

## 29316 - Bio-materials for Odontology and Ergonomics

### Syllabus Information

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**Academic Year:** 2020/21

**Subject:** 29316 - Bio-materials for Odontology and Ergonomics

**Faculty / School:** 229 - Facultad de Ciencias de la Salud y del Deporte

**Degree:** 442 - Degree in Odontology

**ECTS:** 6.0

**Year:** 2

**Semester:** First semester

**Subject Type:** Compulsory

**Module:** ---

## 1.General information

### 1.1.Aims of the course

The subject and the outcomes foreseen respond to the following approaches and aims:

- Understanding the fundamental concepts related to the properties and principles of using dental materials in professional practice, selecting and learning to use the most commonly used materials and the adequate equipment with which to manipulate it.
- Familiarising oneself with the basic instruments used in therapeutic procedures and scientific principles of sterilisation, disinfection and antisepsis for managing and maintaining a safe environment in the dental clinics.
- Learning how to optimise the diagnostic and therapeutic procedures from an ergonomic perspective.

### 1.2.Context and importance of this course in the degree

Context: Materials and Equipment

Dental materials and equipment are the necessary substrates, subjects and equipment for maintaining the population's oral health through Dentistry.

Modern Dentistry tends to not only restore and substitute lost parts, but also aims to prevent disease in the first place. At later stages, it also aims to restore lost or altered functions, while using organs as the function's material substrate. This second aspect is of primordial importance, as the current tendency in Health Sciences is to promote and maintain the above. In this sense, Dental Biomaterials and Ergonomics has an important role to play as employing inadequate materials or instruments, or manipulating a product without adequate training can not only not improve a therapeutic treatment, but it can also help disease advance or make a secondary disease appear.

It is not possible to understand current and future dental materials without first understanding their past. When examining Dental history, it can be proven that the materials that each civilisation had access to, at any given moment, were significant to dental work of that time period.

Context: Ergonomics and Instrumentation

Ergonomics is a discipline of reciprocal communication between humans and their socio-technical environment. The aim is to provide reciprocal, constant and systematic adjustment between humans and their environment; designing a work space which, where possible, results in a space that is comfortable, easy and consistent with minimum hygiene and safety requirements, while elevating overall indicators of both qualitative and quantitative productivity. There is a common aim in all of its applications: to adapt products, tasks, tools, spaces and the general surroundings to the needs and ability of people, in a way that improves the efficiency, safety and wellbeing of consumers, users and workers. This is the definition of an object's comfort from the perspective of the person using it. The ergonomic approach consists of designing products in a way that allows them to adapt to the user and not the other way around.

Significance of the subject within the degree

From a curricular point of view, Dental Biomaterials and Ergonomics is organised into two areas of knowledge: theoretical knowledge and applied knowledge. The subject taught in the second course represents the students' first approach to specialised industry training. This discipline is one of great interest for the future professional as it provides essential training on both specific contents and skills of the Dentistry profession.

### 1.3.Recommendations to take this course

## SUBJECT PREREQUISITES

Essential prerequisites. In order to study this subject, it is recommended that students have basic knowledge of chemistry and physics.

Recommended prerequisites. If you have basic English and computer literacy (use of PowerPoint, Internet browsers, bibliographic reference management, electronic journals, etc.), you will benefit much more from this subject.

## RECOMMENDATIONS TO STUDENTS FOR STUDYING THIS SUBJECT

Students are advised to read about the practical components before doing them so as to take better advantage of the classes.

In order to understand both the theoretical and practical components of the subject, students should carefully consult the basic books.

## 2.Learning goals

### 2.1.Competences

After having passed this subject, the student will be more competent at...

- Knowing scientific concepts of sterilisation, disinfection, antiseptics necessary for preventing cross-contamination in dental practice.
- Using, differentiating and selecting adequate materials and instruments in Dentistry.
- Knowing dental biomaterials: how to manipulate them as well as their properties, allergies, bio-compatibility, toxicity, waste disposal and environmental impact.
- Understanding and using basic equipment and basic instruments for dental practice.
- Applying ergonomic principles in dental work, on an individual level as much as within a work team when appropriate, as well as in work-risk prevention associated with dental practice.

