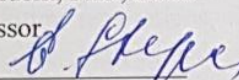


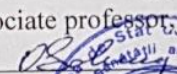


FACULTY OF STOMATOLOGY  
STUDY PROGRAM 0911.1 STOMATOLOGY  
CHAIR OF STOMATOLOGICAL PROPAEDEUTICS "PAVEL GODOROJA"

APPROVED

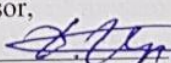
At the meeting of the Committee for Quality Assurance and Evaluation of the Curriculum Faculty of Stomatology  
Meeting nr. 1 of 22.09.2020  
Committee president, PhD, DMS  
Associate professor  
Stepco Elena 

APPROVED

at the Council meeting of the Faculty of Stomatology  
Meeting nr. 2 of 30.09.2020  
Dean of Faculty of Stomatology,  
PhD, DMS, Associate professor  
Solomon Oleg 

APPROVED

At the meeting of the chair of Stomatological Propaedeutics "Pavel Godoroja":  
Meeting nr. 3 of 18.09.2020

Head of the chair, PhD, DHMS,  
Associate professor,  
Uncața Diana 



**CURRICULUM**

DISCIPLINE: **BIOMATERIALS IN DENTISTRY**

**Integrated studies**

Course type: **Compulsory discipline**

Chișinău, 2020



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### I. Introduction

- **General presentation of the disciplines: the place and the importance of discipline in the formation of specific competencies in the professional training program of specialists.**

Biomaterials are an integral part of dentistry being a basic discipline, necessary for training future specialists. Development biomaterials by the students on a preclinical course includes the study of the relationship, composition, structure, properties, production technology and application of materials for various sections of modern dentistry. Thus, students get acquainted with laws changing properties of materials under the influence of the physical, mechanical and chemical factors. The results of the investigation of the properties of dental materials have not only theoretical, but also practical value associated with the property management by changing the composition of materials and the development of best practices and technologies use of materials in various fields of dentistry. The basic steps for working with biomaterials, study of their properties, indications and contra-indications for use, are aimed at the development the student's clinical thinking, develop skills for proper preparation, mixing material for future restorations, fixation of dentures, the ability to choose the right material, taking into account the indications and contraindications, compatibility of different chemical composition materials. At the same time, attention is paid to individual biocompatibility of the dental material, the absence of allergic reactions to it. A great attention is paid to the protection of the student while working with biomaterials and later when working with the patient. For this purpose, the students work in special equipment (a disposable robe, gloves, glasses, medical hat and a mask).

#### *The Mission (purpose) of this training plan in specialists' preparation.*

The main objective of dental materials science, is to teach future dentist the properties of materials, the technology of preparation, knowledge of field of their application. At the same time, the study of biomaterials that are described within the discipline aimed at developing skills and clinical thinking of students, where future experts on the basis of fundamental knowledge of biomaterials will continue to study and work out the skills while working with these materials at first on phantom, and later on while treating the patients. All this will lead to a right choice of a method of treatment and selection of necessary biomaterials.

- **Discipline teaching languages:** Romanian, Russian and English.
- **Beneficiaries:** students of the first course, Faculty of Stomatology.

### II. DISCIPLINE ADMINISTRATION

Discipline code	<b>S.02. O.015</b>		
	<b>Biomaterials in dentistry</b>		
Responsible for discipline	<b>Uncuța Diana</b> , PhD, DHMS, Associate professor, head of chair <b>Porosencova Tatiana</b> , PhD, DMD, Associate professor, Head teacher		
Year	I	Semester	II
Number of hours, including			90



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Course	17	Practice	17
Seminars	34	Individual work	22
Evaluation form	E	Number of credits	3

