melting, thermal conductivity.  
 Chemical and biological properties of basic materials. Plastics in orthopedic dentistry.  
 Classification of plastics.

Hot polymerization plastics: composition, properties, application.  
Plastics of cold polymerization: composition, properties, application. Basic plastics of hot polymerization: composition, properties, application.  
Basic plastics of cold polymerization: composition, properties, application. Elastic backing materials.  
Polymerization, stages of polymerization.  
Polymerization mode.  
Stages of maturation of plastic dough.  
Types of plasticity.  
Metal alloys in orthopedic dentistry.  
Classification of metal alloys.  
Alloys based on silver and palladium: composition, properties, applications.  
Samples of gold. Refining.  
Chromium-nickel alloys: composition, properties, application.  
Cobaltochrome alloys: composition, properties, application.  
Alloy based on titanium, tantalum, etc. Refractory alloys.  
Technology of metals and metal alloys.  
History of development and application of porcelain masses in dentistry.  
Physico-mechanical, chemical and biological properties of porcelain.  
Composition and application of porcelain masses.  
Classification of porcelain masses.  
Ways to reduce or destroy gas wells when firing porcelain.  
Porcelain masses for metal ceramics.  
Sit in orthopedic dentistry.  
Composition, properties, application of sieves.  
Classification of impression materials.  
Requirements for impression materials.  
Brief description of the group of imprinting materials that crystallize, in particular gypsum, materials based on zinc oxide and eugenol.  
Chemical composition, properties, classification, areas of application of gypsum.  
Classification of gypsum.  
Properties of gypsum (dimensional stability, compressive strength, tensile strength, hardness and wear resistance) and their clinical significance.  
Advantages and disadvantages of gypsum for making models.  
Requirements for modeling materials.  
Substances that are part of the modeling materials.  
Classification of waxes.  
Beeswax: its properties and applications.  
Vegetable waxes: origin, properties and applications.  
Types of mineral waxes: properties and application.  
Modeling wax for bases: composition and application.  
Modeling wax for fixed prostheses. Its properties and applications.  
Modeling wax for clasp works: types and applications.  
Disadvantages of waxes and wax compositions.  
Composition, properties, application of molding materials.  
Requirements for molding materials.  
Composition, properties, application of fluxes and bleaches.  
Natural and artificial abrasives.  
Composition, properties, application of abrasive materials.  
Composition, properties, application of separating varnishes.  
Classification of materials for fixing fixed orthopedic structures.  
Fixing materials for temporary and permanent fixation.  
General characteristics of materials for fixing fixed structures.  
Requirements for fixing materials.

Cements: varieties, their composition, properties.

Properties, technology of application of zinc phosphate, zinc silicate, zinc oxide deugenol, polycarboxylate, glass ionomer cements.

Composites and compomers for fixing fixed structures.

## 16. LIST OF PRACTICAL SKILLS TO BE TESTED DURING THE TEST

- Cast models of jaws from plaster;
- Pack gypsum in the ditch;
- Plaster wax reproduction to the ditch;
- To etch wax from a ditch;
- To carry out isolation of models in a ditch;
- Prepare molding compounds for the manufacture of refractory models;
- Duplicate the model;
- Knead self-hardening plastics;
- Knead hot polymerization plastics for fixed and removable prosthetics;
- Pack plastic in a ditch;
- Carry out polymerization of plastics;
- Carry out processing, grinding and polishing of finished prostheses;
- Knead different fixing materials;
- To bring fixing material to a fixed design;
- Apply a non-removable structure on the model, remove the remnants of fixing material.

## 17. METHODS AND FORMS OF CONTROL

**Current control** is carried out in the form of oral questioning and test written control.

**The form of final control** - according to the curriculum - semester test in the form of an oral examination and test written control.

Evaluation criteria: control measures include current and final semester control.

**The current control** is carried out during training sessions and has a tent to check the assimilation of educational material by students. Forms of assessment of current educational activities include control of theoretical and practical training. During the assessment of mastering each topic for the current educational activity of the student grades are given on a 4-point (excellent, good, satisfactory, unsatisfactory). This takes into account all types of work provided by the discipline program. The student must receive a grade from each topic for further conversion of grades into points on a multi-point (200-point) scale.

**The grade "excellent"** is given in the case when the student knows the program in full, illustrating the answers with various examples; gives exhaustively accurate and clear answers without any leading questions; teaches material without errors, freely solves problems and performs practical tasks of varying complexity;

**The grade "good"** is given when the student knows the whole program and understands it well, answers the questions correctly, consistently and systematically, but they are not exhaustive, although the student answers additional questions without errors; solves all problems and performs practical tasks experiencing difficulties only in the most difficult cases;

**The grade "satisfactory"** is given to the student on the basis of his knowledge of the whole volume of the program on the subject and a satisfactory level of understanding of it. The student is able to solve modified problems with the help of leading questions; solves problems and performs practical skills, experiencing difficulties in simple cases; is not able to systematically state the answer on his own, but answers directly asked questions correctly.

**The grade "unsatisfactory"** is given in cases when the student's knowledge and skills do not meet the requirements of "satisfactory" assessment.

The form of final control of academic performance is a semester test is a form of final control, which consists in assessing the student's mastery of educational material solely on the basis of the results of his performance of certain types of work in practical classes. Semester credit in disciplines is held after the end of its study, before the examination session.

## 18. EVALUATION OF THE LEVEL OF STUDENT TRAINING IN THE DISCIPLINE

*For disciplines the form of final control which is a test:*

**The maximum number of points** that a student can score for the current academic activity in the study of the discipline is 200 points.

