

1. BASIC INFORMATION

Course	BIOMATERIALS AND INSTRUMENTAL
Degree program	GRADE IN DENTISTRY
School	VALENCIA
Year	2024-2025
ECTS	6 ECTS
Credit type	MANDATORY
Language(s)	Spanish, English
Delivery mode	Presential
Semester	First semester
Academic year	2024-2025
Coordinating professor	Dra. María Grau Benítez

2. PRESENTATION

Contextualization of the subject inside the module.

Through the subject “Biomaterials and Instrumentation” the student will achieve to:

Learn the general fundament of the properties of the dental biomaterials.

Familiarize with concepts: Biomaterial, Instrumentation, Ergonomics and Equipment.

Know the structure, chemical composition, setting reaction, properties and manipulation of all materials used in Dentistry.

Develop practical skills to the use and manipulation of the impression and casting materials.

Develop practical skills to the use and manipulation of the fillings materials, metallic or esthetic.

Develop practical skills to the use and manipulation of the cementation materials. Develop

practical skills to the use and manipulation of the laboratory materials.

Contextualization of the competences of Matter within the Module "Pathology and Odontological Therapeutics" and in the degree.

Knowledge of the biomaterials used in dental diagnosis and treatment in general, studying physical, chemical, thermal, rheological, adhesives, optical, esthetic and biological properties, as well as in particular,

studying each material theoretically (knowing the structure composition, chemical setting reaction, properties and clinical or laboratory indications) and practically (learning the material's manipulation at the laboratory).

Remarks

To enroll the subject “Biomaterials and Instrumentation” it is compulsory to have taken the subject “Introduction to clinic”.

3. COMPETENCIES AND LEARNING OUTCOMES

Core competencies:

- BC1: Students should demonstrate to acquire knowledge and understanding in a field of study that comes from the basis of general secondary education, and is typically at a level which, although it is supported by advanced textbooks, includes some aspects involving knowledge of the forefront of their field of study.
- BC2: Students should apply their knowledge to their work or vocation in a professional manner and have competences typically demonstrated through devising and sustaining arguments and solving problems within their field of study.
- BC4: Students should communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.
- BC5: Students should develop those skills needed to undertake further studies with a high degree of autonomy.
- GC1: Know the essential elements of the dentist profession, including ethical principles and legal responsibilities.
- GC13: Ability to understand and recognize the sciences of essential biomaterials for dental practice, as well as the immediate management of possible allergies to them.
- GC17: Ability to understand recognize the principles of ergonomics and safety at work (including cross-infection control, radiation protection and occupational and biological diseases).
- GC3: Ability to know how to identify the patient's concerns and expectations, as well as to communicate effectively and clearly, both orally and in writing, with patients, family members, the media and other professionals.
- GC7: Ability to promote autonomous learning of new knowledge and techniques as well as motivation for quality.
- GC8: Ability to know how to share information with other health professionals and work as a team.

Cross-curricular competencies:

- CC1: Responsibility: the student should be able to assume the consequences of the actions taken and accountable for their own actions.
- CC3: Awareness of ethical values: the student capacity should be able to feel, judge, argue and act according to moral values consistent, persistent and autonomously.
- CC7: Teamwork: students should be able to participate actively in achieving a common goal, listening, respecting and valuing the ideas and proposals of the other members of his team.
- CC9: Planning: the student should be able to effectively determine his goals and priorities defining the actions, deadlines, and optimal resources required to achieve these goals.
- CC10: Innovation-Creativity: the student should be able to devise new and different solutions to problems that add value to problems faced.

Specific competencies:

- CE11: To handle, discriminate and select the appropriate materials and instruments in dentistry.
- CE12: To know the dental biomaterials: their manipulation, properties, indications, allergies, biocompatibility, toxicity, waste management and environmental impact.
- CE14: To know and use the basic equipment and instrumentation for dental practice.
- CE15: Apply the principles of ergonomics in dental work, both individually and within the work team when appropriate, as well as in the principles of prevention of occupational risks associated with dental practice.

Learning outcomes:

Achieve sufficient knowledge and skills related to:

- RA1- Achieve sufficient knowledge and skills related to:

- The evolution and classification of different type of materials and biomaterials.
- The principal and general, physical, chemical, mechanical and biological properties that need to be taken into account when learning, selecting and applying dental materials in their different areas, that is preclinical, clinical or laboratory.
- RA2- Recognize and apply the most appropriate ergonomic, hygienic and safety measures for the handling of each of the materials developed in the course.
- RA3- Obtain a base of learning facilitator for all those subjects during the degree that will need biodental materials.

The following table shows the relationship between the competencies developed during the course and the learning outcomes pursued:

Competencies	Learning outcomes
CE11, CE12, CE14, CE15, CB1, CB2, CB4, CB5, CG1, CG13, CG17, CG3, CG7, CG8, CT1, CT10, CT3, CT7, CT9	RA1, RA2, RA3

4. CONTENT

Presentation of contents.

