

MINISTRY OF HEALTH OF THE REPUBLIC OF BELARUS
Educational Institution
BELARUSIAN STATE MEDICAL UNIVERSITY

APPROVED

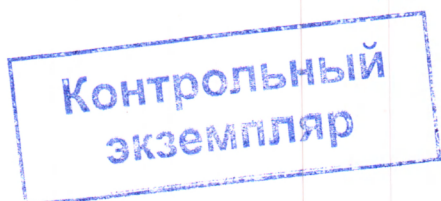


by Rector of the Educational
Institution «Belarusian State
Medical University»

S.P.Rubnikovich

24.06.2023

Reg. # UD-0911-03-05/2324edu.



**MATERIALS SCIENCE AND FUNDAMENTALS OF MANUFACTURING
DENTURES**

**Curriculum of the educational institution
in the academic discipline for the specialty**

7-07-0911-03 «Dentistry»

Curriculum is based on the educational program 1-79 01 07 «Dentistry», approved 27.06.2023, registration # УД-0911-03-05/2324/уч.; on the educational plan in the specialty 7-07-0911-03 «Dentistry», approved 17.05.2023, registration # 7-07-0911-03/2324/mf.

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RECOMMENDED FOR APPROVAL:

by the Department of General Dentistry of the educational institution «Belarusian State Medical University»
(protocol # 21 of 19.06.2023);

by the Scientific and Methodological Council of the educational institution «Belarusian State Medical University»
(protocol # 6 of 27.06.2023)

EXPLANATORY NOTE

«Materials Science and Fundamentals of Manufacturing Dentures» is the academic discipline of the module «Propaedeutic Dentistry and Materials Science», which contains systematized scientific knowledge about dental materials science, technological processes and methods of working with various materials, laboratory techniques for manufacturing dentures and various orthopedic structures.

The aim of the discipline «Materials Science and Fundamentals of Manufacturing Dentures» is the formation of basic professional competence based on the study of the latest scientific data on the properties and application of structural and auxiliary materials, technological processes used when working with various dental materials, the sequence of clinical and laboratory stages of manufacturing dental prostheses and dentitions to solve the problems of professional activity.

The objectives of the discipline «Materials Science and Fundamentals of Manufacturing Dentures» are to form students' scientific knowledge about the types of prostheses used to eliminate defects in teeth and dentition, the composition and properties of structural and auxiliary materials, the basics of technological processes and the clinical and laboratory stages of manufacturing prostheses of teeth and dentitions, the basics of medical ethics and deontology, skills and abilities necessary for orthopedic prosthetics.

The knowledge, skills and abilities acquired during the study of the academic discipline «Materials Science and Fundamentals of Manufacturing Dentures» are necessary for the successful study of the following modules: «Medical Prevention in Dentistry», «Therapeutic Dentistry», «Prosthodontics Module».

Studying the educational discipline «Materials Science and Fundamentals of Manufacturing Dentures» should ensure the formation of students' basic professional competency:

BPC. Use knowledge about the composition and properties of structural and auxiliary dental materials, technological processes used at the clinical and laboratory stages of manufacturing orthopedic structures.

As a result of studying the discipline «Materials Science and Fundamentals of Manufacturing Dentures», the student should

know:

structure of dental care in the Republic of Belarus;

basics of medical ethics and deontology;

organization and equipment of dental office;

organization and equipment of the main and auxiliary premises of the dental laboratory;

classification of materials used in the manufacture of dentures and orthopedic appliances;

classification of dental prostheses and orthopedic appliances;

requirements for the main and auxiliary materials in the manufacture of dentures and orthopedic appliances;

compositions, properties and use of structural and auxiliary materials in the manufacture of dentures and orthopedic appliances;

forms of production of structural and auxiliary materials, the technology of their preparation and use;

main technological processes used when working with the main and auxiliary materials in the manufacture of dentures and orthopedic devices;

features and sequence of clinical and laboratory stages in the manufacture of various types of structures that eliminate defects in teeth and dentition;

general and specific anatomy of permanent teeth;

clinical-laboratory steps of manufacturing inlays;

clinical-laboratory steps of manufacturing crowns;

clinical-laboratory steps of manufacturing bridges;

clinical-laboratory steps of manufacturing partial removable dentures;

clinical-laboratory steps of manufacturing bugeel dentures;

clinical-laboratory steps of manufacturing complete removable dentures;

be able to:

organize the workplace of the dental technician;

choose dentures according to the classification;

select impression materials when taking an impression from a patient;

select modeling materials when modeling a wax prototype of a denture;

select molding materials when replacing a wax prototype of a denture with a structural material;

select abrasive materials and tools when processing, grinding and polishing dentures from various structural materials;

model various types inlay;

model the wax composition of a cast post-and-core construction;

model artificial crowns;

model different types of bridges;

model bases of removable plastic prostheses;

make individual tray;

to carry out the arrangement of artificial teeth in removable dentures;

edging functional impressions;

prepare and apply the ceramic mass on the metal base of the frame;

carry out the molding of the wax composition in a cuvette to replace it with plastic;

install sprue-system;

carry out the molding of the wax composition in the flask to replace it with structural metal alloys;

master:

manual skills in the preparation of gypsum;

technique of casting a plaster model from an impression;

skills of selecting an impression tray;

skills of choice of impression material;

manual skills in the preparation of various types of impression materials;

manual skills of working with modeling materials (scraping and layering);

skills in working with krampon forceps for bending orthodontic wire;

skills of choosing dental rotary instruments for processing various structural

materials and hard tissues of teeth;

skills of choosing the types of tips for processing various structural materials and hard tissues of teeth;

skills in choosing dental rotary instruments for various types of handpieces;

manual skills of fastening rotating tools in various types of tips;

manual skills in the preparation of plastic dough;

skills in determining the types of prostheses, their structural elements and their features;

skills in selecting combinations of various structural materials for the manufacture of various types of prostheses;

skills in the selection of auxiliary materials at the stages of manufacturing various types of prostheses;

skills of determining the color shades of natural teeth;

first aid skills to the victim from exposure to an open flame, aggressive liquids, electric current.

Total number of hours for the study of the discipline is 218 academic hours. Classroom hours according to the types of studies: lectures – 24 hours, practical classes – 120 hours, student independent work (self-study) – 74 hours.