### III. AIMS OF DISCIPLINE

• **At the level of knowledge and concepts a student must:**

- ✓ know the role of biomaterials in dentistry;
- ✓ define biomaterials in dentistry, aims and objectives;
- ✓ know the physicochemical features of biomaterials;
- ✓ know the optical, thermal, electrical and mechanical properties of dental materials;
- ✓ know the notion of biocompatibility of dental materials. Biocompatibility test types;
- ✓ know the classification of biocompatibility: bio tolerance, bio inertness, bioreactivity (biological activity);
- ✓ know the metals and metallic alloys, classification; definition.
- ✓ be familiar with the methods of using acrylic resins in dentistry;
- ✓ know the medico-biological material requirements for impression materials;
- ✓ understand the difference between physical and chemical adhesion;
- ✓ know base alloys based on Co-Cr and Ni-Cr. Their properties;
- ✓ know the materials that are used in the development of Endo-bone grafts;
- ✓ know the classification of polymeric materials in accordance with the chemical structure;
- ✓ know the definition of the ceramic mass, chemical composition and their classification;
- ✓ know the composition of the dental waxes, classify according to usage;
- ✓ be familiar with the introduction and use of wax for laying;
- ✓ be familiar with the requirements for dental wax;
- ✓ know the equipment and processing steps of Acrylic polymers;
- ✓ be familiar with the sequence and technique of taking the impression;
- ✓ be familiar with the basic properties of the impression materials;
- ✓ examine the materials used for casting models, and their properties;
- ✓ be familiarized with the requirements for temporary seals and medical laying's;
- ✓ know common notions of the permanent filling material
- ✓ know the difference between bandages and temporary fillings;
- ✓ know materials used for dressings;
- ✓ know materials used for temporary fillings;
- ✓ know the characteristic of artificial dentin;
- ✓ to know the purpose of the use of therapeutic laying;
- ✓ know the difference between the baseline and layer laying;
- ✓ understand the reaction of curing glass-ionomer cement;
- ✓ know the factors that influence the adhesion;
- ✓ understand the reaction of curing hybrid glass ionomer cements, properties and indications for use;
- ✓ familiarize yourself with the difference between the basic metal ionomer cements and "cermet";
- ✓ know the structure of the hybrid glass-ionomer cement after polymerization;
- ✓ familiarize yourself with the chemical composition with silver amalgam;
- ✓ know the working time and to correctly test preparation with silver amalgam;
- ✓ to understand the mechanism of etching the enamel with acid;
- ✓ get acquainted with the classification of adhesive systems;
- ✓ get acquainted with the classification of diacrylic resins after polymerization reaction;



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- ✓ see the basic parts of light curing lamp;
  - ✓ explore temporary root canal filling materials based on calcium hydroxide, their properties and indications for use;
  - ✓ know the materials used for the production of fixed and removable dentures;
  - ✓ know the optimal proportion for the proper kneading of materials
- **At the level of practical work, students must:**
- ✓ be able to explain the use of biomaterials in dentistry;
  - ✓ be able to describe general properties of dental materials;
  - ✓ be able to distinguish between the necessary materials for temporary and permanent sealing;
  - ✓ be able to describe and explain the compatibility of different dental materials;
  - ✓ be able to list the tests of biocompatibility of biomaterials;
  - ✓ to be able to prove need of the use of adhesive systems;
  - ✓ to have the ability to enumerate and characterize the materials necessary for the protection of the dental pulp;
  - ✓ be able to use different methods to determine important tooth shades;
  - ✓ be able to enumerate the factors that affect the choice of color of a material in the process of restoration;
  - ✓ be able to explain the use of impression trays with different dental materials;
  - ✓ be able to take the impression from the prosthetics field with various impression materials.
  - ✓ be able to knead different types of cements;
  - ✓ be able to knead curative pastes.
- **At the level of integration:**
- ✓ evaluate phases of acrylate polymerization;
  - ✓ evaluate the benefits of using wax as auxiliary material in the denture manufacture;
  - ✓ evaluate the elasticity of composite materials;
  - ✓ evaluate filling material on the scale of "VITA";
  - ✓ sort the instruments for grinding and polishing the materials

#### IV. PRELIMINARY CONDITIONS AND REQUIREMENTS

Knowledge of and compliance with ethical and professional standards in relation with the patient. Knowledge of the purpose and objectives of biomaterials in dentistry. Knowledge of the chemical composition and physical-chemical properties of different dental materials. Knowledge of indications and contraindications of materials to evaluate the biological compatibility of materials. Knowing the stages of the use of the materials in different dental cases. Knowledge and use of tools for kneading and processing of dental materials. Know the use of working time involved biomaterial. Knowledge of the right sources of information necessary for the work with dental biomaterials

