

**COURSE DATA****DATA SUBJECT**

Code: 34704
Name: Biomaterials and ergonomics I
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1206 - Degree in Dentistry	Facultat de Medicina i Odontologia	1	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1206 - Degree in Dentistry	Biomaterials and ergonomics	BASIC

COORDINATION

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SUMMARY

The subject has two main components, firstly it tries to introduce the student to what their environment and working conditions will be throughout their future working life, for this and given that they are in the first years, they are introduced to the variants of clinical dentistry and its peculiarities, then the student goes on to address the working conditions, postural hygiene, and occupational risks and their prevention, then the clinical instruments and equipment are addressed, and then the student is introduced to the basic concepts about Dental Biomaterials.

PREVIOUS KNOWLEDGE**RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE**

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS



COMPETENCES / LEARNING OUTCOMES

1206 - Degree in Dentistry

Adquirir experiencia clínica bajo la adecuada supervisión.

Aplicar los principios de ergonomía en el trabajo odontológico, tanto a nivel individual como dentro del equipo de trabajo cuando sea apropiado, así como en los principios de prevención de riesgos laborales asociados a la práctica odontológica.

Comprender las ciencias biomédicas básicas en las que se fundamenta la Odontología para asegurar una correcta asistencia buco-dentaria.

Comprender y reconocer las ciencias de los biomateriales esenciales para la práctica odontológica así como el manejo inmediato de las posibles alergias a los mismos.

Comprender y reconocer los principios de ergonomía y seguridad en el trabajo (incluyendo control de infecciones cruzadas, protección radiológica y enfermedades ocupacionales y biológicas).

Conocer, valorar críticamente y saber utilizar las fuentes de información clínica y biomédica para obtener, organizar, interpretar y comunicar la información científica y sanitaria.

Conocer del método científico y tener capacidad crítica para valorar los conocimientos establecidos y la información novedosa. Ser capaz de formular hipótesis, recolectar y valorar de forma crítica la información para la resolución de problemas, siguiendo el método científico.

Conocer el peligro de las radiaciones ionizantes y sus efectos en los tejidos biológicos, junto con la legislación que regula su uso. Dirigir instalaciones de radiodiagnóstico bucal.

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Conocer los biomateriales dentales: su manipulación, propiedades, indicaciones, alergias, bio-compatibilidad, toxicidad, eliminación de residuos e impacto ambiental.

Conocer los procedimientos y pruebas diagnósticas clínicas y de laboratorio, conocer su fiabilidad y validez diagnóstica y ser competente en la interpretación de sus resultados.

Conocer y usar el equipamiento e instrumentación básicos para la práctica odontológica.

Diagnosticar, planificar y realizar, con carácter general, un tratamiento multidisciplinar, secuencial e integrado de complejidad limitada en pacientes de todas las edades y condiciones y en pacientes con necesidades especiales (diabéticos, hipertensos, oncológicos, transplantados, inmunodeprimidos, anticoagulados, entre otros) o discapacitados.

Manejar, discriminar y seleccionar los materiales e instrumentos adecuados en odontología.

Realizar las radiografías necesarias en la práctica odontológica, interpretar las imágenes obtenidas y conocer otras técnicas de diagnóstico por imagen que tengan relevancia.

Reconocer la normalidad y la patología bucal, así como la evaluación de los datos semiológicos.



Saber realizar un examen bucal completo, incluyendo las oportunas pruebas radiográficas y de exploración complementarias, así como la obtención de adecuadas referencias clínicas.

Tener capacidad para elaborar un juicio diagnóstico inicial y establecer una estrategia diagnóstica razonada.