Intermediate assessment is carried out according to the syllabus of the specialty in the form of a credit (1 semester) and examination (2 semester).

Form of higher education – full-time.

ALLOCATION OF ACADEMIC TIME ACCORDING TO SEMESTERS OF STUDY

Code, name of the specialty	semester	Number of academic hours						Form of intermediate assessment
		total	in-class	including			out-of-class self-studies	
				lectures (including supervised independent work)	supervised student independent work	practical classes		
7-07-0911-03 «Dentistry»	1	104	69	12	-	57	35	credit
	2	114	75	12	-	63	39	exam

THEMATIC PLAN

Section (topic) name	Number of class hours	
	lectures	practical classes
1. Introduction to the specialty	2,66	6
1.1 Organization of dental service in the Republic of Belarus. Medical ethics and deontology in dentistry. Organization and equipment of dental office and dental laboratory	1,33	3
1.2. Dentures. Algorithm of the manufacturing of dentures. Dental materials classification	1,33	3
2. Dental materials science	9,31	51
2.1. Auxiliary materials used in dentistry	3,99	21
2.1.1. Dental and dental technician instruments	1,33	3
2.1.2. Impression materials	1,33	6
2.1.3. Gypsum, types of gypsum casts	-	6
2.1.4. Modeling materials. Investment and isolation materials	1,33	6
2.2. Construction materials and technological processes used in dentistry	5,32	30
2.2.1. Construction materials: metal alloys	1,33	3
2.2.2. Technological processes for the manufacture of dental prostheses from metal alloys	1,33	6
2.2.3. Construction materials: plastics	1,33	6
2.2.4. Technological processes used in the manufacture of prostheses from polymeric materials	-	6
2.2.5. Construction materials: ceramics	1,33	3
2.2.6. Technological processes used for the manufacture of ceramic dentures	-	6
3. Modeling the anatomical shape of the teeth of the upper and lower jaw	1,33	38,5
3.1 Anatomical shape of teeth. Tooth rows. Sign of teeth. Modeling the anatomical shape of the incisors of the upper and lower jaws	1,33	7
3.2. Modeling the anatomical shape of canine of the upper and lower jaws	-	7
3.3. Modeling the anatomical shape of premolars of the upper and lower jaws	-	7
3.4. Modeling the anatomical shape of molars of the upper and lower jaws	-	17,5
4. Clinical and laboratory steps of dentures manufacturing	10,64	24,5

Section (topic) name	Number of class hours	
	lectures	practical classes
4.1. General characteristics and classification of microprostheses. Clinical and laboratory steps of microprostheses manufacturing	1,33	3,5
4.2. General characteristics of the artificial crowns. Clinical and laboratory steps of crowns manufacturing	2,66	3,5
4.3. General characteristics of the prostheses that eliminate defects in the dentition. Bridges, clinical and laboratory steps of bridges manufacturing	2,66	3,5
4.4. General characteristics and classification of removable dentures. Clinical and laboratory steps of partial removable manufacturing	1,33	3,5
4.5. General characteristics of the bugel dentures. Clinical and laboratory steps of bugel dentures manufacturing	1,33	3,5
4.6. General characteristics of complete removable dentures. Clinical and laboratory steps of complete removable dentures manufacturing. Repairing of the removable dentures	1,33	7
Total hours	24	120

CONTENT OF THE EDUCATIONAL MATERIAL

1. Introduction to the specialty

1.1. Organization of dental service in the Republic of Belarus. Medical ethics and deontology in dentistry. Organization and equipment of dental office and dental laboratory

Definition of the term «dentistry». Sections of dentistry. Dental laboratory, general purpose, functional duties of a dental technician. Appointment of the premises of the dental laboratory. The volume and area of the production facility for each workplace of the dental technician. Sanitary standards for industrial premises of a dental laboratory (ventilation, lighting, coatings, etc.). The equipment of the workplace of the dental technician and the main tools used in the work. Equipment for auxiliary premises of the dental laboratory. Safety precautions for the use of dental equipment, instruments and materials. Prevention of occupational diseases: organization of work and compliance with protection measures against industrial hazards.

1.2. Dentures. Algorithm of the manufacturing of dentures. Dental materials classification

Definition of dental materials science. Definition of prosthetics and dental prosthetics. Classification of prostheses used in dentistry, depending on the functional purpose and method of fixation.

Definition of fixed and removable dentures. Types of prostheses that eliminate defects in hard tissues of teeth and defects in dentition. Maxillofacial prostheses and implants used in dentistry. Classification of dental materials. Classification of prostheses depending on the structural materials used. General technological scheme for the manufacture of dentures. Mechanical, technological, physical properties of dental materials.

2. Dental materials science

2.1. Auxiliary materials used in dentistry

2.1.1. Dental and dental technician instruments

General characteristics of the dental unit. Characteristics of drills and dental grinding motors.

Types of dental handpieces used in the dental office and dental laboratory, depending on the principles of their operation.

Dental burs. Main parts of the hog. Materials for making burs, shapes of the working part of the burs. Mills and their purpose. Materials for the manufacture of cutters. The difference between cutters and burs.

Selection of dental technical and dental rotating instruments depending on the handpiece accessory and according to the indications for use. ISO marking principles.

Characteristics of abrasive tools and materials. Heads, discs, circles.

Definition of grinding, polishing processes. Selection of tools.

2.1.2. Impression materials

Auxiliary materials: impression materials. Classification, requirements, application. Impressions, impression trays. Alginate materials: composition, properties, application.

Impression materials: classification, requirements, application. Impression trays: types, rules for selecting an impression tray. Imprints: definition, requirements. Types of impressions.

Classification of impression materials. Choice of impression material.

Alginate materials: composition, properties, application, advantages, disadvantages.

Auxiliary materials: silicone impression materials. Composition, properties, application. Types of silicone impressions.

Silicone impression materials K (C)-type: composition, properties, application, advantages, disadvantages. A-type silicone impression materials: composition, properties, application, advantages, disadvantages.

Methods of working with various types of impression materials.

2.1.3. Gypsum, types of gypsum casts

Auxiliary materials: gypsum. Classification, composition, properties, application. Gypsum, composition, properties, formula of gypsum. Types of gypsum, their use in dental practice. Types of plaster models. Requirements for models. Model: definition, purpose, requirements. Types of models. Making integral and collapsible models from gypsum and alpha-modification of gypsum: techniques, tools, sequence.

