



**“CAROL DAVILA” UNIVERSITY
OF MEDICINE AND PHARMACY BUCHAREST**
Faculty of Dentistry
Dental Medicine in English



DISCIPLINE GRID

1. Programme:

1.1.	CAROL DAVILA UNIVERSITY OF MEDICINE AND PHARMACY BUCHAREST
1.2.	FACULTY OF DENTISTRY / 1st DEPARTMENT
1.3.	DIVISION: TEETH AND DENTAL ARCHES MORPHOLOGY AND DENTAL MATERIALS
1.4.	STUDY DOMAIN: Health, sectoral regulated within European Union
1.5.	STUDY LEVEL: LICENCE
1.6.	STUDY PROGRAMME: DENTAL MEDICINE IN ENGLISH

2. Discipline:

2.1.	DISCIPLINE NAME: DENTAL MATERIALS						
2.2.	LOCATION: 4-6 Eforie Street., Sect 5, Bucharest						
2.3.	Lectures tenure: Roxana Romanița Ilici (DMD, PhD) - Lecturer						
2.4.	Practical classes tenure: Roxana Romanița Ilici (DMD, PhD) – Lecturer, Mirela Veronica Bucur (DMD, PhD) - Lecturer, Carmen Elena Georgescu (DMD, PhD) - Teaching assistant, Dragoș Corneliu Smărăndescu (DMD, PhD) - Teaching assistant, Cristian Comănescu (DMD, PhD) - Teaching assistant						
2.5. Study year	III	2.6. Semester	6th	2.7. Evaluation	Exam	2.8. Type of discipline	CD/SD

3. Estimated total time (hours/semester)

No. hours/week	4	out of which	Lectures: 1	Laboratory session: 3
Total hours out of learning schedule	56	out of which	Lectures: 14	Laboratory sessions: 42

Time distribution	hours
Textbook study, lecture support, bibliography and notes	14
Supplementary documentation activity in the library, on online platforms	10
Practical activity support material, homework, portfolio and essays	10
Tutorial activity	2
Examinations	4
Other activities	4
Total hours of individual study	44
Total hours per semester	100
Credits	4

4. Preconditions

4.1. curriculum	Tooth and Dental Arch Morphology Dental Prosthesis Technology Biochemistry, Biophysics, Histology Scientific Research Methodology
4.2. proficiencies	Basic computer operating skills

5. Conditions

5.1. for lecture activity	<ul style="list-style-type: none"> - Lecture Hall with projection system; - Internet connection - laptop or PC; - E-learning UMF Carol Davila platform; - Telephone conversations are not tolerated during the course; - Students arriving late will not be allowed to attend the lecture.
5.2. for laboratory activity	<ul style="list-style-type: none"> - Laboratories with specific endowments, as devices and dental materials for practical activities; - Internet connection - laptop or PC; - E-learning UMF Carol Davila platform; - Telephone conversations are not tolerated during laboratories; - Students arriving late will not be allowed to attend the lecture - Mandatory participation is required in laboratories, with a maximum of 10% of unmotivated absences being accepted; - Recovery of absences is allowed according to the Regulation on the professional activity of students enrolled at the U.M.F. "Carol Davila", Chapter VI, Art. 53