DESCRIPTION OF CONTENTS

1. Theory

Master lectures: Presentation of the general outlines of the topics in the theoretical syllabus:

Block I: Introduction to the Dental Environment

- 1.- Introduction to the Clinic. Nomenclature. Odontogram
- 2.- Standardization and Normalization for Instruments and Biomaterials
- 3.- Introduction to Fixed Prosthodontics
- 4.- Introduction to Removable Prosthodontics
- 5.- Impression and Casting Techniques
- 6.- Introduction to Restorative Dentistry and Endodontics
- 7.- Introduction to Surgery
- 8.- Introduction to the Dental Laboratory I: Resin Processing
- 9.- Introduction to the Dental Laboratory II: Metal and Ceramic Processing

Block II: Instrumentation and Equipment

- 10.- Risk Prevention
- 11.- Disinfection and Sterilization
- 12.- Hand Instruments
- 13.- Rotary Instruments
- 14.- Dental Unit
- 15.- Dental Equipment
- 16.- Specialized Devices
- 17.- New Technologies

Block III: Ergonomics

- 18.- Dental Office
- 19.- Ergonomics. Working Positions
- 20.- Occupational Diseases I
- 21.- Occupational Diseases II
- 22.- Marketing. Quality Control

Block IV: General Properties of Biomaterials

- 23.- Structure of a Biomaterial
- 24.- Physical-Mechanical Properties
- 25.- Surface Properties
- 26.- Adhesive Properties



- 27.- Rheological Properties
- 28.- Thermal and Electrical Properties
- 29.- Optical and Aesthetic Properties. Color
- 30.- Biological Properties

2. Practical Lessons

In the Laboratory: Students will become familiar with the equipment and instruments, and will train in acquiring and developing the basic skills necessary for the precise handling of simple or complex instruments, with special attention to the careful disposal of waste, cleaning of the workstation, and care of the facilities. Students will have access to state-of-the-art scanners for training in the acquisition of oral records.

PRACTICAL 1.- NOMENCLATURE AND ODONTOGRAM exercises. History of Biomaterials

PRACTICAL 2.- Modeling a tooth in soap

PRACTICAL 3.- MODEL DUPLICATION: Impression on a model using irreversible hydrocolloids. Plaster casting. Trimming and Base Formation

PRACTICAL 4.- Manual and rotary INSTRUMENTS

PRACTICAL 5.- Training in the use of the intraoral SCANNER

PRACTICAL 6.- INDIRECT VISION. Training with high-precision haptic simulators for performing exercises with direct and indirect vision

PRACTICAL 7.- DENTAL UNIT AND WORKING POSITIONS. In the clinical rooms, students will have access to dental units to gain a proper understanding of all their components, following ergonomic criteria applied to working positions.

COLLECTIVE DISCUSSION SEMINARS

- COLOR SEMINAR
- SEMINAR on the General Properties of Biomaterials

INDIVIDUAL ASSIGNMENTS

- DESIGN of the dental office
- MARKETING / MANAGEMENT / ADVERTISING

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	33,00
Laboratory	27,00
Total hours	60,00

NON PRESENCIAL ACTIVITIES



Activity	Hours
Attendance at other activities	0,00
Individual or group project	10,00
Independent study and work	80,00
Preparation of lessons	0,00
Preparation for assessment activities	0,00
Resolution of case studies	0,00
Total hours	90,00

TEACHING METHODOLOGY

Master classes: Exposition of the general ideas of the topics of the theoretical program.

Seminars: Collective discussion about issues raised.

Preclinical laboratory practices: Students will learn about the equipment and instruments, they will train in the acquisition and development of the basic skills necessary for precise handling of simple or complex instruments, with special attention to the careful removal of waste, cleaning of the workplace and care of the facilities. All this within ergonomic criteria applied to work positions.

Tutorials: In person or virtually, teachers will personally guide students by answering questions, doubts, clarifications, etc. Likewise, systems for continuous evaluation, planning and control of bibliographic searches, presentations, etc. can be established.

The gender perspective, respect for diversity and the sustainable development goals (SDGs) will be incorporated into teaching, whenever possible.