2.1.4. Modeling materials. Investment and isolation materials

Modeling materials: requirements, application. Wax compositions: composition, properties, application. Modeling plastics: composition, properties, application methods. Equipment and tools for modeling. Methods of working with wax compositions. Refractory molding materials: composition, properties, application. Model duplication: materials, equipment and tools. Insulating materials. Types, purpose, application. Auxiliary materials and tools for processing dentures.

2.2. Construction materials and technological processes used in dentistry

2.2.1. Construction materials: metal alloys

Classifications of metals and alloys. Biological, physical and chemical properties of metals and metal alloys. Mechanical properties of metals and metal alloys. Technological properties of metals and metal alloys.

Requirements for metals and metal alloys used in dentistry for the manufacture of dentures and appliances.

Compositions of noble metal alloys with a high gold content (high noble), noble metal alloys with a gold content of 25 to 75 percent, palladium-based noble metal alloys, silver-based noble metal alloys.

Compositions of alloys based on cobalt. Nickel-based alloy compositions.

Steel alloys alloyed stainless.

Forms of release of metals and their alloys for the manufacture of dentures and for auxiliary purposes.

Solders. Compositions of solders used in dentistry.

2.2.2 Technological processes for the manufacture of dental prostheses from metal alloys

Metal forming: drawing, knurling, rolling, punching, drawing, bending, twisting, forging and stamping.

Heat treatment of metal alloys: purpose and technique.

Technology of milling dentures.

Technology for the manufacture of dental prostheses using selective laser sintering.

Technology of sintering metals and metal alloys in molds (MIM technology).

Electroerosive methods of processing metal alloys. Principles of electrodischarge processing methods.

Technology of plasma spraying of coatings.

Soldering and welding. Melting and casting of metal alloys.

2.2.3. Construction materials: plastics

Classification of polymeric materials used in dentistry.

Basic acrylic plastics of hot polymerization: composition and purpose of components.

Basic acrylic plastics are self-hardening. Basic plastics of light polymerization.

Thermoplastic base materials: compositions and physical and mechanical properties.

Polymeric materials used for the manufacture of maxillofacial prostheses.

Polymeric materials used for the manufacture of individual spoons, acrylic plastics and light-curing materials.

Polymeric materials used for the manufacture of mouth guards and their characteristics.

Basic acrylic plastics of cold polymerization: composition and purpose of components.

Composite and thermoplastic polymer materials: definition, main components (polymer matrix, inorganic filler, binding agent).

Plastic artificial teeth: manufacturing method, properties, forms of industrial production.

2.2.4. Technological processes used in the manufacture of prostheses from polymeric materials

Methods for molding plastic prostheses used hot polymerization polymers.

Methods for molding plastic prostheses. The sequence of molding plastic dentures by pressing under pressure.

Molding of plastic dentures by injection (molding) pressing. Injection molding equipment and technology sequence.

Devices for thermal vacuum pressing and principles of pressing polymeric materials.

Thermoplastics used in dentistry for thermopressing.

Polymeric materials used for free molding of plastics. The sequence of laboratory steps for the manufacture of an individual spoon using free molding of self-hardening plastics.

Matrix technology work with cold polymerization polymers.

Polymeric materials used for milling technology

Devices for thermopneumatic pressing and principles of pressing polymeric materials.

2.2.5. Construction materials: ceramics

Definition of ceramics and its application in dentistry. Classification of dental ceramic materials.

Feldspar ceramics: composition and purpose of components.

Leucite-reinforced glass-ceramics: composition, scope.

Glass-ceramic reinforced with lithium disilicate.

Forms of industrial production of glass-ceramic materials used for the manufacture of fixed (non-removable) dentures.

General characteristics of ceramics infiltrated with glass.

Color scale for determining tooth color and selection of ceramic type.

Porcelain artificial teeth.

2.2.6. Technological processes used for the manufacture of ceramic dentures

Combined technologies for the manufacture of ceramic dentures.

Technological processes used in the manufacture of dentures using dental ceramics. Technology of layer-by-layer sintering of ceramics.

Technology of hot pressing of ceramics. CAD/CAM technologies.

Technological processes used in the manufacture of dentures using dental ceramics. Technology of milling of ceramics.

3. Modeling the anatomical shape of the teeth of the upper and lower jaws

3.1. Anatomical shape of teeth. Tooth rows. Signs of teeth. Modeling the anatomical shape of the incisors of the upper and lower jaws

Signs of teeth. Modeling the anatomical shape of the maxillary incisors.

Groups of teeth, dentition, dental formula, types of records. Parts of the tooth, relief of the tooth crown. Signs of teeth that determine whether they belong to the right or left half of the dentition.

Reproduction of the anatomical features of the central and lateral incisors of the upper jaw, function. Parts of the tooth, surface. Macro- and microrelief of the coronal part of the upper incisors. Dental formula, types of recording. Signs of teeth that determine whether they belong to the right or left half of the dentition.

Signs of teeth. Modeling the anatomical shape of the lower jaw incisors.

Reproduction of the anatomical features of the central and lateral incisors of the lower jaw, function. Parts of the tooth, surface. Macro- and microrelief of the coronal part of the lower incisors. Dental formula, types of recording. Signs of teeth that determine whether they belong to the right or left half of the dentition.

3.2. Modeling the anatomical shape of canine of the upper and lower jaws

Signs of teeth. Modeling the anatomical shape of the maxillary canines.

Reproduction of the anatomical features of the maxillary canines, function. Parts of the tooth, surface. Macro- and microrelief of the coronal part of the upper canines. Dental formula, types of recording. Signs of teeth that determine whether they belong to the right or left half of the dentition.

Signs of teeth. Modeling the anatomical shape of the canines of the lower jaw.

Reproduction of the anatomical features of the canines of the lower jaw, function. Parts of the tooth, surface. Macro- and microrelief of the coronal part of the lower canines. Dental formula, types of recording. Signs of teeth that determine whether they belong to the right or left half of the dentition.

3.3. Modeling the anatomical shape of premolars of the upper and lower jaws

Signs of teeth. Modeling the anatomical shape of the maxillary premolars.