#### V. THEMES AND ORIENTATIVE DISTRIBUTION OF HOURS

Nr	THEME	Number of hours



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d/o		Cou rses	Semi -nars	Pract ice	Indi vidu al
1	<p><b>Biomaterials. General concept. Classification. Properties of biomaterials.</b> The notion of biomaterials. Properties. Physical properties (melting temperature, boiling, color, luminescence, optical effects luminescence) of dental materials. Thermal properties of dental materials (thermal diffusivity and thermal expansion). Electrical properties (galvanic corrosion). Mechanical properties (strength, resilience, flexibility) of biomaterials. Chemical properties, corrosion. Biocompatibility of dental materials.</p>	1	2	1	1
2	<p><b>Basic dental materials. Metals and alloys used in dentistry (Au; Ni-Cr; Co-Cr). Composition and properties.</b> Metals and metal alloys. Definition Classification by Siebert (1983). Noble alloys and their properties (melting range, density, hardness). Gold Alloys. Platinum Alloys. Base alloys based on Co-Cr and Ni-Cr. Properties. Iron- based alloys based on titanium and copper. Alloys for fixed dentures (noble, base). Metal-ceramic alloys. Alloys for removable partial dentures. Alloy casting.</p>	1	2	1	1
3	<p><b>Non-metallic materials. Acrylic Resins. Composition and properties. Practical application. Medical-biological requirements.</b> Polymers. Structure of polymers. Classification of polymers by chemical structure. Classification of polymers by application. Acrylic resins. Types of acrylic resins. Heat activated resins. Mixing of powder and liquid. The properties of heat activated resins. Indications for use of heat activated resins. Chemically activated (self-cure) acrylic resins. Types of chemically activated acrylic resins. Properties of chemically activated acrylic resins. Indications for use of chemically activated acrylic resins.</p>	1	2	1	2
4	<p><b>Non-metallic materials. Dental ceramics. Composition and properties. Practical application. Medical and biological requirements. Final.</b> Dental ceramics. Definition. Chemical composition. Classification of dental ceramics depending on: firing temperature, type, layers and function within the restoration. Manufacture of dental ceramics: industrial and laboratory. Stages of baking ceramic body on the metal structure. Characteristics of dental ceramics. Notion about new ceramic system: Hi-Ceram-Vita, Ceremony, In-Ceram-Vita, Dicor, Impression technique. Mechanical copying methods. Computerized grinding methods (CAD-CAM).</p>	1	2	1	1
5	<p><b>Auxiliary materials. Wax. Classification of packaging materials.</b> Dental wax. Classification by the method of application. Wax properties: fluidity, thermal dilatation, physical properties. Release form and properties of the base wax. Release form and properties of molded (shaped) waxes. Release form and properties of the sticky wax. Release form and properties between the modeling wax for tabs. Release form and properties of finished wax models. Requirements for dental wax. Classification of packaging materials used in dental laboratory. Properties</p>	1	2	1	2



