Załącznik
do Zarządzenia Nr 4/2020

Pomorski Uniwersytet Medyczny w Szczecinie

CLASS SYLLABUS
General Information

Name of the course: Dental Materials and Equipment	
Type of Classes	Mandatory
Faculty of PUM	Faculty of Dentistry
Field of study	Medical and Dental
Specialty	-
Level of study	uniform Master's degree
Form of studies	full-time/part-time
Year of studies/semester of studies	Year 2 / semester: 3
Number of ECTS credits assigned	5
Course formats (number of hours)	Lectures: 5 / seminars: 25 / classes: 30
Methods of verifying and assessing learning outcomes	☐ passing grade: ☐ descriptive ☐ test ☐ practical ☐ oral ☒ pass without grade ☒ egzamin końcowy: ☐descriptive ☒ test ☐ practical ☐ oral
Head of Departament	Dr hab. n. med. Danuta Lietz – Kijak, prof. PUM
Teaching assistant or person responsible for the subject	Dr n. med. Piotr Skomro, piotr.skomro@pum.edu.pl
Name and contact details of the unit	Department of Propedeutics, Physical Diagnostics and Dental Physiotherapy, al. Powstańców Wielkopolskich 72; 70 – 111 Szczecin; zpropst@pum.edu.pl; 914661673
Unit website	https://www.pum.edu.pl/studia_iii_stopnia/informacje_z_jednostek/wmis/zaklad_propedeutyki_fizykodiagnostyki_i_fizjoterapii_stomatologicznej/

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Detailed information

Objectives of the classes		**The course objectives are:** 1. To acquire knowledge of: a) dental office equipment, tools, and devices, and the ability to recognize and use them in a specific field of dentistry. b) the surface properties of dental hard tissues and biomaterials, the phenomenon of adhesion and the adhesive preparation procedures for enamel, dentin, and dental biomaterials; c) basic and auxiliary dental materials: - their composition, structure, properties, purpose, and method of use as temporary and permanent restorations in the conservative treatment of primary and permanent teeth, and used in caries prevention, endodontic, and aesthetic treatment; d) medications used in the treatment of caries, endodontic treatment, and bonding systems. 2. To acquire the ability to: a) select appropriate instruments, restorative biomaterials, and bonding agents based on their properties and clinical conditions. b) use auxiliary equipment during the placement of fillings. The learning objective will be met if the student is able to recognize and use dental instruments and materials in appropriate treatment procedures.
Prerequisites:	Knowledge	1. Knowledge of the anatomy of permanent and primary teeth 2. Knowledge of the histological structure of the hard and soft tissues of the oral cavity. 3. Knowledge of the physiology of the masticatory system.
	Skills	1. Basic manual skills. 2. Spatial imagination. 3. Eye-hand coordination.
	Social Competencies	1. Self-directed learning 2. Teamwork skills 3. Communication skills 4. Accuracy and perseverance

LEARNING OUTCOMES			
learning effect no.	**A student who has passed the CLASSES knows/can/is able to:**	**SYMBOL**	**Method of verifying learning outcomes***
W01	knows and understands the definition and classification of basic and auxiliary dental materials	C.W31.	ET; EPR ; K; S; O; PS;
W02	knows and understands the equipment of a dental office and a dental laboratory, as well as the instruments used in dental procedures and in the laboratory production of prosthetic restorations and orthodontic appliances	C.W29.	ET, EPR, K, S, O, PS, SP, W, PM, UP, TWDO (quiz)
W03	knows and understands the composition, structure, properties, purpose and use of dental materials	C.W32.	ET, EPR, K, S, O, PS, SP, W, PM, UP, TWDO (quiz)
W04	knows and understands the surface properties of dental hard tissues and dental biomaterials	C.W33.	ET, EPR, K, S, O, PS, SP, W, PM, UP, TWDO (quiz)
W05	knows and understands the phenomenon of adhesion and the procedures for adhesive preparation of enamel, dentin and dental biomaterials	C.W34.	ET, EPR, K, S, O, PS, SP, W, PM, UP, TWDO (quiz)