Reproduction of the anatomical features of the maxillary premolars, function. Parts of the tooth, surface. Macro- and microrelief of the coronal part of the maxillary premolars. Dental formula, types of recording. Signs of teeth that determine whether they belong to the right or left half of the dentition.

Signs of teeth. Modeling the anatomical shape of the mandibular premolars.

Reproduction of the anatomical features of the mandibular premolars, function. Parts of the tooth, surface. Macro- and microrelief of the coronal part of the mandibular premolars. Dental formula, types of recording. Signs of teeth that determine whether they belong to the right or left half of the dentition.

3.4. Modeling the anatomical shape of molars of the upper and lower jaws

Signs of teeth. Modeling the anatomical shape of the first molars of the upper jaw. Reproduction of the anatomical features of the first molars of the upper jaw, function. Parts of the tooth, surface. Macro- and microrelief of the coronal part of the first molars of the upper jaw. Dental formula, types of recording. Signs of teeth that determine whether they belong to the right or left half of the dentition.

Signs of teeth. Modeling the anatomical shape of the second molars of the upper jaw.

Reproduction of the anatomical features of the second molars of the upper jaw, function. Parts of the tooth, surface. Macro- and microrelief of the coronal part of the maxillary molars. Dental formula, types of recording. Signs of teeth that determine whether they belong to the right or left half of the dentition.

Signs of teeth. Modeling the anatomical shape of the first molars of the lower jaw.

Reproduction of the anatomical features of the first molars of the lower jaw, function. Parts of the tooth, surface. Macro- and microrelief of the coronal part of the mandibular molars. Dental formula, types of recording. Signs of teeth that determine whether they belong to the right or left half of the dentition.

Signs of teeth. Modeling the anatomical shape of the second molars of the lower jaw.

Reproduction of the anatomical features of the second molars of the lower jaw, function. Parts of the tooth, surface. Macro- and microrelief of the coronal part of the second molars of the lower jaw. Dental formula, types of recording. Signs of teeth that determine whether they belong to the right or left half of the dentition.

4. Clinical and laboratory steps of dentures manufacturing

4.1. General characteristics and classification of microprostheses. Clinical and laboratory steps of microprostheses manufacturing

General characteristics of inlays and veneers, requirements, advantages, disadvantages. Classification of cavities according to Black. Classification of inlays and veneers.

Basic (structural) materials for the manufacture of inlays and veneers. Technologies for manufacturing inlays and veneers from various materials.

Clinical and laboratory stages of manufacturing inlays from various materials (metal alloys, ceramics, polymers).

4.2 General characteristics of the artificial crowns. Clinical and laboratory steps of crowns manufacturing

General characteristics of artificial crowns depending on the functional purpose: structural materials, technological processes used to manufacture crowns from various structural materials.

Requirements for artificial crowns. The sequence of clinical and laboratory stages of manufacturing stamped metal crowns. The sequence of clinical and laboratory stages in the manufacture of cast metal crowns (with casting without a model). The sequence of clinical and laboratory stages in the manufacture of plastic artificial crowns. The sequence of clinical and laboratory stages of manufacturing metal-ceramic artificial crowns.

4.3. General characteristics of the prostheses that eliminate defects in the dentition. Bridges, clinical and laboratory steps of bridges manufacturing

General characteristics of defects in the dentition. Classification of prostheses used to restore the integrity of the dentition, according to the methods of fixation in the oral cavity and the principles of transferring the masticatory load to the underlying tissues.

General characteristics of bridge prostheses: main elements. Types of supporting elements of bridge prostheses. Characteristics of the intermediate part of the bridge prosthesis. Comparative characteristics of bridges with bilateral support and cantilever prostheses.

The sequence of clinical and laboratory stages of manufacturing a stamped-brazed bridge prosthesis.

The sequence of clinical and laboratory stages in the manufacture of a one-piece cast bridge prosthesis.

The sequence of clinical and laboratory steps in the manufacture of a plastic bridge.

The sequence of clinical and laboratory stages of manufacturing a metal-ceramic bridge prosthesis.

4.4. General characteristics and classification of removable dentures. Clinical and laboratory steps of partial removable manufacturing

General characteristics of removable plastic dentures used in the partial absence of teeth. The principle of transmission of chewing pressure. The main elements of removable plastic dentures used in the partial absence of teeth. Borders of bases on the upper and lower jaws.

Retaining elements of removable plastic dentures used in the partial absence of teeth. Materials used for the manufacture of holding clasps. Types of clasp fixings depending on the number and topography of retaining elements, the direction of clasp lines. The location of the bent wire holding clasp on the abutment tooth and the main elements of the clasp.

The sequence of clinical and laboratory stages in the manufacture of removable plastic dentures in the partial absence of teeth. Materials used for the manufacture of wax bases with bite ridges.

4.5. General characteristics of the bugel dentures. Clinical and laboratory steps of bugel dentures manufacturing

General characteristics of supported prostheses used in the partial absence of teeth. The principle of transmission of chewing pressure. Advantages of supported removable dentures in comparison with plastic partial removable dentures.

The main structural elements of the metal frame.

Ney's clasp system. The main parts of the support-holding clasp and their functional purpose. Laboratory stages in the manufacture of cast removable dentures.

Surveying. Equipment, the purpose of surveying.

The sequence of clinical and laboratory stages in the manufacture of supported prostheses.

4.6. General characteristics of complete removable dentures. Clinical and laboratory steps of complete removable dentures manufacturing. Repairing of the removable dentures

General characteristics of complete removable plastic dentures. The principle of transmission of chewing pressure. The main structural elements of complete removable plastic dentures.

The sequence of laboratory steps for the manufacture of removable plastic dentures in case of complete loss of teeth.

Features of the design of artificial dentition in complete removable plastic dentures.

Methods for replacing the wax composition of the base with plastic in the manufacture of removable plastic dentures in the complete absence of teeth.

Possible technical errors in the manufacture of removable dentures by pressing under pressure and hot polymerization. Final processing of prosthesis bases.

Causes of breakdowns of the basis of removable plastic dentures and materials used for repair.

The sequence of repairing removable plastic dentures for fractures of the basis using self-hardening plastics.