- Concept and definition. General goals of the subject
- Theoretical and practical programme
- Recommended bibliography
- Follow-up and continuous assesment norms
- Other norms of interest

Materials in Dentistry

- Concept and definition
- Evolution and development
- Clasification of the different groups of materials

Characteristics and general physical properties of dental materials

- Mechanical physical properties
- Magnitudes
- Non-mechanical physical properties

Characteristics and chemical properties of dental materials

- Structure of the matter
- Crystallography
- States of the matter and dental applications
- Other chemical properties of interest
- Adhesion

Characteristics and biological properties of dental materials

- Biological properties and clinical applications
- Control levels of materials: tests and trials
- International norms

Polymeric materials

- Characteristics, composition and general properties
- Classification

Ceramic materials

- Characteristics, composition and general properties
- Classification

Metallic materials

- Characteristics, composition and general properties
- Classification

THEORETICAL CONTENT

- Presentation of the subject and contents
- Materials in Dentistry.
- General concepts of impression and pouring. Physical, chemical and biological properties are treated.
- Pouring materials. Dental gypsum. Physical, chemical and biological properties are treated.
- Thermoplastic impression materials: waxes and modelling compounds. Physical, chemical and biological properties are treated.
- Reversible and irreversible hydrocolloids. Physical, chemical and biological properties are treated.
- Synthesis elastomeric materials: polysulfides, polyethers, silicones. Physical, chemical and biological properties are treated.

- Metallurgy. Physical, chemical and biological properties are treated.
- Polymers for prostheses. Physical, chemical and biological properties are treated.
- Dental Adhesion. Adhesion to tooth structures. Adhesion between different materials Physical, chemical and biological properties are treated.
- Composite resins for direct filling. Physical, chemical and biological properties are treated.
- Non-adhesive cements. Physical, chemical and biological properties are treated.
- Adhesive cements. Physical, chemical and biological properties are treated.
- Dental Ceramic. Physical, chemical and biological properties are treated.

PRACTICAL CONTENT

- Irreversible hydrocolloids
- Dental gypsums
- Thermoplastic impression materials: waxes and modelling compounds
- Synthesis elastomeric materials: polysulfides, polyethers, silicones.
- Self and photopolymerizable acrylic resins
- Adhesive systems
- Composite resins for direct filling
- Adhesive cements
- Non-adhesive cements
- Dental Ceramic

5. TEACHING-LEARNING METHODOLOGIES

The types of teaching-learning methodologies used are indicated below:

- Master class.
- Cooperative learning
- Problem-based learning
- Simulation environments

6. LEARNING ACTIVITIES

Listed below are the types of learning activities and the number of hours the student will spend on each one:

Campus-based mode:

Learning activity	Number of hours
Master classes	20
Problems activities solving	15
Practical activities	15
Practical lessons in the laboratory	25
Tutorial sessions	18
Virtual master classes	10
Autonomous study and work	45
Campus-based mode tests	2
TOTAL	150

7. ASSESSMENT

Listed below are the assessment systems used and the weight each one carries towards the final course grade:

Campus-based mode:

Assessment system	Weight
Theoretical knowledge tests	30%
Simulated preclinical practical lessons	30%
Oral presentations	15%
Practical activities	10%
Workbook	15%

When you access the course on the *Campus Virtual*, you'll find a description of the assessment activities you have to complete, as well as the delivery deadline and assessment procedure for each one.

7.1. First exam period

To pass the course in the first exam period, you must obtain a grade greater than or equal to 5.0 out of 10.0 in the final grade (weighted average) of the course.

In any case, it will be necessary to obtain a grade greater than or equal to 5.0, independently, in each of the evaluation systems that make up the course (including the knowledge tests segregated in partial). It may be assessed that the tests of knowledge segregated in partial weighted average from a grade equal to or greater than 4.

The Universidad Europea de Valencia establishes continuous assessment as a system of evaluation of knowledge, skills and basic, general, transversal and specific competences of the degree in Dentistry, in accordance with the provisions of the Regulations for the evaluation of undergraduate degrees. In this regard and for the purposes of the consumption of calls the student should be aware that, if any evaluation system provided in the Learning Guide, in the ordinary call the student will have an overall grade of the subject, thus consuming call.

According to the aforementioned Regulations, students taking face-to-face degree courses are required to justify at least 50% of class attendance, as a necessary part of the evaluation process and in the case of theoretical or practical classes determined as mandatory by the teacher in the schedules of the subject, the student must register an attendance of 90%, whether the absence is justified or not. The lack of accreditation by the means proposed by the University will entitle the professor to grade the subject as failed in the ordinary call, according to the grading system.

Absences below the compulsory attendance in the theoretical or practical sessions imply that the student has not reached the necessary skills to pass the subject and will fail in the ordinary period.

Only 2 justified absences in practice and theory can be recovered during the ordinary period announced by the university. If the student does not attend the recover session in the ordinary period, the student will fail the whole subject in the ordinary period. In order to recover it, a dedication equal to the time spent in that theory or practice will be necessary. If the absence is not justified, it will not be possible to recover it neither in the ordinary period nor in the extraordinary one.

Punctuality will be required, 3 delays of more than 15 minutes or departures before class will be counted as a lack of attendance.

The student must consult in the schedule of the course in the Virtual Campus the sessions of compulsory attendance in the classroom.