W06	knows and understands the mechanisms of degradation (corrosion) of dental biomaterials in the oral cavity and their influence on the biological properties of dental materials	C.W35.	ET, EPR, K, S, O, PS, SP, W, PM, UP, TWDO (quiz)
U06	can select the right tools for a dental procedure	C.U10.	ET, EPR, K, S, O, PS, PS, W, PM, UP, TWDO (quiz)
U07	can use adhesion techniques	C.U13.	ET, EPR, K, S, O, PS, W, PM, UP, TWDO (quiz)
U08	is able to select restorative and bonding biomaterials based on the properties of the materials and clinical conditions	C.U14.	ET, EPR, K, S, O, PS, SP, W, PM, UP, TWDO (quiz)
W09	knows and understands the principles of treatment in cases of pulp diseases and mineralized dental tissues	F.W5.	ET, EPR, K, S, O, PS, SP, W, PM, UP, TWDO (quiz)
W10	knows and understands the morphology of dental cavities and the principles of endodontic treatment	F.W7.	ET, EPR, K, S, O, PS, W, PM, UP, TWDO (quiz)
W11	knows and understands the principles of using instruments, materials and pharmacological agents in dental treatment	F.W9.	EPR, K, S, O, PS, UP, TWDO (quiz)
W12	knows and understands the indications and contraindications for performing procedures in the field of restorative dentistry	F.W15.	ET, EPR, K, S, O, PS, SP, W, PM, UP, TWDO (quiz)
U13	is able to formulate research problems in the field of dentistry	F.U15.	EPR, K, S, O, PS, SP, UP, TWDO (quiz)
K14	is ready to notice and recognize his/her own limitations, make a self-assessment of deficits and educational needs	K.5.	EPR, K, S, O, PS, SP, UP, TWDO (quiz)
K15	is ready to use objective sources of information	K.7.	EPR, K, S, O, PS, SP, UP, TWDO (quiz)
K16	is ready to formulate opinions on various aspects of professional activity	K.10.	EPR, K, S, O, PS, SP, UP, TWDO (quiz)

Table of LEARNING outcomes in relation to the form of classes

learning effect no.	Learning outcomes	Form of classes						
		Lecture	Seminar	Exercises	Clinical exercises	Simulati	E-lerarning	Other
W01	knows and understands the definition and classification of basic and auxiliary dental materials		X	X			X	
W02	knows and understands the equipment of a dental office and a dental laboratory, as well as the instruments used in dental procedures and in the laboratory production of prosthetic restorations and orthodontic appliances			X				
W03	knows and understands the composition, structure, properties, purpose and use of dental materials		X	X			X	

W04	knows and understands the surface properties of dental hard tissues and dental biomaterials		X	X			X	
W05	knows and understands the phenomenon of adhesion and the procedures for adhesive preparation of enamel, dentin and dental biomaterials		X	X			X	
W06	knows and understands the mechanisms of degradation (corrosion) of dental biomaterials in the oral cavity and their influence on the biological properties of dental materials		X				X	
U06	can select the right tools for a dental procedure		X	X			X	
U07	can use adhesion techniques		X	X			X	
U08	is able to select restorative, prosthetic and connecting biomaterials based on the properties of the materials and clinical conditions		X	X			X	
W09	knows and understands the principles of treatment in cases of pulp diseases and mineralized dental tissues		X	X			X	
W10	knows and understands the morphology of dental cavities and the principles of endodontic treatment		X	X				
W11	knows and understands the principles of using instruments, materials and pharmacological agents in dental treatment		X	X			X	
W12	knows and understands the indications and contraindications for performing procedures in the field of restorative dentistry		X	X			X	
U13	is able to formulate research problems in the field of dentistry		X	X				
K14	is ready to notice and recognize his/her own limitations, make a self-assessment of deficits and educational needs		X	X				
K15	is ready to use objective sources of information		X	X				
K16	is ready to formulate opinions on various aspects of professional activity		X	X				