ACADEMIC DISCIPLINE CURRICULAR CHART

Section, topic #	Section name, topic	Number of classroom hours			Self-Studies	Forms of control
		lectures	practical classes	supervised student work		
1 semester						
1.	Introduction to the specialty	2,66	6	-	3	
1.1.	Organization of dental service in the Republic of Belarus. Medical ethics and deontology in dentistry. Organization and equipment of dental office and dental laboratory	1,33	3	-	2	Interview, written reports on practical work, electronic tests
1.2.	General information about dentures. Stages of manufacturing dentures. General characteristics of structural and auxiliary materials. Dental materials science	1,33	-	-	1	Interviews, tests, written reports on practical work, abstracts, electronic tests
	Dentures. Stages of making dentures	-	3			
2.	Dental materials science	9,31	51	-	32	
2.1.	Auxiliary materials used in dentistry	3,99	21	-	13	
2.1.1	Dental instruments and equipment	1,33	-	-	-	
	Dental technician instruments	-	3	-	1	Interviews, tests, written reports on practical work, abstracts, electronic tests
2.1.2	Impression materials	1,33	6	-	4	
	Auxiliary materials used at the stages of manufacturing dentures: impression materials. Purpose, classification, compositions and properties	1,33	-	-	-	Interviews, tests, written reports on practical work, abstracts, electronic tests

	Impression materials: classification, requirements. Impression trays. Alginate composition properties	-	3	-	2	Interviews, tests, written reports on practical work, abstracts, electronic tests
	Impression materials: classification, requirements. Impression trays. Silicon composition properties	-	3	-	2	Interviews, tests, written reports on practical work, abstracts, electronic tests
2.1.3	Gypsum, types of gypsum casts Plaster like axillary material. Classification. Composition. Properties	-	6	-	2	Interviews, tests, written reports on practical work, abstracts, electronic tests
	Types of gypsum models. Requirements	-	3	-	-	Interviews, tests, written reports on practical work, abstracts, electronic tests
2.1.4.	Modeling materials.molding and insulating	1,33	6	-	4	
	Modeling materials. Molding and insulating axillary materials	1,33	-	-	-	Interviews, tests, written reports on practical work, abstracts, electronic tests
	Modeling materials: molding and insulating	-	3	-	-	Colloquium
	Final lesson on the topic: «Axillary dental materials»	-	3	-	4	
2.2.	Construction materials and technological processes used in dentistry	5,32	30	-	21	
2.2.1	Metals and metal alloys used in dentistry. Classifications, properties	1,33	-	-	2	Interviews, tests, written reports on practical work, abstracts, electronic tests
	Constructive metal alloys used for the manufacture of dentures and appliances	-	3	-		
2.2.2	Technological processes used for the manufacture of dental prostheses from metal alloys	1,33	6	-	4	
	Technological processes for the manufacture of dental prostheses using metal alloys	1,33	6	-	4	Interviews, tests, written reports on practical work, abstracts, electronic tests
	Technological processes for the manufacture of dental prostheses from metal alloys: metal processing by pressure; CAD/CAM technology. SLS technology, MIM technology. Electroerosive	1,33	-	-	2	Interviews, tests, written reports on practical work, abstracts, electronic tests
		-	3	-		

	processing methods. Plasma spraying technology. Electroplating. Technologies for connecting metal parts of prostheses							Interviews, tests, written reports on practical work, abstracts, electronic tests
	Technological processes for the manufacture of dental prostheses from metal alloys: metal alloy casting	-	3	-	2			
2.2.3.	Construction materials: plastics	1,33	6	-	4			
	Plastics. Technologies for manufacturing dentures from plastics	1,33	-	-	-			
	Basic (structural) materials: hot polymerization plastics, requirements, composition, application	-	3	-	2			Interviews, tests, written reports on practical work, abstracts, electronic tests
	Basic (structural) materials: cold polymerization plastics, requirements, composition, application. Thermoplastic and photocurable polymers. Artificial teeth for removable dentures	-	3	-	2			Interviews, tests, written reports on practical work, abstracts, electronic tests
2.2.4.	Technological processes used in the manufacture of prostheses from polymeric materials	-	6	-	4			
	Technologies for manufacturing dentures from hot polymerization plastics	-	3	-	2			Interviews, tests, written reports on practical work, abstracts, electronic tests
	Free forming of plastics. Technologies for milling and thermopressing of plastics	-	3	-	2			Interviews, tests, written reports on practical work, abstracts, electronic tests
2.2.5.	Ceramics. Manufacturing technologies of ceramic and metal-ceramic dentures	1,33	-	-	-			
	Basic (structural) materials: ceramics	-	3	-	2			Interviews, tests, written reports on practical work, abstracts, electronic tests
2.2.6.	Technologies for manufacturing ceramic dentures: milling, hot pressing, sintering. Metal ceramics	-	3	-	2			Interviews, tests, written reports on practical work, abstracts, electronic tests
	Final lesson on the topic: «Basic (structural) dental materials and technologies for manufacturing dentures»	-	3	-	3			Colloquium, test

2 semester

3.	Modeling the anatomical shape of the teeth of the upper and lower jaw	1,33	38,5	-	22	
3.1.	Anatomical shape of teeth. Dental rows. Signs of teeth. Modeling the anatomical shape of the incisors of the upper and lower jaws	1,33	7	-	4	
	Anatomical shape of teeth. Dental rows. Signs of teeth	1,33	-	-	-	
	Anatomical shape of teeth. Dental rows. Signs of teeth. Modeling the anatomical shape of the maxillary incisors	-	3,5	-	2	Interviews, tests, written reports on practical work, abstracts, electronic tests
	Signs of teeth. Modeling the anatomical shape of the lower jaw incisors	-	3,5	-	2	Interviews, tests, written reports on practical work, abstracts, electronic tests
3.2.	Modeling the anatomical shape of the canines of the upper and lower jaws	-	7	-	4	
	Signs of teeth. Modeling the anatomical shape of the maxillary canines	-	3,5	-	2	Interviews, tests, written reports on practical work, abstracts, electronic tests
	Signs of teeth. Modeling the anatomical shape of the canines of the lower jaw	-	3,5	-	2	Interviews, tests, written reports on practical work, abstracts, electronic tests
3.3.	Modeling the anatomical shape of the premolars of the upper and lower jaws	-	7	-	4	
	Signs of teeth. Modeling the anatomical shape of the maxillary premolars	-	3,5	-	2	Interviews, tests, written reports on practical work, abstracts, electronic tests
	Signs of teeth. Modeling the anatomical shape of the mandibular premolars	-	3,5	-	2	Interviews, tests, written reports on practical work, abstracts, electronic tests
3.4.	Modeling the anatomical shape of the molars of the upper and lower jaws	-	17,5	-	10	
	Signs of teeth. Modeling the anatomical shape of the first molars	-	3,5	-	2	Interviews, tests, written reports