6. Accumulated skills

6.1. Proficiencies (<i>knowledge and abilities</i>)	<p>I. <u>Knowledge</u> (cognitive dimension)</p> <ul style="list-style-type: none"> - Ability to identify the main groups of dental materials used in the dental office and in the dental laboratory, to know their workflow, application and indications for use; - Knowledge of the main components of the chemical composition of the dental materials that are being studied; - Knowledge of the main properties of dental materials; - Knowledge of the mutual interaction between dental materials, as well as between them and the oral biological substrate; - Ability to use specialized terminology - appropriately and according to context. <p>II. <u>Abilities</u> (functional dimension)</p> <ul style="list-style-type: none"> - Acquiring theoretical and practical knowledge and gaining practical experience in applying general and specific dosing-preparation techniques and working techniques with dental materials, both in dental practice and dental laboratory; - To be able to make an informed selection of dental materials for specific dental applications.
6.2. Transversal skills (<i>role, professional and personal development</i>)	<p>III. <u>Role skills</u></p> <ul style="list-style-type: none"> - Using assimilated notions in new contexts; - Application of theoretical notions in practical activity; - Establishing interdisciplinary correlations within the other fields of study; - Efficient use of information sources, with the development of selection and synthesis skills. <p>IV. <u>Professional and personal development skills</u></p> <ul style="list-style-type: none"> - Proving the ability to search and use scientific information, as the basis of lifelong professional learning; - Initiation of scientific research activities in the field of dental materials; - Developing the ability to integrate and collaborate in a team; - Developing organizational capability.

7. Objectives (based on the grid of acquired specific skills)

7.1. General Objective	<ul style="list-style-type: none"> - Students will learn the theoretical and practical notions pertaining to the use of the main groups of dental materials in dentistry; - Students will develop professional communication skills to achieve an efficient collaboration within the team (dentist-nurse-dental technician).
7.2. Specific Objectives	<ul style="list-style-type: none"> - To identify, dose and optimally prepare the different classes of dental materials used in the clinical / technological stages of performing different types of fillings/ crowns / bridges/post and core restorations /other prostheses, obtained by direct / indirect techniques; - To be able to evaluate dental materials in terms of chemical composition, chemical, physical and biological properties; - To know the mechanisms of interaction of dental materials with dental and periodontal structures and the adjacent soft tissues and possible mechanisms of their failure in time; - To use dental materials in safe, appropriate clinical or laboratory conditions; - To be able to make an informed choice, based on clinical evidence and basic laboratory research in the literature, on the selection of materials for specific dental applications, taking into account the variables that influence their handling, accuracy, stability and longevity of the restorations.

8. Content

8.1. Lectures	No. hrs/topic	Teaching method	Obs.
<p>1. Overview of dental materials in the oral cavity. Classification of dental materials. Basic chemical composition of dental materials. Classification of properties of dental materials. Standard tests of evaluation. Biocompatibility of dental materials Physical and Chemical Properties of Dental Materials. Rheology. Thermal properties. Mechanical Properties. Optical properties. Chemical/Electrochemical properties.</p>	2		
<p>2. Dental amalgams for direct restorations - historical background, current status and comparison with mercury-free modern products (commercial products, packaging, chemical composition, setting reaction, dosage-preparation, properties, indications, working technique, Minamata Convention Regulations). Dental cements: Zinc phosphate cement, Zinc oxide eugenol/non-eugenol cements. Glass ionomer cements/resin-modified glass ionomers / metal reinforced glass ionomers. (commercial products, packaging, chemical composition, setting / polymerization reaction, dosage-preparation, properties, indications, working technique). Bioactive dental cements for pulp capping. Root canal sealers. Calcium hydroxide based cements with / without resins; Calcium silicate cements with / without resins. (commercial products, packaging, chemical composition, setting reaction, dosage-preparation, properties, indications, working technique).</p>	2	Lecture, Interactive oral presentation of the material according to the curriculum, using multimedia tools, PowerPoint presentations, and educational videos.	
<p>3. Adhesive systems for bonding to tooth structures and restorations (adhesion principles, classification of adhesive systems, adhesion mechanisms, commercial products, packaging, chemical composition, polymerization reaction, properties, indications, working technique).</p>	2		

