1. BASIC INFORMATION

Course	Biomatherials and instrumental
Degree program	Grade in dentistry
School	Valencia
ECTS	6 ECTS
Credit type	Mandatory
Language(s)	Spanish, English
Delivery mode	Presential
Semester	First semester
Academic year	2025-2026
Coordinating professor	Dra. María Jesús Escrivá Morant

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 materialsused 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:

- GC1: Know the essential elements of the dentist profession, including ethical principles and legal responsabilities.
- 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.
- 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 high degree of autonomy.

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.

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 ispreclinical, clinical or laboratory.

• RA2- Recognize and apply the most appropriate ergonomic, hygienic and safety measures for thehandling 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 continous 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 propertiesare treated.
- Pouring materials. Dental gypsum. Physical, chemical and biological properties are treated.
- Thermoplastic impression materials: waxes and modelling compounds. Physical, chemical and biologicalproperties are treated.
- Reversible and irreversible hydrocolloids. Physical, chemical and biological properties are treated.
- Synthesis elastomeric materials: polysulfides, polyethers, silicones. Physical, chemical and biologicalpropertiesare 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. Ordinary Assessment Period

To pass the course in the ordinary assessment 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.

The Universidad Europea de Valencia establishes continuous assessment as a system of evaluation of knowledge, skills and core, general, cross-curricular 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 use of calls the student should be aware that, if any evaluation system provided in the Learning Guide, in the ordinary call (first exam period) the student will have an overall grade of the subject, thus using up one 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 oftheoretical 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 orhigher 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 questionsand an open question.
The first term exam will compensate only with a grade equal or higher than 4´0 points out of 10 points. To pass the second term exam it is necessary to obtain a grade equal or higher than 5'0 points out of10'0points.
In case that the student does not achieve the minimum required grade (or does not attend the exams) ineither the first or second term exam, the student will need to retake those parts in the extraordinary period. 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 final grade is obtained by making an average of 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.

The student must bring his practice workbook to practice sessions everyday as well as the material required for everyday practice session. Otherwise the practice will be graded with a zero.

Attendance to practical sessions is mandatory. A minimum of 90% attendance is required (maximum 2 absences). If a student does not achieve 90% attendance, they will not be able to pass the practical component of the course, resulting in a failure in the ordinary call.
Recovery sessions for justified absences will be held during the first exam period. During this period, a maximum of two justified absences can be made up.

Test of theoretical knowledge of the practical part (10%): It will consist of 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.

7.2. Extraordinary assessment period

To pass the course in the extraordinary assessment period, you must obtain a grade higher or equal to 5.0 out of 10.0in 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 handed in or passed in the first exam period must be submitted, after having received the corresponding corrections from the teacher.

The Universidad Europea de Valencia establishes the continuous evaluation as a system of assessment of knowledge, skills and core, general, cross-curricular, and specific competences of the degree in Dentistry,in accordance with the provisions of the Regulations for the evaluation of undergraduate degrees. In thisregard and for the purposes of using calls, the student should be aware that in the extraordinary call the Objective Test of Knowledge (OTK) which determines whether or not the call was used. In the exceptional case that the student only needs to pass evaluation system /s that are not the OTK, it will be considered NP if not presented and will obtain a numerical grade if the student was examined of, at least, one of them.

Pursuant to the aforementioned Regulations, students taking face-to-face degree courses are required tojustify 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 take the extraordinary call (second exam period), need to perform as many activities or knowledge tests determined by the teacher to recover this part successful completion will be based on the specified rubric.

To pass in the extraordinary call, students will have to take a practical assessment where they must demonstrate that they have acquired the necessary theoretical knowledge and practical skills from the practical sessions conducted throughout the semester. This practical assessment will last a maximum of 2 hours.
Students who have not reached 90% attendance will have to be examined on all practical sessions, while students with sufficient attendance will only need to pass the practical sessions or blocks they failed.

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:

- Anusavice, Kenneth, J. (2013). Phillip´s. Cience of Dental Materials. Elsevier.12th ed

The recommended Bibliography is:

- Fink, JK. (2018). Materials, chemicals and methods for dental applications.Wiley.
- Noort, R. (2013). Introduction to dental materials. Elsevier. 4rd ed
- O´Brien WJ. (2008). Dental materials and their selection. Quintessence. 4rd ed
- Scheller C. (2010). Basic guide to dental materials.Willey-Blackwell

10. EDUCATIONAL GUIDANCE AND DIVERSITY UNIT

From the Educational Guidance and Diversity Unit we offer support to our students throughout their university life to help them reach their academic achievements. Other main actions are the students inclusions with specific educational needs, universal accessibility on the different campuses of the university and equal opportunities.
From this unit we offer to our students:

1. Accompaniment and follow-up by means of counselling and personalized plans for students who need to improve their academic performance.
2. In terms of attention to diversity, non-significant curricular adjustments are made in terms of methodology and assessment for those students with specific educational needs, pursuing an equal opportunities for all students.

3. We offer students different extracurricular resources to develop different competences that will encourage their personal and professional development.
4. Vocational guidance through the provision of tools and counselling to students with vocational doubts or who believe they have made a mistake in their choice of degree.

Students in need of educational support can write to us
at: orientacioneducativa.uev@universidadeuropea.es