PROGRAM CONTENT TABLE			
program content no.	**Program content**	**Number of hours**	**Reference to learning outcomes for CLASSES**
Winter semester			
	Lectures		
TK01	Introduction to materials science. Classification of dental materials.	1	C.W31.; C.W29.C.W32; C.W34; F.W9.; K.5.; K7; K10
TK02	the course of changes in the hard tissues of teeth and the possible restorative techniques and materials.	1	C.W31.; C.W32.; C.W33.; C.W34.; C.U10.; F.W5.; F.W15.; K.5.; K7; K10
TK03	Knowledge of caries risk and protective factors as a basis for prevention and biomimetic action of materials and the appropriate choice of material depending on the patient's risk group.	1	C.W31.; C.W32.; C.W33.; C.W34.; C.U10.; F.W5.; F.W15.; K.5.; K7; K10

TK04	Basics of preparation techniques and diagnostic methods to facilitate the selection of the appropriate working technique and material for hard tissue reconstruction.	1	C.W34.; C.W33.; C.W34.; C.W35.; C.U10.; C.U13.; C.U14.; F.W9.; F.W5.; F.W15.; F.U15.; K.5.; K7; K10
TK05	Directions of development of dental materials science, nanoparticles in dentistry	1	K.7.; K.10.; C.W32; C.U10.; C.U14.; F.W15.; K.5.; K7; K10
Seminars			
TK01	The course of the carious process and its diagnostic methods. Principles of cavity preparation according to Black and contemporary approaches, taking into account differences resulting from the type of material used. Devices for diagnosing pulp vitality.	2	C.W31.; C.W32.; C.W34.; C.U10.; C.U13.; C.U14.; F.U15.; F.W9.; F.W15.; K.5.; K7; K10
TK02	GIC: classification, composition and its modifications, structure, method of binding, properties, purpose and method of use.	2	C.W31.; C.W32.; C.W33.; C.W35.; C.U10.; C.U14.; F.W5.; F.W9.; F.W15.; K.5.; K7; K10
TK03	Composites: classification, composition and its modifications, structure, bonding method, properties, purpose, and use. Optical properties: color and its measurement, fluorescence, translucency, opacity, color loss. Polymerization phenomenon.	2	C.W31.; C.W32.; C.W33.; C.W34.; C.W35.;C.U10.; C.U13.; C.U14.; F.W9.; F.W15.; F.U15.; K.5.; K7; K10
TK04	Surface phenomena, adhesion to dentin and enamel – mechanisms, bonding systems and their generations. Etching techniques: total and selective.	2	C.W31.; C.W32.; C.W33.; C.W34.; C.W35.;C.U10.; C.U13.; C.U14.; F.W9.; F.W15.; F.U15.; K.5.; K7; K10
TK05	Auxiliary equipment for placing fillings - types of matrices and their stabilization. Retraction in the gingival area.	2	C.W31.; C.W34.; C.U10.; C.U13.; F.W9.; F.W15.; F.U15.; K.5.; K7; K10
TK 06	Knowledge of the morphology of dental cavities, essential for endodontic treatment..	2	F.W7.; F.U15.; K.5.; K7; K10
TK07	Mechanical properties of tissues and materials. Occlusal forces, cutting, and abrasion in the oral cavity. Thermal properties and thermal conductivity. Tissue and material processing methods—cutting pattern and heat generation.	2	C.W32.; C.W35.; C.U10.; C.U14.; F.W5.; F.W15.; F.U15.; K.5.; K7; K10
TK08	Optical properties: color and its measurement, fluorescence, translucency, opacity, color loss. Degradation mechanisms of dental materials in the oral cavity	2	C.W32.; C.W35.; C.U10.; C.U14.; F.W5.; F.W15.; F.U15.; K.5.; K7; K10
TK09	Materials and tools used in orthodontic treatment	2	C.W29.;C.W34.; C.W35.; C.U10.; C.U13.; C.U15.; F.W9.; F.U15.; K.5.; K7; K10
TK10	Selection of the appropriate technique, tools and biomaterials for reconstruction and bonding, based on the properties of the materials and clinical conditions (indications, contraindications) – part I – case report.	2	C.W31.; C.W32.; C.W33.; C.W34.; C.W35.; C.U10.; C.U13.; C.U14.; F.W5.; F.W9.; F.W15.; F.U15.; K.5.; K7.; K10.;
TK 11	Glass fiber and its use in dentistry and its degradation in the oral environment.	2	C.W31.; C.W32.; C.W34.; C.W35.; C.U10.; C.U13.; C.U14.; F.W7.; F.W9.; F.W15.; F.U15.; K.5.; K7; K10