of the upper jaw						on practical work, abstracts, electronic tests
Signs of teeth. Modeling the anatomical shape of the second molars of the upper jaw						
Signs of teeth. Modeling the anatomical shape of the first molars of the lower jaw	-	3,5	-	2	2	Interviews, tests, written reports on practical work, abstracts, electronic tests
Signs of teeth. Modeling the anatomical shape of the second molars of the lower jaw	-	3,5	-	2	2	Interviews, tests, written reports on practical work, abstracts, electronic tests
Final lesson on the topic: «Anatomical shape of teeth»	-	3,5	-	2	2	Colloquium, test
4. Clinical and laboratory stages of manufacturing dentures	10,64	24,5	-	17		
4.1. Microprostheses. Characteristics, clinical and laboratory stages	1,33	-	-	-	-	
General characteristics and classification of microprostheses. Clinical and laboratory stages of manufacturing microprostheses	-	3,5	-	2	2	Interviews, tests, written reports on practical work, abstracts, electronic tests
4.2. General characteristics of artificial crowns. Clinical and laboratory stages of manufacturing artificial crowns	2,66	3,5	-	2		
Metal artificial crowns. Characteristics, clinical and laboratory stages of manufacturing	1,33	-	-	-	-	
Metal-free and combined artificial crowns. Characteristics, clinical and laboratory stages of manufacturing	1,33	-	-	-	-	
General characteristics of artificial crowns. Clinical and laboratory stages of manufacturing artificial crowns	-	3,5	-	2	2	Interviews, tests, written reports on practical work, abstracts, electronic tests
4.3. General characteristics of prostheses that eliminate defects in the dentition. Bridges, clinical and laboratory stages of manufacturing bridges	2,66	3,5	-	2		
Metal bridges. Characteristics, clinical and laboratory stages of manufacturing	1,33	-	-	-	-	
Metal-free and combined bridges. Characteristics, clinical and	1,33	-	-	-	-	

	laboratory stages of manufacturing						
	General characteristics of prostheses that eliminate defects in the dentition. Bridges, clinical and laboratory stages of manufacturing bridges	-	3,5	-	2	Interviews, tests, written reports on practical work, abstracts, electronic tests	
4.4.	Partial removable dentures. Characteristics, clinical and laboratory stages of manufacturing	1,33	-	-	-		
	General characteristics of removable dentures. Clinical and laboratory stages of manufacturing partial removable dentures	-	3,5	-	2	Interviews, tests, written reports on practical work, abstracts, electronic tests	
4.5.	Bugel dentures. Characteristics, clinical and laboratory stages of manufacturing	1,33	-	-	-		
	General characteristics of bugel dentures. Clinical and laboratory stages of manufacturing bugel dentures	-	3,5	-	2	Interviews, tests, written reports on practical work, abstracts, electronic tests	
4.6.	General characteristics of complete removable dentures. Clinical and laboratory stages of manufacturing complete removable dentures. Repairing removable dentures	1,33	7	-	7		
	Complete removable dentures. Characteristics, clinical and laboratory stages of manufacturing	1,33	-	-	-		
	General characteristics of complete removable dentures. Clinical and laboratory stages of manufacturing complete removable dentures. Repairing removable dentures	-	3,5	-	2	Interviews, tests, written reports on practical work, abstracts, electronic tests	
	Final lesson on practical skills	-	3,5	-	5	Use of simulation equipment (phantom models). Objective structured complex examination Examination	
		24	120	-	74		

INFORMATION AND INSTRUCTIONAL UNIT**LITERATURE****Basic:**

1. Powers, J. M. Dental materials: foundations and applications / J. M. Powers, J. C. Wataha. – 11 th ed. – Elsevier, 2017. – 240 p.

Additional:

2. Phillips' Science of Dental Materials / Chiayi Shen & H. Ralph Rawls & Josephine F. Esquivel-Upshaw. – 13th ed. – Elsevier, 2021. – 448 p.

3. Introduction to Dental Materials / Richard Van Noort & Michele Barbour. – 5th ed. – Elsevier, 2023. – 288 p.

4. Contemporary Fixed Prosthodontics / Stephen F. Rosenstiel & Martin F. Land & Robert Walter. – 6th ed. – Elsevier, 2022. – 944 p.

5. Методы препарирования твердых тканей зубов = Methods of preparation of hard dental tissue : учеб.-метод. пособие / Н. М. Полонейчик и др. – Минск : БГМУ, 2019. – 36 с.

6. Полонейчик, Н. М. Оттисковые материалы = Impression materials : учеб.-метод. пособие. – Минск : БГМУ, 2018. – 39 с.

7. Полонейчик, Н. М. Керамические материалы в стоматологии и технологические процессы, используемые при изготовлении керамических зубных протезов = Ceramic materials in dentistry and technological processes used in the fabrication of ceramic dental prostheses : учеб.-метод. пособие. – Минск : БГМУ, 2018. – 40 с.

8. Полонейчик, Н. М. Металлы и сплавы металлов в стоматологии. Технологические процессы, применяемые при изготовлении зубных протезов из сплавов металлов. = Metals and alloys of metals in dentistry. Technological processes used for production of dental prostheses of metals alloys. – учеб.- метод. пособие. – Минск : БГМУ, 2018. – 40 с.

9. Полонейчик, Н. М. Моделировочные материалы, применяемые в стоматологии = Modelling materials used in dentistry: учеб.-метод. пособие. – Минск : БГМУ, 2018. – 20 с.

10. Полонейчик, Н. М. Полимерные материалы в стоматологии и технологические процессы, используемые при изготовлении полимерных зубных протезов = Polymer materials in dentistry and technological processes used in the fabrication of polymer dental prostheses : учеб.- метод. пособие. – Минск : БГМУ, 2018. – 44 с.