### 2.2.Learning goals

To pass this subject, the student will need to demonstrate the following:

Identify and recognise dental materials and biomaterials with adequate precision and terminology.

Understand and differentiate between the properties of dental materials and biomaterials that are significant in clinical application.

Adequately handle biomaterials according to the dental procedure to be undertaken.

Understand, differentiate and apply Ergonomics concepts and work-related risk prevention principles in dental practice.

Know the characteristics of and differentiate between dental instruments, devices and equipment and exemplifying their clinical application.

### 2.3.Importance of learning goals

We will introduce the learning outcomes that are intended to be attained throughout this subject, based on the following parts:

- Identifying and recognising dental materials and biomaterials with adequate precision and terminology.
- Understanding and differentiating between the properties of the dental materials and biomaterials that are significant in clinical application.
- Adequately handling the biomaterials according to the dental procedure to be undertaken.
- Understanding, differentiating and applying Ergonomics concepts and the work-related risk prevention principles in dental practice.
- Knowing the characteristics and differentiating between dental instruments, devices and equipment and exemplifying their clinical application.

## 3.Assessment (1st and 2nd call)

### 3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

Students must demonstrate that they have attained the foreseen learning outcomes through the following evaluation activities:

Students must choose 2 evaluation options.

#### OPTION A

In order to pass the subject, the following aspects will be evaluated:

- Regular attendance and active participation in theoretical lectures and debates (contributions, suggestions, questions, involvement, etc.).
- Obligatory attendance and active participation in practical classes.
- Individual compilation work in practical class (Practice books).
- Group work on a subject to be decided on with the Professors.
- Written theory exam (10 short questions and 20 single-answer questions).
- Practical exam.
- Voluntary individual work.

In order to pass the exam, students are obliged to attend practical sessions and complete a file documenting all of the tasks undertaken in the above. 3 absences with explanation are permitted. Any student who is absent for more than 3 explained practical classes will be obliged to submit a monographic assignment corresponding to the practical session that he or she missed (subject to be agreed upon with Professors).

#### Subject Evaluation Polynomial

- CONCEPTUAL BLOCK
  - Theoretical component (60%)
- Theoretical knowledge test (2 tests are undertaken per semester) will consist of:
- 10 short questions each worth 0.5;
  - 20 multiple choice questions with only one correct answer, each worth 0.25.
- PROCEDURAL BLOCK
  - Practical component (40%)

Marks for this section will be distributed as follows:

- 15% for practical session attendance (completing exercises, actively participating in sessions and seminars);
- 15% for portfolio evaluation (Practice Book) and final practical exam.
- 10% for co-evaluation of group work through the rubric.

In order to pass the subject, students will need to pass both the theoretical and the practical component separately.

Any student who wishes to, may complete a voluntary individual written assignment which can count for 1 point of the final mark for the subject, as long as they have passed the previous components separately and they have met the criteria established by the professor.

#### OPTION B

Students who cannot meet the required criteria in OPTION A (EXAMPLE: in the case of not attending more than 3 practical class), they will automatically be evaluated by OPTION B.

#### Subject Evaluation Polynomial

- CONCEPTUAL BLOCK
  - Theoretical component (50%)
- Written test. This exam will consist of:
- 10 short questions, each worth 0.5;
  - 20 multiple-choice questions with only one correct answer, each worth 0.25.
- PROCEDURAL BLOCK
  - Final practical exam of the whole subject (50%).

#### Final Mark

- The grading system will be carried out according to the current legislation.
- The final date for handing in portfolios (Practice Books) and monographic assignments will be 15 days before the date of the exam (up until 13:00h). Work handed in after this date will not be accepted. Should the aforementioned date coincide with a non-working day, the deadline will be the first school day after the non-working day
- In regards to the final mark, both blocks need to be passed separately, to then be averaged (5 will be considered a pass mark).
- The formal guidelines for presentation expressed in class and duplicated in writing must be followed for all written work handed in (except when expressly written to the contrary).
- The marks will be published all at the same time, with no individual marks released prior to this time.