The mention of "Matrícula de Honor" will be awarded to students who have obtained a grade equal to or higher than 9.0. Their number may not exceed 5% of the students enrolled in each subject in the corresponding academic year, unless the number of students enrolled is less than 20, in which case only one honorary registration may be awarded.

Theoretical part

There will be two written tests of theoretical knowledge (20%). It will consist multiple choice questions and an open question. To pass this part, it is necessary to obtain a grade equal to or greater than 5'0 out of 10'0 in each of them. In case of not obtaining a minimum grade of 5 in any of them, the student must recover this part that has not been passed (or that has not been taken) in the extraordinary call. Each of the partial tests of theoretical knowledge will be 10% of the grade.

Oral presentation (15%): there will be a group presentation at the end of the semester on a specific assigned topic and following the guidelines explained by the teacher.

Practical part

A continuous evaluation of simulated preclinical practices (30%) will be carried out. Each practice has its own evaluation rubric. The average grade is obtained between the different grades obtained based on the contents that are evaluated at each moment. The student needs to have a minimum of 5'0 out of 10'0 points in the daily practice average so as to overcome the subject.

Test of theoretical knowledge of the practical part (10%): It will consist of 2 images of materials seen in practices and a clinical case. It is necessary to pass the practical test to pass the practical part of the subject with a minimum of 5'0 out of 10'0 points.

Practical activities (10%): Digital Block. Evaluable practical activities with the support of audiovisual material will be carried out in order to assess the knowledge and skills acquired.

Practice notebook (15%): the practice notebook will be evaluated according to the rubric provided at the beginning of the course.

To pass the practical content evaluation, it is necessary to obtain a grade equal to or greater than 5.0 out of 10.0 points.

7.2. Second exam period

To pass the course in the second exam period, you must obtain a grade higher or equal to 5.0 out of 10.0 in the final grade (weighted average) of the course.

In any case, it will be necessary to obtain a grade greater than or equal to 5.0 in the final test, so that it can be averaged with the rest of the activities.

The activities that were not passed in the ordinary exam must be handed in, after having received the corresponding corrections from the teacher, or those that were not handed in.

The Universidad Europea de Valencia establishes the continuous evaluation as a system of assessment of knowledge, skills and basic, general, transversal and specific competences of the degree in Dentistry, in accordance with the provisions of the Regulations for the evaluation of undergraduate degrees. In this regard and for the purposes of the consumption of calls the student should be aware that in the extraordinary call will be the Objective Test of Knowledge (POC) which determines whether or not to consume call and in the exceptional case that only has pending to overcome evaluation system /s that are not the POC, will be considered NP if not presented and will obtain a numerical grade if you present at least one of them.

Pursuant to the aforementioned Regulations, students taking face-to-face degree courses are required to justify at least 50% of class attendance, as a necessary part of the evaluation process, and in the case of theoretical or practical classes determined as mandatory by the teacher in the schedules of the subject, the student must register an attendance of 90%, whether the absence is justified or not. Those students who, due to non-compliance with this requirement, must appear in the extraordinary call, must perform as many activities or knowledge tests determined by the teacher to recover this part and its corresponding overcoming based on the specified rubric.

8. SCHEDULE

This table shows the delivery deadline for each assessable activity in the course:

Assessable activities	Deadline
Theoretical evaluations	See virtual campus
Practice lessons	Every week, during each practice
Oral presentations	See virtual campus
Practical activities	See virtual campus
Workbook	See virtual campus

This schedule may be subject to changes for logistical reasons relating to the activities. The student will be notified of any change as and when appropriate.

9. BIBLIOGRAPHY

The main reference work for this subject is:

Phillip's science of dental materials; Kenneth J. Anusavice (12th 2013)

The recommended Bibliography is:

CAMPS ALEMANY, I "II Cuaderno de Biomateriales Odontológicos". www.lapasionporloslibros.com

JIMENEZ-PLANAS, A y cols. "Diccionario de Materiales Odontológicos". Secretariado de publicaciones de la Universidad de Sevilla (2007)

MACCHI RL. "Materiales dentales". Ed. Panamericana. 4a edición. (2007)

TOLEDANO M, OSORIO R, y cols. "Arte y Ciencia de los Materiales Odontológicos". Ed. Avances (2003)

10. DIVERSITY MANAGEMENT UNIT

Students with specific learning support needs:

Curricular adaptations and adjustments for students with specific learning support needs, in order to guarantee equal opportunities, will be overseen by the Diversity Management Unit (UAD: Unidad de Atención a la Diversidad).

It is compulsory for this Unit to issue a curricular adaptation/adjustment report, and therefore students with specific learning support needs should contact the Unit at orientacioneducativa.uev@universidadeuropea.es at the beginning of each semester.

11. ONLINE SURVEYS

Your opinion matters!

The Universidad Europea encourages you to participate in several surveys which help identify the strengths and areas we need to improve regarding professors, degree programs and the teaching-learning process.

The surveys will be made available in the "surveys" section in virtual campus or via e-mail.

Your assessment is necessary for us to improve.

Thank you very much for your participation.