1. BASIC INFORMATION

Course	Dentistry Diagnosis
Degree program	Degree in Dentistry
School	Biomedical and Health Sciences
Year	2
ECTS	3 ECTS
Credit type	Mandatory
Language(s)	Castellano/English
Delivery mode	Classroom-based
Semester	Second Semester
Academic year	2024/2025
Coordinating professor	Victor Díaz-Flores García

2. PRESENTATION

The use of ionizing radiation in clinical practice has been an unthinkable advance decades ago in the diagnosis and treatment of various diseases.
Dentistry has been one of the medical specialties that has benefited most from advances in diagnostic imaging, however, this use means an increase in the dose suffered by both the patient and the one who performs the radiographic test. The dental professional must be aware of the limitations and protection measures against ionizing radiation.
The ICRP (International Commission on Radiation Protection) has warned of this fact and insists (in its publications 103, 105 and 113) on the need for those who perform diagnostic procedures using ionising radiation to have an adequate level of training.
In this course, the fundamentals of radiation production, the criteria of radioprotection and radiobiology, the legislation applicable in Spain to producers of ionising radiations and the techniques applicable in dentistry will be presented. All this to train the future professional who will use radiation as one of his most common diagnostic means. The basis for the training of this subject will be in the educational material of the ICRP and the European Commission. In addition, and as a complement to the course, the latest advances in diagnosis will be shown and experts in various specialties will explain how radiology and other newly emerging technologies can help achieve better diagnosis and treatment.

3. COMPETENCIES AND LEARNING OUTCOMES

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4. COMPETENCIES AND LEARNING OUTCOMES

Basic competencies:

- CB2: That students know how to apply their knowledge to their work or vocation in a professional way and have the skills that are usually demonstrated through the development and defense of arguments and problem solving within their area of study.
- CB3: Students have the ability to collect and interpret relevant data (usually within their area of study) to make judgments that include reflection on relevant social, scientific or ethical issues.
- CB5: That students have developed the necessary learning skills to undertake further studies with a high degree of autonomy.

Transversal competences:

- CT1 - Autonomous learning: Process that allows the person to be the author of his or her own development, choosing the paths, strategies, tools and moments that he or she considers most effective in order to learn and put into practice independently what has been learned. The freelance learner, in short, selects the best strategies to achieve his or her learning objectives.
- CT2 - Self-confidence: Ability to value our own results, performance and capabilities with the internal conviction that we are capable of doing things and the challenges we face.
- CT3 - Capacity to adapt to new situations: To be able to work under different conditions, different people and in different groups. It involves valuing and understanding different positions, adapting one's own approach as the situation requires.
- TC5 - Ability to apply knowledge to practice: Ability to use knowledge acquired in the academic field in situations as close as possible to the reality of the profession for which they are being trained, for example, by relating theoretical foundations to their application to real problems in everyday life, by addressing problems and situations close to professional activity or by solving real issues and/or problems.
- CT6 - Oral Communication / Written Communication: Communication is the process by which we transmit and receive data, ideas, opinions and attitudes to achieve understanding and action, being oral that which is done through words and gestures and, written, through writing and/or graphic support. CT8 - Information Management: Ability to search, select, analyze and integrate information from diverse sources.
- CT9 - Interpersonal relationship skills: To relate positively to other people by verbal and non-verbal
- means through assertive communication, understood as the ability to express or transmit what one wants, thinks or feels without disturbing, attacking or hurting the other person's feelings.

General competencies:

- GC1 Know the essential elements of the dentist profession, including ethical principles and legal responsibilities.

- GC3 Know how to identify the patient's concerns and expectations, as well as communicate effectively and clearly, both orally and in writing, with patients, family members, the media, and other professionals.
- GC4 Understand and recognize the social and psychological aspects relevant to the treatment of patients.
- GC6 Understand the importance of developing a professional practice with respect to the patient's autonomy, their beliefs and culture.
- GC7 Promote autonomous learning of new knowledge and techniques, as well as motivation for quality.
- GC9 Understand the importance of maintaining and using records with patient information for subsequent analysis, preserving the confidentiality of the data
- GC12 Understand and recognize the normal structure and function of the stomatognathic apparatus, at the molecular, cellular, tissue and organic levels, at different stages of life.
- GC17 Understand and recognize the principles of ergonomics and safety at work (including control of cross infection, radiation protection and occupational and biological diseases).
- GC18 Know, critically assess, and know how to use the sources of clinical and biomedical information to obtain, organize, interpret, and communicate scientific and health information.
- GC21 Knowing how to perform a complete oral examination, including appropriate radiographic and complementary examination tests, as well as obtaining adequate clinical references.