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Nr d/o	THEME	Number of hours			
		Cou rses	Semi -nars	Pract ice	Indi vidu al
6	<p><b>Materials for taking impression and casting models. Characteristic. Classification. The materials used. Methods of creating impressions and models.</b></p> <p>The Definition of Impression. Classification of the impression. The impression trays. Characteristic. Classification. Stages and method of taking the impression. Basic properties of the impression material (plasticity, accuracy, elasticity, mechanical durability, volume stability, time of curing). Secondary properties of the impression material (absence of toxic irritation and smell, pleasant taste, long-term storage and easy removal after curing). Reversible and irreversible solid impression materials. Properties. Characteristic of group of reversible and irreversible elastic impression materials. Medical and biological requirements for the impression materials. Model. Definition. Features. The materials used for the manufacture of models. Their properties and use. Classification of models depending on purpose and method of use. The equipment that is necessary for the manufacture of models.</p>	1	2	1	2
7	<p><b>Materials for sealing cavities. Classification. Requirements for permanent restorative materials.</b></p> <p>The concept of sealing. Classification of sealing materials. Requirements for temporary sealing materials. Requirements for therapeutic sealing materials. Requirements isolating cements. Requirements for the constant filling materials. Determination of crown restoration.</p>	1	2	1	1
8	<p><b>Temporary filling material. Basic properties. Final.</b></p> <p>The definition of temporary filling materials. Requirements for temporary restorative materials. The difference between a bandage and other seal. The materials used for bandages. The materials used for the temporary seals. Characteristics of artificial dentin. Properties. Chemical composition. The composition of the dentin-paste and paste eugenol. Chemical properties. Temporary light cured seals. Properties. Methods of preparation and application of temporary filling materials.</p>	1	2	1	1
9	<p><b>Treatment (therapeutic) linings and isolating paste.</b></p> <p>Definition and classification of treatment linings. The purpose of use of treatment linings. Calcium hydroxide paste. Properties and indications for use. Zinc oxide paste. Properties and indications for use. Combined therapeutic pastes. Properties and indications for use. How to prepare treatment lining. The mechanism of action of treatment lining. Definition and classification of isolating cements. The purpose of the application of isolating cements.</p>	1	2	1	1



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Nr d/o	THEME	Number of hours			
		Cou rses	Semi -nars	Pract ice	Indi vidu al
10	<p><b>Glass Ionomer Cements. Classification. Indications for use. Contraindications. The advantages and disadvantages.</b> Definition and chemical composition of glass-ionomer cement. Release form. Setting reaction of glass-ionomer cement. Properties of glass-ionomer cement. Indications for use for glass-ionomer cement. Classification of glass-ionomer cement by Wilson and McLean (1988). Classification by G. J. Mount and W.R. Hume (1998). Characteristics of glass-ionomer cement type I; type II; type III.</p>	1	2	1	1
11	<p><b>Hybrid glass ionomer cements. Properties.</b> Glass ionomer cement with addition of resin. Definition. Chemical composition Types of polymerization. Release form. The curing reaction, properties and indications for use of resin glass ionomer cements. Glass ionomer cement with addition of metal particles. Properties. Indications for use. Compomers. Indications for use of compomers. The curing reaction of hybrid glass ionomer cements. The structure of resin glass ionomer cements after curing reaction. The definition of ormokers. Properties. Indications for use.</p>	1	2	1	1
12	<p><b>Dental amalgam. Classification. Definition. Properties. Indications for use, advantages and disadvantages. Final.</b> Definition of amalgams. Chemical composition of amalgam. The amount of silver in the powder. Characteristic of dental amalgam. Release form. Equipment and method for kneading the amalgam. Capsules for kneading the amalgams.</p>	1	2	1	2
13	<p><b>Adhesive systems. General principles of adhesion. Factors influencing the adhesion.</b> Definition of adhesion. General principles of adhesion. Features of adhesion to hard tissues of the tooth. Adhesion to enamel, morpho functional features of enamel. Preparation of enamel for the adhesion. Adhesion to dentin, morpho functional features of dentin. Factors influencing the adhesion (working surface, the adhesive nature, the material used for restorations, skills and a method of use, depending on the producer). Classification of adhesive systems. Characteristic of adhesive systems. Advantages and disadvantages of different adhesive systems.</p>	1	2	1	1



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Nr d/o	THEME	Number of hours			
		Cou rses	Semi -nars	Pract ice	Indi vidu al
14	<b>Composite filling materials. General characteristics. Classification. Chemical curing composites.</b> Definition of composite materials. Classification of composite materials. Organic monomers (BIS-GMA, UDMA, DGMA, TGDMA). Inorganic fillers. Silans, polymerizations initiators, stabilizers, colorants and pigments. Composite macro-filled sealing materials. Composite micro-filled sealing materials. Chemical curing composites. Release form. Advantages and disadvantages.	1	2	1	1
15	<b>Light cured composite filling materials. Properties.</b> Hybrid composite filling materials. Characteristics. Light-curing composite filling materials. Advantages and disadvantages. Classification of light-curing composites by material consistency. Characteristics. Fluid composite filling materials. Characteristics. Indications. Packable composites. Characteristics. Indications. Release form. Structure of light-curing lamp.	1	2	1	1
16	<b>Materials for root canal filling. Classification. Materials for temporary seal.</b> Materials for sealing the root canals. Requirement for root canal sealing materials Classification. Temporary sealing materials based on calcium hydroxide. Indications for use. Properties. Release form. The materials for temporary sealing based on iodoform. Indications for use. Release form.	1	2	1	2
<b>Total</b>		<b>17</b>	<b>34</b>	<b>17</b>	<b>22</b>