11. Полонейчик, Н. М. Формовочные материалы, применяемые в стоматологии = Investment materials applied in dentistry : учеб.- метод. пособие. – Минск : БГМУ, 2018. – 19 с.

12. Полонейчик, Н. М. Методы изготовления гипсовых моделей = Methods of working casts and die systems production : учеб.- метод. пособие. – Минск : БГМУ, 2020. – 24 с.

13. Материалы, технологические процессы и устройства, используемые для изготовления индивидуальных оттисковых ложек = Materials, technological

processes and devices used for custom impression trays fabrication : учеб.-метод. пособие / Н. М. Полонейчик [и др.]. – Минск : БГМУ, 2020. – 16 с.

METHODOLOGICAL RECOMMENDATIONS FOR THE ORGANIZATION AND PERFORMANCE OF INDEPENDENT WORK OF STUDENTS IN ACADEMIC DISCIPLINE

The time allotted for independent work can be used by students for:
 preparation for lectures and practical exercises;
 preparation for colloquium, tests and exams in the academic discipline;
 preparation of thematic reports, abstracts, presentations;
 implementation of practical tasks;
 note-taking of educational literature.

LIST OF AVAILABLE DIAGNOSTIC TOOLS

The following forms are used for competences assessment:

1. Oral form:
 interview;
 colloquium.
2. Written form:
 tests;
 abstracts;
 written reports on practical work.
3. Oral-written form:
 credit;
 exam.
4. Technical form:
 electronic tests.
5. Simulation form:
 objective structured complex examination
 using of simulation equipment (phantom models).

LIST OF AVAILABLE TEACHING METHODS

Traditional method (lecture, laboratory practicals);

Active (interactive) methods:

- team-based learning (TBL);
- research-based learning (RBL);
- training, based on simulation technologies.

LIST OF PRACTICAL SKILLS

1. Selection of dental instruments according to indications.
2. Selection of type and size of an impression tray for maxilla and mandible on phantom model.
3. Preparation of alginate impression material and making an impression on phantom model.
4. Preparation of silicone impression material of condensation type and making

an impression on phantom model.

5. Preparation of silicone impression material of addition type and making an impression on phantom model.

6. Preparation of gypsum and casting a plaster model from an alginate impression.

7. Preparation of plaster and superplaster and casting a folding plaster model from a silicone impression.

8. Mounting of gypsum models into occludator (articulator).

9. Modelling of an inlay from wax on phantom model.

10. Modelling of a veneer from wax on phantom model.

11. Modelling of a plastic crown from wax on phantom model.

12. Reproduction of the anatomical shape of maxillary incisors and canines in wax on phantom model.

13. Reproduction of the anatomical shape of mandibular incisors and canines in wax on phantom model.

14. Reproduction of the anatomical shape of maxillary premolars and molars in wax on phantom model.

15. Reproduction of the anatomical shape of mandibular premolars and molars in wax on phantom model.

16. Fabrication of an individual impression tray on phantom model.

17. Bordering of an individual tray with functional impression.

18. Fabrication of wax bases with occlusal rims on maxillary and mandibular phantom models.

19. Positioning of artificial teeth in wax reproduction of removable partial denture on phantom model.

20. Finishing and polishing of metal dentures.

21. Finishing and polishing of plastic dentures.

22. Finishing and polishing of ceramic dentures.

LIST OF EQUIPMENT USED

1. Equipment of the main premises of the dental laboratory. Dental table, burner, matches, grinding motor, plaster knife, dental hammer, spatulas, scalpel (eye scalpel), tweezers, jigsaw and file set, low-fusible metal alloy, spoon for melting low-fusible alloy, device for final stamping by MMDI, adhesive plaster, metal scissors, tongs, files, rubber cups, articulators and occludators. Articulation papers. Furnace for ceramic. Wax cutter. Sets of waxes (dipping waxes, lavax, base wax, modevax, voskolit, formodent, clasp wax 02, sticky wax, wax for bridge-like dentures, standard wax profile kits), alcohol, sets of modelling instruments, dental wax melting pot. Modelling resins, capacities for resin preparation, brush for working with resin. Sets of dental instruments. Dental surveyor. Dental handpieces, sets of dental abrasive materials and instruments for processing plastics, metal alloys, ceramics. Loop, calipers. Forms of industrial production of ceramic materials: ceramic powders for layer-by-layer sintering, ceramic pastes for layer-by-layer sintering, blocks for CAD / CAM technologies, blocks for casting ceramic dentures, ceramic artificial teeth. Demonstration kits for practical classes on clinical and laboratory stages of various

dentures fabrication.

2. Polymerization equipment.

Polymerizer, collapsible cuvettes, hydraulic press, λ -form of gypsum, silicone flasks, gypsum spatulas, sets of resins of hot and cold polymerization for fabrication of fixed and removable dentures, light-cured and thermoplastic polymer materials for individual trays and removable dentures, isolating material (isokol). Demonstrative fixed and removable dentures. Plastic artificial teeth.

3. Plaster equipment.

λ -form of gypsum and β -form of gypsum, standard metal impression trays for maxilla and mandible of different types and sizes, impression materials: material for duplication of gypsum models, alginate impression materials, measuring scoops for powder and water, silicone impression materials of condensation and addition types. Duplication mold. Spatula for hand mixing of materials, automatic mixer for cartridges, electric mixer "Pentamix".

Simple and collapsible models for demonstration of fabrication stages of veneers, inlays, crowns, bridges, various constructions of removable dentures. Plaster knife, vibrating table, vacuum mixer for plaster mixing, trimmer, pins for making collapsible models, jigsaw and nail files for separating models, retention rings, water supply and canalization with sump for gypsum.

4. Polishing equipment.

A polishing motor for polishing, a set of brushes and puffs, polishing pastes, a sandblaster, a steam jet.

5. Foundry equipment.

Muffle furnace, scales, a casting and melting machine, vacuum mixer for investment material, a grinder with vulcanite discs for trimming the gating system, a milling cutter, various metal alloys for casting.

LIST OF LECTURES

1 semester

1. Organization of dental service in the Republic of Belarus. Medical ethics and deontology in dentistry. Organization and equipment of a dental office and dental laboratory.