Specific competencies:

- SC7. Know the risk of ionising radiation and its effects on biological tissues, together with the legislation regulating its use. Manage oral radiodiagnosis facilities.
- SC8. Perform the radiographs necessary in dental practice, analyze the images obtained and learn about other relevant diagnostic imaging techniques.
- SC9. Know the clinical and laboratory diagnostic procedures and tests, know their reliability and diagnostic validity, and be competent in the interpretation of their results.
- SC10. Recognize oral normality and pathology, as well as the evaluation of semiological data.
- SC13. Handle, discriminate and select appropriate materials and instruments in Dentistry.
- SC14. Know dental biomaterials: their handling, properties, indications, allergies, biocompatibility, toxicity, waste disposal and environmental impact.
- SC36. Take and interpret radiographs and other image-based procedures relevant to dental practice.

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

Competencies	Learning outcomes
CB2, CB3, CT1, GC1, GC3	RA1: Be competent in identifying the main reason for consultation and the history of the current disease.
CB5, CT2, GC6, GC7	RA2: To be competent in taking a medical history by means of complementary diagnostic tests, with diagnostic validity and interpretation and critical analysis of the results. Obtain and take a medical history containing all relevant information.
CT8, CG9, GC18	RA3: Be able to complete and manage clinical documentation and information management.
CT3, CT4	RA4: To know how to make and arrange intra and extraoral radiographs, as well as other methods and techniques of diagnosis by the image in Odontology.

CT5, CT6, GC9	RA5: To have the ability to make an initial diagnostic judgment and establish a reasoned diagnostic strategy thanks to the interpretation of the diagnostic images obtained, being competent in the recognition of situations that require urgent dental care.
GC12, GC17, GC21	RA6: To know the danger of ionizing radiation and its effects on biological tissues, together with the legislation regulating its use. Running oral radiodiagnostic facilities.
GC6, SC7, GC12, GC17	RA7: Understand the physical fundamentals of ionizing radiation; the effects of ionizing radiation. Apply radiological procedures and techniques
CT5, CB3, CT1, GC18, GC21	RA 8: Understand which radiographs are necessary in dental practice, and interpret the images obtained, and interpret the images obtained, knowing other diagnostic imaging techniques that have relevance in the field of dentistry.

5. CONTENT

The subject is organized into six learning units.
Unit 1. HISTORY AND PHYSICAL FOUNDATIONS OF RADIATION
Unit 2. TYPES OF X-RAYS

- Composition of X-rays
- Image formation
- Visual and geometric characteristics of radiation

Unit 3. RADIOLOGICAL PROTECTION AND INTRAORAL TECHNIQUES

- Concepts and Objectives
- Dose limiting systems
- Basic measurement procedures
- Recommendations
- Intraoral techniques
- Developed

Unit 4. READING AN X-RAY. ERRORS IN EXPOSURE AND TECHNIQUE.
Unit 5. SPECIAL TECHNIQUES.
Unit 6. RADIOBIOLOGY.

6. TEACHING-LEARNING METHODOLOGIES

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

- Case Method
- Problem Based Learning (PBL)
- Master Class

7. 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
Tutorials	5
Master classes	12
Asynchronous virtual master classes	5
Study and independent work	25
Knowledge tests	5
Laboratory practicals	6
Critical analysis of scientific articles	7
Research	6
Wikis	4
TOTAL	**75**

8. 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
Knowledge tests	55%
Learning portfolio/portfolio	35%
Practical notebook	10%

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

In order to pass the course in the ordinary call, it is necessary to obtain a grade higher or equal to 5.0 out of 10.0 in all the evaluable activities of the course.
The following activities will be carried out as part of the portfolio:
- Practical radiographic seminars: Practical seminars will be held on the interpretation of radiographic images, in which students will be able to participate by presenting their knowledge. Attendance at the seminars will be marked with a maximum of 5% of the final mark for the subject.