TK12	Materials and tools used in endodontic treatment.	2	C.W29.;C.W31.; C.W32.; C.W34.; C.U10.; F.W5.; F.W7.; F.W9.; F.W15.; F.U15.; K.5.; K7; K10
TK13	Selection of the appropriate technique, tools and biomaterials for reconstruction and bonding, based on the properties of the materials and clinical conditions (indications, contraindications) – part II – presentation of projects prepared in groups.	1	C.W31.; C.W32.; C.W33.; C.W34.; C.W35.; C.U10.; C.U13.; C.U14.; F.W5.; F.W9.; F.W15.; F.U15.; K.5.; K7.; K10.;
Exercises			
TK01	Rotary instruments for processing dental hard tissue and dental materials. Small dental equipment. Assessment.	2	C.W31; C.U10; F.W9.;F.U15.; K.5.; K7; K10
TK02	Entry Test– GIC. Materials Room Health and Safety. Filling of Class V Black cavities using encapsulated GIC, modeling techniques, and transparent cervical matrices. Hand-mixed GIC as a base.	2	C.W31; C.W32.; C.W33.; C.W35.; C.U10; C.U14.; F.W5.; F.W15.; F.U15.; K.5.; K7; K10
TK03	Dental drills. Diagnostic kit. Tools used in dental specialties: conservative dentistry, periodontics, surgery, prosthetics, and orthodontics. Assessment	2	C.W29.; C.W31; C.U10; F.W9.;F.U15.; K.5.; K7; K10
TK04	Entry Test– sealants. Filling a Black Class I cavity using HV GIC. Compomers and composites as fissure sealants.	2	C.W31; C.W32.; C.W33.; C.W34.; C.W35.; C.U10; C.U14.; F.W5.; F.W15.; F.U15.; K.5.; K7; K10
TK05	Temporary fillings: pre-mixed and ready-made dressings, light- and chemically cured, surgical, periodontal, endodontic. Zinc oxide-eugenol cement. Pass.	2	C.W31; C.U10; F.W9.;F.U15.; K.5.; K7; K10
TK06	Entry – composites. Filling of a Black Class I cavity using bulk composites and adhesive systems, as well as the Essential Line technique and an occlusal stamp.	2	C.W31; C.W32.; C.W33.; C.W34.; C.W35.; C.U10; C.U14.; F.W5.; F.W15.; F.U15.; K.5.; K7; K10
TK07	Technique and preparations for infiltration, whitening, fluoride, desensitizing, calcifying preparations – composition, application properties.	2	C.W31; C.U10; F.W9.;F.U15.; K.5.; K7; K10
TK08	Entry Test – mounted matrices. Reconstruction of the contact point in Black Class II cavities using composite matrices. Tools and techniques for finishing and polishing restorations.	2	C.W31; C.U10; F.W9.;F.U15.; K.5.; K7; K10
TK09	Reconstruction of worn incisal edges and chewing surfaces using injectable composites - composition, properties, application procedure.	2	C.W31; C.U10; F.W9.;F.U15.; K.5.; K7; K10
TK10	Entry Test- sectional matrices. Filling a Black Class II cavity with composite using the inclined layer technique, variable viscosity technique, and sectional matrix systems.	2	C.W31; C.U10; F.W9.;F.U15.; K.5.; K7; K10
TK11	Odontotropic materials and biological treatment techniques, preparations based on calcium hydroxide and calcium silicates. Bioactive materials.	2	C.W31; C.W32.; C.W35.; C.U10; C.U14.; F.W5.; F.W7.; F.W9.; F.W15.; F.U15.; K.5.; K7; K10
TK12	Entry Test- aesthetic composite restorations. Composite filling of a Black Class III cavity using the dentin and enamel layering technique and introduction to Smart Chromatic technology.	2	C.W31; C.W32.; C.W33.; C.W34.; C.W35.; C.U10; C.U13.; C.U14.; F.W9.; F.W15.; F.U15.; K.5.; K7; K10

