DISCIPLINE SHEET

1. Study programme

1.1.	"CAROL DAVILA" UNIVERSITY OF MEDICINE AND PHARMACY BUCHAREST
1.2.	FACULTY OF DENTISTRY
1.3.	DEPARTMENT I
1.4.	DIVISION: TEETH AND DENTAL ARCHES MORPHOLOGY AND DENTAL MATERIALS
1.5.	STUDY DOMAIN: Health, sectoral regulated within the European Union
1.6.	STUDY LEVEL: I (Bachelor's degree) and II (Master's degree)
1.7.	STUDY PROGRAMME: DENTAL MEDICINE IN ENGLISH

2. Discipline

2.1.	Discipline name according to the study curriculum: DENTAL MATERIALS				
2.2.	Discipline code: MD03S08EN				
2.3.	Discipline type (FD/SD/CD): SD				
2.4.	Discipline optionality (COD/ED/FAD): COD				
2.5.	Lectures tenure:Roxana Romaniţa Ilici (DMD, PhD) - Lecturer				
2.6.	Practical classes / seminar tenure: Roxana Romaniţa 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.				
2.7. Year of study	III	2.8. Semester	6th	2.9. Evaluation (E/C/V)	E

3. Estimated total time (hours/ semester of teaching and training activity /individual study)

I. University training						
3.1. Number of hours per week	4	from which:	3.2. lecture	1	3.3. practical class/ seminar	3
3.4. Total hours in the study curriculum	56	from which:	3.5. lecture	14	3.6. practical class/ seminar	42
II. Preparation/ individual study						
Time distribution						hours
Study of lecture materials, textbooks, books, study of the minimum recommended bibliography						20
Additional documentation activity in the library, on online platforms						15
Specific preparation activities for projects, practical classes, preparation of assignments, reports						15
Preparation for presentations or evaluations, preparation for the final examination						10
Tutoring activity						2
Other activities						2
3.7. Total hours of individual study						64

3.8. Total hours per semester (3.4.+3.7.)	**120**
3.9. Number of credits	**4**

4. Prerequisites (where appropriate)

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 (where appropriate)

5.1. for lecture activity	- 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 practical class/ seminar activity	- 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 1 unrecovered absence 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. Learning outcomes*

Knowledge	Skills	Responsibility and autonomy
The student/graduate identifies, describes, differentiates, and evaluates the main groups of dental materials used in dental practices and dental laboratories (form of presentation, commercial products, chemical composition, setting/polymerization reaction, properties, indications, working technique).	Students/graduates develop, communicate, and apply the professional knowledge they have acquired to gain practical experience in the assessment, selection, and appropriate application of general and specific techniques for dosing - preparation/working techniques with dental materials in dental practices and dental laboratories for the morphological and functional restoration of the dento-maxillary system.	The student/graduate identifies, differentiates, describes, selects, and uses specific types of dental materials appropriate for dental indications.

The student/graduate knows the main mutual interactions between dental materials, as well as between them and the oral-dental biological substrates with an impact on general health. The student/graduate develops the ability to use the terminology associated with dental materials science appropriately and according to context.		

7. Discipline objectives (correlated with learning outcomes)

7.1. General objective	- 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	- 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. Contents

8.1. Lecture	Teaching methods	Observations
1. Overview of dental materials in the oral cavity**. Classification** of dental materials. Basic **chemical composition** of dental materials. **Properties (physical, chemical, biocompatibility**) of dental materials. **Evaluation** of dental materials.	Lecture, Interactive oral presentation of the material according to the curriculum, using multimedia tools, PowerPoint presentations, and educational videos. There are 7 courses, each lasting 2 hours.	
2. 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).		
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). **Light-curing composites for aesthetic direct restorations** (classification, commercial products, packaging, chemical composition, polymerization reaction, properties, indications, working technique).		
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)		
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).		
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.		
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.		

Recent bibliography:

1. Dental Materials -Course Handouts, PPT format, year of study **2025-2026**
2. Dental Materials - Course and Practical Works Notes, PDF format, year of study **2025-2026**
3. Ionescu E. Manual pentru rezidenţiat: stomatologie, Volumele 1 si 2, ed. Universitara „Carol Davila", Bucuresti, **2021**
4. Ciocan LT , Donciu II, Ionescu C. Dental Prostheses Technology. Manual pentru studenți și rezidenți. Volumele 1 si 2, ed. Universitara „Carol Davila", Bucharest, **2024- 2025**
5. Shen C, Rawls HR, Esquivel-Upshaw JF. Phillips' Science of Dental Materials, 13th ed., Elsevier, **2021**
6. Gladwin M, Bagby M. Clinical aspects of dental materials. Jones and Bartlett Learning, 5th ed.,**2018**
7. Sakaguchi RL, Ferracane J, Powers J, Powers J. Craig's restorative dental materials, 14th ed., **2019**
8. Ritter A, Walter R, Boushell LW. Sturdevant's Art and Science of Operative Dentistry, 7th ed, Elsevier Publishing, **2019**
9. Rosenstiel SF, Land MF. Contemporary Fixed Prosthodontics, 5th ed., Elsevier, **2015**
10. Sailer I, Fehmer V, Pjetursson BE. Fixed restorations, A clinical guide to the selection of materials and fabrication technology, Quintessence **2021**

8.2. Practical classes/ seminar	**Teaching methods**	**Observations**
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.	Presentation, practical demonstrations, hands-on session, interactive exercises	Presentation, practical demonstrations, , interactive exercises
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/conventions, specialized magazines in the field of Dental Materials. Distribution of "narrative review" project topics.		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.		Hands-on session. Literature search & debate

Mentoring students for projects.		
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		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.		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). Mentoring students for projects.		Hands-on session. Literature search & debate
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.		Hands-on session. Literature search & debate
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		Hands-on session. Literature search & debate
9. Condensation / addition silicones; polyethers. **Review** of theoretical notions **Examples** of commercial products – types of silicones and polyethers.		Hands-on session.

Demonstration of various impression techniques with synthetic impression elastomers. **Hands-on**: silicone impression on didactic model Mentorin		Literature search & debate
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.g students for projects.		Presentation, practical demonstrations, interactive exercises, Q and A session
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. **Review Hands-on:** Temporary bisacrylic crown on didactic model using a silicone index. Cementation using ZO-NE temporary cement. S**ubmission Projecs (Word and Power-Point).**		Presentation, practical demonstrations, interactive exercises, Q and A session, Project Submission
12. Students' Oral presentations of their Narrative Reviews (session 1)		Oral Presentations
13. Students' Oral presentations of their Narrative Reviews (session 2)		Oral Presentations
14. Practical exam		Practical assessment

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9. Assessment

Activity type	9.1. Evaluation criteria	9.2. Evaluation methods	9.3. Percentage of final grade
9.4. 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**	**50%**
9.5. Practical classes/ seminar	**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%**
9.5.1. Individual project (if any)	**A. Knowledge for mark 5:** Submission report (Word document) and associated Power Point of the Project **B. Knowledge for mark 10:**	**Project Presentation**	**10%**

	Submission report (Word document) and associated Power Point of the Project plus Oral Presentation according to the guidline provided by the discipline.		

Minimum performance standard

Acquiring the main notions for the optimal use of the main groups of dental materials in dentistry:

- 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.

At least mark 5 on each evaluation component.