<p>Light-curing composites for aesthetic direct restorations (classification, commercial products, packaging, chemical composition, polymerization reaction, properties, indications, working technique).</p>			
<p>4. Self-cured/dual-cured composites for direct and indirect restorations. Fiber reinforced composites. Luting resin cements. (commercial products, packaging, chemical composition, polymerization reaction, properties, indications, working technique) Auxiliary Dental materials. Dental impression materials: general characteristics, trays, classification of impression materials. Rigid and semi-rigid impression materials. Zinc oxide-eugenol pastes. Simple self-curing acrylic resins. Acrylic resins with slow progressive viscosity. Thermoplastic materials. Oro-plastic materials. Gypsum products. Dental waxes. Casting Investments. (classification, commercial products, packaging, , chemical composition, setting / polymerization reaction, dosage-preparation, working technique, properties, indications)</p>	2		
<p>5. Auxiliary Dental materials. Elastic dental impression materials. Reversible hydrocolloids, irreversible hydrocolloids, synthetic elastomers (polysulphides, condensation / addition silicones, polyethers)- classification, commercial products, packaging, chemical composition, setting / polymerization reaction, dosage-preparation, working technique, properties, indications. Metals and Alloys for casting techniques (noble / non-noble alloys) -classification, commercial products, packaging, chemical composition, melting-casting/galvanizing/sintering, properties, indications. Materials for CAM technologies. SLS powders, blocks and discs for milling techniques, materials for 3D printing (classification, commercial products, packaging, chemical composition, properties, indications).</p>	2		
<p>6. Dental glass-ceramics: Feldspathic/ leucitic/disilicate dental ceramics- classification, commercial products, packaging, chemical composition, sintering, properties, indications. Dental oxide-ceramics: Zirconia and Alumina-based dental ceramics- classification, commercial products, packaging, chemical composition, properties, indications.</p>	2		
<p>7. Biomaterials for osseointegration and tissue regeneration. Titanium and titanium alloys for dental implants. Grafting materials for guided bone regeneration/ guided tissue regeneration. (classification, commercial products, packaging, chemical composition, properties). Prosthetic Polymers (acrylic resins, composite resins, polyamides)-classification, commercial products, packaging, chemical composition, self- / light- / heat and pressure polymerization; polymerization reaction, dosing-preparation, indications.</p>	2		

8.2 Laboratory Sessions	No. hrs/topic	Teaching method	Obs.
1. Administrative matters of internal order and workplace safety. Introduction to Dental Materials: objectives, classifications, specific terminology. Instruments and tools - presentation. Presentation on how ‘instructions for use’ is to be read. Examples of direct and indirect restorations using different dental materials. Debate on the radiopacity of dental restorations on dental radiographs.	3	Presentation, debate, interactive exercises	Debates
2. Tutorial for making an analytical documentary analysis as a written narrative review and associated Power Point and Education video presentation , from recommended bibliographic resources on a dental material topic. Presentation of associations / forums, specialized magazines in the field of Dental Materials. Distribution of “narrative review” project topics.	3	Presentation, interactive exercises	Literature search & debate
3. Dental cements Review of theoretical notions. Examples of commercial products of zinc phosphate, Z.O.E/N.E, G.I.C, R.M.G.I.C, metal reinforced glass ionomers. Dosing-preparation of cements by manual / electro-mechanical technique. Demonstration on didactic models. Hands-on: phosphate and glass ionomer cements temporary fillings, placed on didactic models. Mentoring students for projects.	3	Presentation, practical demonstrations, hands-on session, interactive exercises	Hands-on session. Literature search & debate
4. Bioactive materials for pulp capping. Root canal sealers. Calcium hydroxide based cements with / without resins; Calcium silicate cements with / without resins. Review of theoretical notions. Examples of commercial products of Ca hydroxide / Ca silicate cements. Dosing-preparation of Ca hydroxide-based and calcium silicate cements. Demonstration on didactic models. Hands on: working technique and placement on didactic models. Mentoring students for projects	3	Presentation, practical demonstrations, hands-on session, interactive exercises	Hands-on session. Literature search & debate
5. Adhesive Systems for bonding to tooth structures and restorations. Review of theoretical notions. Examples of commercial products – adhesive systems/bonding agents from different generations. Demonstration of posterior fillings on didactic model. Hands-on: bonding and bulk-fill composite placement - posterior filling on didactic model. Mentoring students for projects.	3	Presentation, practical demonstrations, hands-on session, interactive exercises	Hands-on session. Literature search & debate
6. Light-cured composites for direct restorations. Review of theoretical notions. Presentation and selection criteria for different commercial RBC universal products / anterior/ posterior composite restorations. Demonstration of anterior composite fillings on didactic models. Hands-on: direct veneering - aesthetic anatomical stratification on anterior teeth (didactic models).	3	Presentation, practical demonstrations, hands-on session, interactive exercises	Hands-on session. Literature search & debate