2. General information about dental, maxillofacial prostheses and orthodontic appliances. Dental materials, classification, properties, application.

3. Dental instruments and equipment.

4. Auxiliary materials used at the stages of manufacturing dentures: impression materials. Purpose, classification, compositions and properties.

5. Modeling materials. Molding and insulating auxiliary materials.

6. Metals and metal alloys used in dentistry. Classifications, properties.

7. Technological processes used for the manufacture of dentures using metal alloys.

8. Technological processes for the manufacture of dental prostheses from metal alloys: metal alloy casting.

9. Plastics. Technologies for manufacturing dentures from plastics.

10. Ceramics. Manufacturing technologies of ceramic and metal-ceramic dentures.

2 semester

1. Anatomical shape of teeth. Dental rows. Signs of teeth.
2. Microprostheses. Characteristics, clinical and laboratory stages.
3. Metal artificial crowns. Characteristics, clinical and laboratory stages of manufacturing.
4. Metal-free and combined artificial crowns. Characteristics, clinical and laboratory stages of manufacturing.
5. Metal bridges. Characteristics, clinical and laboratory stages of manufacturing.
6. Metal-free and combined bridges. Characteristics, clinical and laboratory stages of manufacturing.
7. Partial removable dentures. Characteristics, clinical and laboratory stages of manufacturing.
8. Bugel dentures. Characteristics, clinical and laboratory stages of manufacturing.
9. Complete removable dentures. Characteristics, clinical and laboratory stages of manufacturing.

LIST OF PRACTICAL CLASSES

1 semester

1. Organization of dental service in the Republic of Belarus. Medical ethics and deontology in dentistry. Organization and equipment of a dental office and dental laboratory.
2. Dentures. Stages of manufacturing dentures.
3. Dental technician instruments.
4. Impression materials: classification, requirements. Impression trays. Alginate composition properties.
5. Impression materials: classification, requirements. Impression trays. Silicon composition properties.
6. Plaster like axillary material. Classification. Composition. Properties.
7. Types of gypsum models. Requirements.
8. Modeling materials: molding and insulating.
9. Final lesson on the topic «Axillary dental materials».
10. Constructive metal alloys used for the manufacture of dentures and appliances.
11. Technological processes for the manufacture of dental prostheses from metal alloys: metal processing by pressure; CAD/CAM technology, SLS technology, MIM technology. Electroerosive processing methods. Plasma spraying technology. Electroplating. Technologies for connecting metal parts of prostheses.
12. Technological processes for the manufacture of dental prostheses from metal alloys: metal alloy casting.
13. Basic (structural) materials: hot polymerization plastics, requirements,

composition, application.

14. Basic (structural) materials: cold polymerization plastics, requirements, composition, application. Thermoplastic and photocurable polymers. Artificial teeth for removable dentures.

15. Technologies for manufacturing dentures from hot polymerization plastics.

16. Free forming of plastics. Technologies for milling and thermopressing of plastics.

17. Basic (structural) materials: ceramics.

18. Technologies for manufacturing ceramic dentures: milling, hot pressing, sintering. Metal ceramics.

19. Final lesson on the topic «Basic (structural) dental materials and technologies for manufacturing dentures».

2 semester

1. Anatomical shape of teeth. Dental rows. Signs of teeth. Modeling the anatomical shape of the maxillary incisors.

2. Signs of teeth. Modeling the anatomical shape of the lower jaw incisors.

3. Signs of teeth. Modeling the anatomical shape of the maxillary canines.

4. Signs of teeth. Modeling the anatomical shape of the canines of the lower jaw.

5. Signs of teeth. Modeling the anatomical shape of the maxillary premolars.

6. Signs of teeth. Modeling the anatomical shape of the mandibular premolars.

7. Signs of teeth. Modeling the anatomical shape of the first molars of the upper jaw.

8. Signs of teeth. Modeling the anatomical shape of the first molars of the lower jaw.

9. Signs of teeth. Modeling the anatomical shape of the second molars of the upper jaw.

10. Signs of teeth. Modeling the anatomical shape of the second molars of the lower jaw.

11. Final lesson on the topic: «Anatomical shape of teeth».

12. General characteristics and classification of microprostheses. Clinical and laboratory stages of manufacturing microprostheses.

13. General characteristics of artificial crowns. Clinical and laboratory stages of manufacturing artificial crowns.

14. General characteristics of prostheses that eliminate defects in the dentition. Bridges, clinical and laboratory stages of manufacturing bridges.

15. General characteristics of removable dentures. Clinical and laboratory stages of manufacturing partial removable dentures.

16. General characteristics of buge dentures. Clinical and laboratory stages of manufacturing buge dentures.

17. General characteristics of complete removable dentures. Clinical and laboratory stages of manufacturing complete removable dentures. Repairing removable dentures.

18. Final lesson on practical skills.

**PROTOCOL OF THE CURRICULUM APPROVAL
BY OTHER DEPARTMENTS**

Title of the discipline requiring approval	Title of department	Amendments to the curriculum in the academic discipline	Decision of the department, which designed the curriculum (date, protocol #)
1. Prosthetic dentistry	Prosthetic dentistry	No offers	protocol № 21 of 19.06.2023
2. Medical and Biological Physics	Medical and biological physics	No offers	protocol № 21 of 19.06.2023

COMPILERS:

Head of the Propaedeutics of Dentistry and Materials Science Department of the educational institution «Belarusian State Medical University», PhD, Associate Professor

T.V.Krushinina

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N.A.Gres

Assistant Lecturer of the Propaedeutics of Dentistry and Materials Science Department of the educational institution «Belarusian State Medical University»

V.V.Krivonoschenko

Assistant Lecturer of the Propaedeutics of Dentistry and Materials Science Department of the educational institution «Belarusian State Medical University»

D.V.Garaburda

Assistant Lecturer of the Propaedeutics of Dentistry and Materials Science Department of the educational institution «Belarusian State Medical University»

M.I.Kruk

Curriculum content, composition and the accompanying documents comply with the established requirements.

Dean of the Medical Faculty for International Students of the educational institution «Belarusian State Medical University»

13.11.2023

O.S.Ishutin

Methodologist of the educational institution «Belarusian State Medical University»

13.06.2023

S.V.Zaturanova