EVALUATION

For the THEORETICAL part (80% of the final grade):

THEORETICAL EXAM:

- Mandatory.
- Multiple-choice test consisting of 50 questions.
- For grading, the formula $X = A - (E \cdot K)$ will be used, where X is the score obtained (correcting for randomness), A is the number of correctly answered items, E is the number of incorrectly answered or unanswered items, and K corresponds to $1/(n-1)$, where the number of distractors is 5. A passing grade is achieved with $X = 25$.

For the PRACTICAL part (20% of the final grade):

- 80% of the practical grade: PRACTICAL EXAM



- 20% of the practical grade: Continuous assessment, monitoring attendance and the students' personal completion of activities throughout the course, final review of activities, and, if necessary, the occasional completion of some type of activity.

Attendance at practical activities is MANDATORY. A student is considered to meet this requirement if they have attended at least 80% of these activities and have properly justified their inability to attend the remaining sessions due to force majeure. Meeting this requirement is essential to pass the course. The assignment of groups, by day and time, cannot be modified by the student.

The theoretical exam and the practical exam must be passed independently, with a grade equal to or higher than 5, in order to pass the course. The final course grade is calculated only after these requirements have been met. The course has a SINGLE final grade.

For subsequent examination periods, it will again be mandatory to take both the Theoretical Exam and the Practical Exam.

Students are reminded of the great importance of completing the evaluation surveys for all instructors involved in the course..

REFERENCES

BASIC

- ÁGUILA F. J. , TEGIACCHI. "Ergonomía en Odontología. Un enfoque preventivo".
- BOURDARION, G. "Manual de Biomateriales dentarios".
- CAMPS I. I Cuaderno de Biomateriales Ed Pasion por los libros.
- CAMPS I. II Cuaderno de Biomateriales Ed Pasion por los libros.
- CEBALLOS ATIENZA R. Prevencion de riesgos laborales para la higienista dental Ed Formación Alcalá.
- CORTESI ARDIZZONE V. Manual práctico para la auxiliar de odontología. Ed Elsevier.
- COVA JL. Biomateriales Dentales Ed. Amolca.
- CRAIG R. Materiales de Odontología Restauradora Ed. Harcourt Brace.
- CRAIG. O'BRIEN. POWERS Dental Materials. Properties - Manipulation. Ed Mosby.
- DE LA MACORRA. Manual de Biomateriales Odontológicos UCM.
- JIMÉNEZ-PLANAS A, ÁBALOS C, CAMPS I, MARTÍN J. Diccionario de Materiales Odontológicos. Universidad de Sevilla. Secretariado de Publicaciones.
- MACIA SOLER L. Gestión Clínica. Colección Cuidados de Salud Avanzados. Ed Elsevier.
- McCABE JF. ANDERSON. Materiales de aplicación dental. Ed Salvat.
- MOSBY Diccionario de Odontología. Ed Elsevier.
- O'BRIEN W. Dental Materials and their selection Ed Quintessence Books.
- REIS A, LOGUERCIO A. Materiales dentales directos. De los fundamentos a la clínica Santos Editora.
- REISBICK M.H. Materiales dentales en la Odontología Clínica (1985) Ed. Manual Moderno.
- TOLEDANO M. Arte y Ciencia de los Materials Odontológicos Ed. Avances Médico-Dentales.
- VAN NOORT R. Introduction to Dental materials.



- VEGA DEL BARRIO JM. Materiales en Odontología. Fundamentos biológicos, clínicos, biofísicos y fisicoquímicos Ed Avances Médico-Dentales.
- VEGA DEL BARRIO JM, HIDALGO JJ, CARRILLO P Ergonomía y Odontología UCM.

RECURSOS e-Salut:

- ClinicalKey Student Medicina, Odontologia y Enfermería [<https://uv-es.libguides.com/RecursosSalut>]
- Acces Medicina [https://uv-es.libguides.com/Access_Medicina]
- Médica Panamericana [https://uv-es.libguides.com/Medica_Panamericana]