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**REFERENT OBJECTIVES AND CONTENT UNITES**

Objectives	Content units
<b>Biomaterials. Properties of metals and alloys used in dentistry. Acrylates. Ceramics. Practical application. Medico-biological requirements.</b>	
<ul style="list-style-type: none"><li>✓ know the role of biomaterials in dentistry;</li><li>✓ define biomaterials in dentistry, their properties;</li><li>✓ biocompatibility of dental materials;</li><li>✓ know metals and alloys used in dentistry;</li><li>✓ know the alloys for metal-ceramic works;</li><li>✓ know the classification of polymeric materials;</li><li>✓ know simple resins and the acrylic resins with thermal polymerization;</li><li>✓ know the concept of ceramic masses;</li><li>✓ know the classification of the ceramic masses;</li></ul>	<p>The role of biomaterials in dentistry. Goals and objectives.</p> <p>Electrical, thermal, mechanical and optical properties.</p> <p>The types of research on biocompatibility (basic and secondary).</p> <p>Precious metals and alloys, their properties (melting point, density, hardness). Gold. Platinum. Non-precious alloys based on Co-Cr and Ni-Cr. Their properties.</p> <p>Iron-based, titanium and copper-based alloys. Metal-ceramic connection.</p> <p>The classification of acrylic resins according to the chemical structure and use.</p> <p>The release form of the ceramic masses. Their properties.</p> <p>The classification of ceramic masses depending on: the melting point, the number of layers and the purpose of use.</p>
<b>Auxiliary materials. Wax. Tools for processing of hard dental tissues. Tools for processing and polishing. Materials for taking the impression and casting models. Methods of creating impressions and models. Materials for sealing cavities. Temporary filling materials.</b>	
<ul style="list-style-type: none"><li>✓ define dental wax, it's properties and composition;</li><li>✓ list and describe the release forms of dental wax for modeling;</li><li>✓ give the definition for "impression", classification of impressions, characteristic classification;</li><li>✓ know materials for taking the impression</li></ul>	<p>Wax properties: fluidity, thermal dilatation, physical properties, etc. The requirements for dental wax.</p> <p>Base wax, molding (profile) wax, modeling wax for laying etc.</p> <p>The classification of the impressions depending on the method of taking the impression. The classification of impression materials based on</p>