**The minimum number of points** that a student must score for the current academic activity to enroll in the discipline is 120 points.

**The calculation of the number of points** is based on the student's grades on a 4-point (national) scale during the study of the discipline

### Assessment scale: national and ECTS

Score on a 200-point scale	Score for 4-point scale
From 180 to 200 балів	«5»
From 150 до 179 балів	«4»
From 149 to minimal number of points, which must be scored by the student	«3»
Lower than minimal number of points, which must be scored by the student	«2»

Recalculation of current success of students in studying the elective course: "Materials Science in Orthopedic Dentistry"

Score "excellent" - 20 points

Score "good" - 15 points

Score "satisfactory" - 12 points

Score "unsatisfactory" - 0 points

### Distribution of points for current activities

Module number/number of training hours /number of credits ECTS	Quantity of modules, its number	Number of practical classes	Conversion into points				Min number of points
			Traitional grades				
			«5»	«4»	«3»	«2»	
Module 1 (test) 105 / 3,5	№ 1	10	20	15	12	0	<b>120</b>

For the current educational activity the student can receive a maximum of 200 points. This grade is calculated by multiplying the number of points corresponding to the grade "excellent" by the number of topics in the module: 20 points x 10 topics = 200.

The minimum number of points that a student can score when studying the module is calculated by multiplying the number of points corresponding to the grade "satisfactory" by the number of topics in the module: 12 points x 10 topics = 120 points.

*Individual student work* is assessed during the current control of the topic in the relevant lesson.

Assimilation of topics that are submitted only for independent work is controlled during the final control.

## 19. RECOMMENDED LITERATURE

### 19.1 Basic literature:

1. Rozhko MM, Nespryadko VP, Paliychuk IV Dental equipment K. : Book-plus, 2014.-603.
2. Abdurakhmanov AI, Kurbanov OR Materials and technologies in orthopedic dentistry. - Textbook. - M. : Medicine, 2002. - 208p.
3. Arutyunov SD Materials science in orthopedic dentistry. Propaedeutics of dental diseases. Workbook. textbook Publisher: Practical Medicine, 2018. - 80 p.
4. Materials science in dentistry: a textbook / [King DM, King MD, Odzhubeyskaya OD, etc.]; for general ed. King DM - Vinnytsia: New Book, 2019. - 400 p. : il.
5. Orthopedic dentistry. Applied Materials Science 7th ed. ispr. and additional Trezubov VN, Mishnev LM, Zhulev EN, Trezubov SS Publisher: Medpress-inform, 2017. 328 p.

### 19.2 Additional literature

1. Orthopedic dentistry: [textbook for students. stomat. fac. higher honey. textbook institutions of III-IV levels of accreditation] / M.M. Rozhko, VP Неспрядько.-Вид.2-ге, випр., Доп.-К. : Книга плюс, 2008.- 575 с
2. Abolmasov NG, Abolmasov NN, Bychkov VA, Al-Hakim A. Orthopedic dentistry, SGMA, 2000.-576p.
3. Vlasenko AZ, Strelkovsky KM Dental materials science / Ed. Professor Fleece PS - K. : Здоров'я, 2004. - 332 с.
4. Muzychenko VP, Lutsevich DD, Yavorskaya LP Medical chemistry.- K.:Medicine, 2015.- 496.
5. Konovalov AP, Kuryakina NV, Mitin NE Phantom course of orthopedic dentistry / Ed. prof. N.V. Trident. - M. : Medical book; N.Novgorod: NGMA Publishing House, 1999. - 344p.
6. Shilova GB, Pochtarev AA, King MD Workshop on orthopedic dentistry.- Poltava, 1995.- 140 p.
7. Rozhko MM, Nespryadko VP Dental prosthetic equipment. - K. : Книга плюс, 2006. – 543p.
8. Strelkovsky KM, Vlasenko AZ, Filipchuk JS Dental Materials Science, K., "Health", 2004, 329p.
9. Nurt RV Fundamentals of Dental Materials Science Textbook. - 2nd ed. - Translation from English. Incoralus. - KMK-Invest, 2004. - 304 p. - ISBN 5-9900267-1-4.
10. Poyurovskaya I.Ya. Dental materials science: a textbook. - Geotar Medicine, 2007 (2008). - 192 p.

### 19.3 Information resource

- <http://moodle.bsmu.edu.ua/course/view.php?id=270>  
<https://knigi-shop.prom.ua/p1113475474-materialoznavstvo-stomatologiyi-korol.html>  
<http://eprints.zu.edu.ua/21893/1/%D0%BF%D0%BE%D1%82%D0%B0%D1%88%D0%BE%D0%B2%D0%B0.pdf>  
<https://www.gurt.org.ua/uploads/news/files/2016-8/%D0%9C%D0%B0%D1%82%D0%B5%D1%80%D1%96%D0%B0%D0%BB%D0%BE%D0%B7%D0%BD%D0%B0%D0%B2%D1%81%D1%82%D0%B2%D0%BE-min.pdf>  
<https://ohi-s.com/ortopediya-cat/>  
<http://dspace.kpfu.ru/xmlui/handle/net/32581>

## 20. COMPILERS OF THE GUIDE FOR STUDENT (SILABUS)

1. Belikov Oleksandr - head of the department, professor, doctor of medicine;
2. Gavaleshko Vasil Petrovich – assistant of the department, candidate of medical sciences