Mentoring students for projects.			
<p>7. Self-cured/dual cured composites for direct and indirect restorations. Fiber reinforced composites. Luting Resin cements. Review of theoretical notions. Examples of commercial products: adhesive / self-adhesive luting resin cements. Demonstration: post and core build-ups with glass fiber-reinforced composite resins on didactic models; temporary composite crown produced and cemented. Hands-on: post and core build-ups with glass fiber-reinforced composite resins on didactic models. Mentoring students for projects.</p>	3	Presentation, practical demonstrations, hands-on session, interactive exercises	Hands-on session. Literature search & debate
<p>8. Impression materials: irreversible hydrocolloids - alginates Review of theoretical notions. Demonstration of alginate impression and production of plaster model. Hands-on: alginate impression and production of plaster model Mentoring students for projects</p>	3	Presentation, practical demonstrations, hands-on session, interactive exercises	Hands-on session. Literature search & debate
<p>9. Condensation / addition silicones; polyethers. Review of theoretical notions Examples of commercial products – types of silicones and polyethers. Demonstration of various impression techniques with synthetic impression elastomers. Hands-on: silicone impression on didactic model Mentoring students for projects.</p>	3	Presentation, practical demonstrations, hands-on session, interactive exercises	Hands-on session. Literature search & debate
<p>10. Indirect Restorative Materials Revision of notions from Dental Prosthesis Technology 2nd year curricula on the lab workflow and lab materials for indirect restorations. Presentation of different models and dies / wax dental materials/different investment materials/metals and alloys for different prosthesis. Demonstration through multimedia presentation the clinico-technological workflow of using different auxiliary dental materials and indirect restorative materials. Hands-on: bonding protocol with resin cements to zirconia /alumina-based/ feldspathic/ leucitic/disilicate dental ceramics on didactic models. Mentoring students for projects.</p>	3	Presentation, practical demonstrations, interactive exercises, Q and A session	Hands-on session Literature search & debate
<p>11. Materials for CAM technologies. Prosthetic Polymers Revision of practical sessions. Review of theoretical notions. Demonstration of different technologies using SLS powders, blocks and discs for milling techniques, materials for 3D printing to obtain different types of indirect restorations. Presentation of SLS powders, blocks and discs for milling techniques, materials for 3D printing and examples of indirect restorations using CAD-CAM technology workflow.</p>	3	Presentation, practical demonstrations, interactive exercises, Q and A session	Hands-on Literature search & debate

Review Hands-on: Temporary bisacrylic crown on didactic model using a silicone index. Cementation using ZO-NE temporary cement. Mentoring students for projects.			
12. Students' Oral presentations of their Narrative Reviews (session 1)	3	Presentations, Q and A session	Literature search & debate Results
13. Students' Oral presentations of their Narrative Reviews (session 2)	3	Presentations, Q and A session	Literature search & debate Results
14. Practical exam	3	Hands-on with Q and A session	Practical assessment