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<b>Objectives</b>	<b>Content units</b>
<p>and casting models;</p> <ul style="list-style-type: none"><li>✓ the concept of sealing the cavity and the basic characteristics of the filling materials;</li><li>✓ the concept of the temporary filling materials and the field of their use;</li><li>✓ the characteristic of artificial dentin, it's properties and chemical composition;</li><li>✓ list the properties of the temporary photo polymerization seals;</li></ul>	<p>Gherner, Oksman, Napadov, și Postolachi Bârsa</p> <p>Properties of the impression materials and their use. The classification models in accordance with the method of use and preparation method.</p> <p>Equipment necessary for the model's production. The basic characteristics of the sealing materials:</p> <p>adhesion, retraction, disintegration, hermetic marginal adhering of the seal, abrasion, tensile strength, coefficient of thermal expansion, viability, optimal blending texture.</p> <p>Temporary sealing materials are used for: control seals, fixing of the medical material, in cases when it is impossible to finish the treatment in one visit, as temporal fillings of the tooth, as insulating laying, temporary fixation of orthopedic constructions.</p> <p>Artificial dentin is easy to use, has good adhesion to the cavity, low mechanical resistance to the mechanic impact, easy to place and model.</p> <p>Temporary photo polymerization fillings are elastic, are easily removed, do not affect the adhesion and curing of the material for futher filling.</p>
<p><b>Materials for medical and insulating layings. Glass ionomer cements. Hybrid Glass-ionomer cements. Dental amalgams. Definition. Classification. Properties. Idications and contraindications for use. Advantages and disadvantages.</b></p>	
<ul style="list-style-type: none"><li>✓ definition and classification of medical laying's;</li><li>✓ to list and explain the purpose of use of the medical laying's;</li><li>✓ to know the requirements and properties of insulating laying's;</li><li>✓ to know the definition and chemical composition of glass-ionomer cement. The release form;</li><li>✓ to learn glass-ionomer cement classifications;</li><li>✓ to know the properties of glass-ionomer cement;</li><li>✓ to know and understand the mechanism of adhesion of glass-ionomer cement to the dental tissues;</li><li>✓ to explain the difference between glass-ionomer cement with the addition of metal particles and metal-ceramics (Cermet);</li><li>✓ to study the properties of glass ionomer</li></ul>	<p>Materials for therapeutic laying's are classified according to their chemical composition and method of polymerization.</p> <p>Stopping the inflammation process in the pulp, influencing the microflora, providing anesthetic action, the stimulation of the formation of substitutional dentin, normalization of metabolic processes in the pulp of a tooth.</p> <p>To requirements for insulating laying's: not to be toxic, to be mechanically strong, to be impenetrable, to have low thermal conductivity, to have good adhesion, to be X-ray contrast, to have thermal expansion coefficient close to solid tissues.</p> <p>Glass-ionomer cement is presented as a two-component system of powder-liquid in bottles or as UNI-dose capsules, acid can be added to the powder or solution.</p> <p>Glass ionomer cement can be classified in 3 types: (I)-fixing, II-restorative III-lining.</p> <p>Glass-ionomer cement has a good chemical</p>



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Objectives	Content units
<p>cement with adding of metal particles;</p> <ul style="list-style-type: none"><li>✓ to know the definition of amalgams.</li></ul> <p>Classification of amalgam;</p> <ul style="list-style-type: none"><li>✓ to know how to identify if the amalgam mass was prepared correctly;</li><li>✓ to know and explain the properties of mercury amalgam and it's release form;</li><li>✓ to know the working time of the amalgam;</li></ul>	<p>adhesion, biocompatibility, shrinkage, mechanical strength, color and transparency options that correspond to the solid tooth tissues.</p> <p>has binding with mineralized tissues, binding with collagen, good conditioning with the tooth surface.</p> <p>Difference between cements in the chemical composition of powder.</p> <p>Has high abrasion resistance comparing to ionomer cements and has high X-ray contrast that can be compared to the amalgam X-ray contrast.</p> <p>Classification of amalgam by: the number of metals in composition, the content of copper in the silver alloy, silver sawdust.</p> <p>Test for the correct amalgam kneading.</p> <p>Mercury is the only metal that has liquid state in normal temperature conditions.</p> <p>Period when the amalgam retains its properties, necessary for sealing</p>
<p><b>Adhesive systems. General principles of adhesion. Classification of dental adhesive systems. Definition. General characteristics. Indications for use. Advantages and disadvantages. Composite filling materials. Chemical curing composites. Photopolymer curing composite filling materials. Root canals filling materials</b></p>	
<ul style="list-style-type: none"><li>✓ to explain the definition of adhesion, and the technique of adhesion;</li><li>✓ to explain physical and chemical mechanisms of adhesion;</li><li>✓ to explain the difference between physical and chemical adhesion;</li><li>✓ to study factors that influence the adhesion.</li><li>✓ to explain the IIIrd generation of adhesive systems;</li><li>✓ define composite materials, classification of composite materials;</li><li>✓ to know the release form of hybrid composite materials;</li><li>✓ the main parts of the photo polymerization lamp;</li><li>✓ to know now the purpose of the root channels sealing;</li><li>✓ to know the classification of the root channels sealing materials by consistency at the moment of placing;</li></ul>	<p>The implementation of different adhesion techniques in practice</p> <p>Physical adhesion occurs at the expense of the micromechanical adhesion material with the tissues of the tooth. Chemical adhesion occurs at the expense of the formation of chemical bonding of adhesive with solid mineralized tissues of dentin and enamel.</p> <p>The main element that differs chemical adhesion from physical is the formation of chemical bonding's with the emergence of conglomerates on both surfaces.</p> <p>The level of participation of the working surface in the process of adhesion depends on the nature of the adhesive, material used for restorations, method of use and on the manufacturer.</p> <p>Content and history, the definition of the primer and adhesive.</p> <p>Classification of composite materials by Lutz, Phillips and Willems.</p> <p>Powder-liquid, paste-liquid, paste-paste, paste in the syringe.</p> <p>List and describe the main parts of photo polymerization lamp.</p> <p>The purpose of root sealing, as well as the basic</p>