#### Proposal of adaptation of the Subject

##### Theoretical part (60%)

- The individual written test will be replaced with:

Test type exam carried out on the Moodle platform with 40 questions with 5 items of which only 1 is correct (0.25 points for each correct answer).

##### Practical part (40%).

- 20% Group work to be arranged with the Teachers and presentation through a recorded video.

- 20% Assessment of the portfolio (practical notebook) that must include the resolution of practical problems raised by the Teachers.

## 4. Methodology, learning tasks, syllabus and resources

### 4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as theory sessions, practice sessions, tutorials, group work, and autonomous work and study.

Due to the exceptional situation of this 2020/21 academic year, the way of carrying out the different learning activities is subject to the availability of physical spaces in the Center.

Otherwise the online format will be used for the theoretical classes that is, synchronously telematically connected teachers and students through technologies that allow interaction (Google Meet type).

### 4.2. Learning tasks

This course is organized as follows:

- **Theory sessions.** Active participation of students will be encouraged.
- **Workshops.** There will also be seminars in the form of theoretical-practical workshops taught by the professor or guest speakers so as to delve further into special interest topics.
- **Practice sessions.** Problem-solving.
- **Individual and group work.** We will also aim to reinforce individual learning through group (or voluntary individual) monographic assignments, within a reciprocal teaching methodology.
- **Tutorials.** Aimed at clarifying doubts or providing literature specific to a particular topic regarding the course's theoretical or practical contents

### 4.3. Syllabus

This course will address the following topics:

#### DENTAL MATERIALS

##### Theory sessions

- Previous knowledge assessment and introduction to matter.

##### - **Section I. Fundamentals.**

1. History of dental materials. physical, chemical and biological properties.
2. Dental polymers, ceramics, and metals.

##### - **Section II. Auxiliary dental materials and dentures.**

3. Impression materials.
4. Gypsum products.
5. Acrylic resin.

##### - **Section III. Inlays, onlays, crowns, and bridges.**

6. Metals and alloys.
7. Dental ceramics.
8. Casting procedures.

##### - **Section IV. Plastic restorations.**

9. Bonding.
10. Direct restorations I (composite resins).
11. Direct restorations II (dental amalgams).
12. Dental cements.

##### - **Section V. Other materials.**

13. Preventive materials.
14. Finishing and polishing materials.
15. Dental Implants and regenerative materials
16. Other materials (orthodontics, endodontics).

##### Laboratory sessions

1. Irreversible hydrocolloids.
2. Elastomers.
3. Gypsum.
4. Impressions and models fabrication procedures.
5. Acrylic resins.
6. Alloys and casting procedures (seminar). Dental ceramics (seminar).
7. Adhesives Systems.
8. Resin composites.
9. Dental cements.
10. Preventive materials.

#### EQUIPMENT, INSTRUMENTS AND ERGONOMICS

##### Theory sessions

- Section I. The dental clinic and dental laboratory.

1. The dental office.
2. The dental unit: composition and handling. dental laboratory  
- Section II. Dental instruments.
3. Dental instruments (I).
4. Dental instruments (II).  
- Section III. Care, maintenance and handling of dental instruments and unit.
5. Disinfection and care of work environment and equipment.  
- Section IV. Four-handed dentistry.
6. Teamwork in dentistry. Time control. Auxiliary staff functions.
7. Four-handed technique.

#### Laboratory sessions

1. Design of a dental clinic.
2. The dental practice and equipment. The dental unit. Basics of the dental laboratory.
3. Dental instruments preparation.
4. Dental instruments preparation.
5. Exercise of cleaning, disinfection, and sterilization in the dental office.
6. Psychomotricity in the dental practice. Instruments management in indirect vision.
7. The dental office. teamwork. Postural control and movements.
8. Four-handed technique.

#### **4.4.Course planning and calendar**

- Lectures: Classroom 1 or 2
- Preclinical Practice: Dental Laboratory Materials
- Clinical practice: Dental Clinic
- Seminars: Classroom 1 or 4 (to be confirmed in advance)

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course will be provided on the first day of class or please refer to the Faculty of Health and Sports Sciences website and Moodle.

#### **4.5.Bibliography and recommended resources**

##### **BASIC BIBLIOGRAPHY**

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