8.3. Bibliography for lectures and laboratory/practical sessions

1. Dental Materials -Course Handouts, PPT format, year of study **2024-2025**
2. Dental Materials - Course and Practical Works Notes, PDF format, year of study **2024-2025**
3. Att W. Digital Workflow in Reconstructive Dentistry, Quintessence, **2019**
4. Gladwin M, Bagby M. Clinical aspects of dental materials. Jones and Bartlett Learning, 5th ed., **2018**
5. Ionescu E. Manual pentru rezidentiat: stomatologie, Volumele 1 si 2, ed. Universitara „Carol Davila”, Bucuresti, **2021**
6. Ritter A, Walter R, Boushell LW. Sturdevant's Art and Science of Operative Dentistry, 7th ed, Elsevier Publishing, **2019**.
7. Rosenstiel SF, Land MF . Contemporary Fixed Prosthodontics, 5th ed., Elsevier, **2015**
8. Sailer I, Fehmer V, Pjetursson BE - Fixed restorations, A clinical guide to the selection of materials and fabrication technology, Quintessence, **2021**
9. Sakaguchi RL, Ferracane J, Powers J, Powers J. Craig's restorative dental materials, 14th ed., **2019**
10. Shen C, Rawls HR, Esquivel-Upshaw JF. Phillips' Science of Dental Materials, 13th ed., Elsevier, **2021**

9. Corroborating the contents of the discipline with the expectations of epistemic community representatives, professional associations and employers in the fields representative for the program

The discipline of Dental Materials is a specialty discipline (DS) , mandatory for a student to become a dentist.

- Permanent and constructive dialogue with representatives of the dental community - in order to identify the needs and expectations of employers in the field and to adapt the analytical program to the needs of the current practical activity
- Permanent participation of department members in scientific events, in various forms of continuing medical education and in exhibitions of equipment and materials dedicated to the practical activity in dentistry - in order to maintain the theoretical and practical information introduced in the structure of the discipline at a high level of relevance.
- Maintaining contacts with other teachers in the field, with tenured professors in other higher education institutions, to coordinate the content taught with other similar programs within other higher education institutions.
- The studied notions are in accordance with the regulations in force and are compatible with the activities carried out at national and international level in the pre-clinical dentistry segment

10. Evaluation

10.1 Evaluation			
Activity type	Evaluation Criteria	Methods of evaluation	% out of final grade
Lecture	A. Knowledge for mark 5: Basic acquisition of theoretical notions regarding the current state of knowledge and use of dental materials. 50% correct answers on each assessment component.	Tests with written grid and / or editorial questions	20%
	B. Knowledge for mark 10: In-depth knowledge of theoretical notions regarding the current state of knowledge and use of dental materials. 100% correct answers on each assessment component.	Exam with written grid and / or editorial questions	60%
Laboratory Sessions	A. Knowledge for mark 5: Minimum practical performance regarding the identification, informed selection and correct use of dental materials. 50% achievement on each assessment component.	Laboratory activity assessment	10%
	B. Knowledge for mark 10: In-depth acquisition of practical notions regarding the identification, informed selection and correct use of dental materials. 100% accomplishment on each assessment component.	Practical Exam	10%
Minimum performance standards			
<p>Acquiring the main notions for the optimal use of the main groups of dental materials in dentistry:</p> <ul style="list-style-type: none"> • Identification, dosage and optimal preparation of different classes of dental materials used in the clinical / technological stages of production of different types of direct and indirect restorations. • Evaluation of dental materials in terms of basic chemical composition, chemical, physical and biological properties with clinical implications. • Knowledge of the main mechanisms of interaction of dental materials with dental and periodontal structures and adjacent soft tissues, and of their most common mechanisms of failure over time. • Use of dental materials in safe parameters, in appropriate clinical or laboratory conditions. • Informed selection of recommended materials for specific dental applications. <p>At least 50% achievement on each assessment component.</p>			

Date:
04.09.2024

Chair of Teeth and Dental Arches Morphology and Dental Materials Division,
Assoc. Prof. Dr. Bogdan Mihai Gălbinașu

Date of the approval in Department Board:

Department director,
Prof. Univ. Dr. Marina Imre