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Objectives	Content units
	requirements for filling material. Determining Sealer and Filler. The difference between them.

**VII. PROFESSIONAL COMPETENCE (SPECIFIK (UK) ANF TRAVERSAL (TC)) AND THE RESULTS OF TRAINING.**

**Professional competence (specific) (SC)**

**SC1:** Knowledge of basic groups of biomaterials used in different branches of dentistry. Knowledge of basic physical and chemical properties of different groups of biomaterials. General principles for the use of biomaterials. Knowing what properties are important for use in different areas of dentistry. Biocompatibility of the material with the tissues of the oral cavity.

**SC2:** For manufacturing of fixed and removable dentures. Knowledge of additional materials, which are not included in the construction of the denture, but necessary for its production. The materials used for fixing removable dentures temporarily and permanently. Materials required for direct and indirect restorations in the destruction of the crown part of the tooth.

**SC3:** The materials necessary for temporal root canal filling for impact on periapical focus of chronic infection and the regeneration of periapical bone tissue, as well as materials for permanent hermetic obturation of the whole gap of the root canal with its branches.

**SC4:** Permanent materials needed for the protection of the pulp from various toxic substances providing protection of dentin and pulp from thermal affection when amalgams are used. The use of adhesive systems for better fixation of restoration materials.

**SC5:** Knowledge of the compatibility of different materials, the ability to compensate for the shortcomings of one by combining several. Ability to mix materials for work. To know the order of their use. Indications and contraindications in each specific situation.

**SC6:** Ability to select the appropriate color of filling materials and orthopedic construction. Factors influencing the choice of colors when working with Vita scale

**Transversal competence (TC):**

**TK1:** Using professional standards of evaluation, respecting professional ethics, as well as legislation. The advance of logic, practice, evaluation and self-evaluation in decision-making related to the choice of treatment for patients

**TK2:** Performing actions and specific role playing in the team work in the phantom class at the Department of propaedeutic dental disease named "P. Godoroja." The promotion of dialogue, cooperation, initiative, positive attitude and respect for others, sympathy, altruism and continuing work on a personal and professional development.

**TK3:** Systematic verification of knowledge and skills, personal role and personal expectations, self-evaluation of knowledge and professional skills, efficient use of linguistic abilities, expertise in information technology, the use of skills in research and communication in view of providing quality services and adapt to the dynamic development of political demands in health and for personal and professional growth.

**Learning Outcomes.**

**At the end of this discipline, the student should:**

- know the basic principles, the structure of biomaterials used in different areas of dentistry;



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- know the basic properties of materials to improve the skills of the correct selection of biomaterials in each specific case;
- know that biomaterials first of all should be compatible with tissues of the oral cavity, Hypo-allergenic, and not be carcinogenic or toxic;

### VIII. INDEPEND WORK OF STUDENT

Nr.	Theme plan	Implementation strategies	Criteria for evaluation	Period of execution
1	Working with information sources	Reading a course or an appropriate topic from the textbook. Discussion of the topic. Knowledge and selection of additional sources of information on the topic. Attentive reading of the text and a description of the key points. Formulation of general conclusions related to the importance of the topic.	Ability to highlight the main points. Interpretative abilities. Ability to analyze and explain information obtained independently.	Throughout the semester
2.	<b>Assessment of basic knowledge on biomaterials</b> Each student makes a table in which he fills the name of the biomaterials, the chemical composition, positive and negative properties, indications and contraindications to this material			
3.	Practical work	The student mixes different materials depending on the subject of the seminar.	Evaluating properly the mixed material according to the proportion taken for mixing and the consistency of the material.	Throughout the semester