TK13	Endodontic instruments. Methods for preparing and measuring root canal lengths, and the use of rinses, medications, and root canal sealants. Assessment.	2	C.W31; C.U10; F.W9.;F.U15.; K.5.; K7; K10
TK14	Entry Test- tools and techniques for finishing and polishing fillings. Filling a Class IV Black cavity with composite using the silicone key and mold technique. Composite veneer.	2	C.W31; C.W32.; C.W33.; C.W34.; C.W35.; C.U10; C.U13.; C.U14.; F.W9.; F.W15.; F.U15.; K.5.; K7; K10.;
TK15	Summary of knowledge. Final assessment in the form of a practical exam.	2	C.W31.; C.W32.; C.W33.; C.W34.; C.W35.; C.U10.; C.U14.; F.W5.; F.W7.; F.W9.; F.W15.; F.U15.; K.5.; K7; K10
Summer semester	**E-learning**		
	Seminars		
	Exercises		

Recommended literature:
Basic literature
1. Materiały stomatologiczne. Powers J.M., Wataha J.C. Elsevier Urban & Partner. Wrocław 2013, wyd.1
2. Stomatologia zachowawcza tom 1 i 2. E.J. Swift Jr, H.O. Heymann, T.M. Robertson, Wydawca: Czelej, 2009
Additional literature
1. Niezbędnik stomatologiczny. Zbiór zadań dla studentów stomatologii. Część 1. Simińska, Aleksandra. Warszawa: PZWL, 2022, doi: https://doi.org/10.53270/2021.016 IBUK LIBRA.
2. Endodoncja wieku rozwojowego i dojrzałego - wydanie 3. Tom 1-2, Barańska-Gachowska M, Czelej, 2021.
3. Podręcznik dla asystentek i higienistek stomatologicznych. Mielczarek A., Kowalik R., Najman N.: PZWL. Warszawa 2018.
4. Endodoncja. Pawlicka H., Lipski M.; Wydawnictwo Kwintesencja. Warszawa 2024.
5. Stomatologia zachowawcza z endodoncją - zarys kliniczny: podręcznik dla studentów stomatologii: Jańczuk Z, Kaczmarek U, Lipski M. PZWL, 2014

Student workload	
Student workload (class participation, active participation, report preparation, etc.)	Student workload [h] As assessed (reviewed) by the teacher
	60
Contact hours with the teacher	15
Preparation for tutorials/seminars	10
Reading the designated literature	5
Preparation for a project/paper, etc.	5
Preparation for a colloquium/quiz	10
Preparation for an exam	
Other…	**105**
ECTS points	**5**

Comments

*Examples of learning outcome assessment methods:
EP – written exam
EU – oral exam
ET – test exam
EPR – practical exam
K – colloquium
R – paper
S – practical skills assessment
O – assessment of student activity and attitude
SP – case study
PS – assessment of independent work skills
W – pre-class quiz
PM – multimedia presentation
UP – structured questions
TWDO – yes/no multiple choice, answer matching (quiz)