### IX. METHODOCAL PROPOSALS FOR TEACHING-LEARNING-ASSESSMENT

#### ✓ Using teaching and learning methods

During teaching this discipline were used different methods to effective understanding and achieving the goals of the training process. Discipline includes teaching courses, seminars, practical work and independent work. This course is conducted on the 1st semester of the first year. During practical work are used the following forms of preparation: independent, brainstorming, group discussion. For the preparation of courses are used the books that are available in the University Library, methodological suggestions of employees, as well as sources of information in electronic format (domestic and international professional websites). Students receive individual tasks, which, later, are subject to group discussion and evaluation of the quality of work performed. For a better assimilation of information and work in groups (team building), throughout the semester, students are evaluated orally and in writing.



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Methods of study include: exploring the information obtained during theoretical courses and information from the textbooks;

**Strategies / technologies used in teaching (relating to discipline).**

Direct contact, individual, brainstorming, group discussions, comparative analysis.

**Evaluation methods (with an explanation of the method for calculating the final mark)**

**Current:** Checking during seminars and practical work, 4 tests in writing and/or the final test.

Individual work performed during the semester is assessed and put together with control works. At the end of the semester, based on evaluations received, the annual average is displayed.

**Final:** The course ends with an exam. The final grade is calculated at the end of the discipline study - 50%; from test-control - 20% and oral interview - 30%. The average annual mark and the marks of all final stages of testing (test and oral answer) - are expressed in numbers according to the scoring scale (according to the table) and the final mark obtained is expressed in two decimal digits, to be entered in the notes book.

**The methodology of rounding of estimates evaluation phases**

Scale of intermediate assessments (average annual, grades at the exam stages)	National Assessment System	Equivalent ECTS
<b>1,00-3,00</b>	<b>2</b>	<b>F</b>
<b>3,01-4,99</b>	<b>4</b>	<b>FX</b>
<b>5,00</b>	<b>5</b>	<b>E</b>
<b>5,01-5,50</b>	<b>5,5</b>	
<b>5,51-6,00</b>	<b>6</b>	
<b>6,01-6,50</b>	<b>6,5</b>	<b>D</b>
<b>6,51-7,00</b>	<b>7</b>	
<b>7,01-7,50</b>	<b>7,5</b>	<b>C</b>
<b>7,51-8,00</b>	<b>8</b>	
<b>8,01-8,50</b>	<b>8,5</b>	<b>B</b>
<b>8,51-8,00</b>	<b>9</b>	
<b>9,01-9,50</b>	<b>9,5</b>	<b>A</b>
<b>9,51-10,0</b>	<b>10</b>	

*Note: Absence in the exam without any obvious reasons is marked by a pass and is estimated by the number "0". The student has the right to 2 retakes.*



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**X. RECOMMENDED LITERATURE:**

*A. Mandatory:*

1. Note de curs.
2. Nicolau G., Terehov A., Năstase C., Nicolaiciuc V. Odontologie practică modernă. Iași, 2010, 448 p.
3. Bîrsa Gh., Postolachi I. Tehnici de confecționare a protezelor dentare. Chișinău 1994.
4. Postolachi I. și colab. Protetica Dentară. Chișinău, „Știința”1993
5. John M. Power, John C. Wataha, Dental Materials properties and manipulation, tenth edition, Elsevier Health Sciences 2007, 384 p.
6. Николау Г.Ю., Терехов А.Б., Настасе К.И. Основы практической Кариесологии. Кишинэу,2008, 176 стр.

*B. Suplimentary*

1. Plescu A., Gafar M. Cariologie și odontoterapie restauratoare. București, 2006, 494 p.
2. McCabe J. F., Angus W.G.Walls. Applied Dental Materials. Singapore, 2008, 303 p.
3. Bonsor S. J., Pearson G. J. Applied Dental Materials. Livingstone, 2013, 454 p.
4. Копейкин В.Н., Демнер Л.М. Зубопротезная техника, Москва, 2003. 400 стр.