- The radiographic knowledge test will consist of 4 different radiographic projections that must be described according to the criteria explained during the seminars of the course. Each X-ray will be worth 2.5 points and the following information must be included: type of X-ray, teeth seen in the X-ray, description of the dental anatomy and description of the adjacent anatomy. Errors in the radiograph, if any, should be indicated. If the teeth are not correctly identified on the X-ray, the X-ray will be marked out of 0 points. Failure in the test must be made up in the extraordinary follow-up period of the subject.
- Multiple-choice tests on the syllabus of the subject, divided into 3 blocks. Two on topics 1 to 3 and 4 to 6 and two on radiological anatomy.
In all the activities included in the portfolio, the student must obtain a score of at least 5. If the student has failed or not completed a maximum of 2 activities during the course, he/she will be able to make them up on the date indicated by the teacher, which will always be before the objective knowledge test. If the student has failed/not completed more than 2 activities, he/she will have to make them up during the follow-up period of the course in the extraordinary exam.
The practical notebook will be completed after performing two laboratory practices and will consist of an online test with 30 questions on the two practices completed:
- Practice 1: Positioning of the rx beam for intraoral techniques.
- Practical 2: Clark's technique in angle bisector.
Failure to attend one or more of the laboratory practices must be made up in the extraordinary period of the course.
Failure to attend one or more of the laboratory practicals must be made up in the extraordinary period of the course. In all the activities described, the student must obtain a score of at least 5.
If the student has failed or not carried out a maximum of 2 activities during the course, he/she will be able to recover them on the date indicated by the teacher, which will always be before the objective knowledge test. If the student has failed/not completed more than 2 activities, it will be necessary to recover these activities during the follow-up period of the course in the extraordinary exam.
Regarding class attendance, the Regulations for the evaluation of official undergraduate degrees at the European University of Madrid (Title I, art. 1- 4) states the following: " Students taking campus-based studies are required to demonstrate that they have attended at least 50% of their classes. Such attendance forms an essential part of the assessment process and is necessary to give the student the right to receive guidance, assistance and academic supervision from the professor. For such purposes, students must use the technological system put in place by the University to accredit their daily attendance at each of their classes. This system shall furthermore ensure that objective information is gathered regarding the active role of the student in the classroom. The failure to use the methods proposed by the University to demonstrate 50% attendance will give the professor the right to grade the course as a fail under the ordinary exam period. The foregoing does not affect other requirements of higher attendance percentages that each school may establish in their teaching guides or internal regulations.

Therefore, it is the authority of the professor that students who have not fulfilled the 50% of attendance in the ordinary call must pass all the evaluation tests in the extraordinary call, for which they must obtain a grade greater than or equal to 5.0 out of 10.0 in all of them (Faculty Board 11-07-23)."

There will be a final knowledge test that may consist in one or more of the following formats: multiple-choice test with 30 questions with 4 answers, only one of which is correct (each wrong answer will deduct 0.33 from the mark); short-question essay test: test of true/false questions and reasoning of the answer; long-question essay test or other assessment methodologies. The type of knowledge test will be announced on the virtual campus one month before the assessment takes place.

Use of cell phones or any other electronic device, during evaluation tests. Those students who are in a "suspicious" situation during the evaluation tests and who are carrying any electronic device (on or off) will be sanctioned according to the internal regulations of the University.
Plagiarism of the professor's intellectual property. Any means of recording (voice, image, presentations...), may be considered cause for sanction.
Disrespect (physical or verbal) to any member of the University (teaching staff, non-teaching staff or students).
In case of fraud, article 6.12 of the Evaluation Regulations of the official undergraduate degrees of the Universidad Europea de Madrid will be applied: “Any student that uses or benefits from unlawful means

during an evaluation test or that unduly attributes the author of the academic work required for the assessment will be graded as a "fail" (0) and may similarly be the object of a sanction, subject to the opening of disciplinary proceedings. In the case of the Final Graduation Project, the plagiarism or the lack of originality of the project, will automatically be graded as a "fail" (0) in the corresponding course in both ordinary and extraordinary periods. Likewise, the student will lose their status as a student during six months according with the General Standards for Graduation Projects and Master's Thesis in its Article 5." (https://universidadeuropea.com/resources/media/documents/6. Reglamento evaluacion titulaciones oficiales grado UEM v2.pdf)

7.2. Second exam period

In order to pass the course in the extraordinary call, a grade higher or equal to 5.0 out of 10.0 must be obtained in all the evaluable activities of the course.
The activities 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 activities failed or not done in the ordinary period will be recovered in person within the follow-up period of the subject, in the timetable set for this recovery.
The activities may vary in format or content, but always corresponding to the lesson or unit corresponding to the activity to be recovered.
As for the format of the recovery of the ordinary objective test, the format may vary. It will be announced in advance on the virtual campus.

9. SCHEDULE

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

Assessable activities	Deadline
Test Lessons 1 to 3	Week 4
Test Lessons 4 to 6	Week 9
X-ray laboratory - Intraoral and Clark techniques.	Week 10-11
Practical laboratory test	Week 11
Practical seminars	Week 12 a 14
Radiological anatomy	Week 14
X-ray test	Week 16
Integration of theoretical knowledge.	Week 18

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.

10. BIBLIOGRAPHY

The main reference work for this subject is:

- Poyton. H.G., Radiología Bucal. México.McGraw-Hill interamericana editores. 1996.

The recommended Bibliography is:

- Cavézian.R. y Pasquet.G., Diagnostico por la imagen en Odonto-estomatología. Barcelona. Masson.1993.
- Brocklebank L. Dental Radiology. Oxford
- Stafne. Diagnóstico radiológico en Odontología. Panamericana
- Goaz, White. Radiología Oral. Principios e Interpretación. Mosby.
- Brocklebank. Dental Radiology. Understanding the X-Ray Image. Oxford
- Pasler. Atlas de Radiología Odontológica. Masson-Salvat.
- Pasler F. Visser H. Pocket atlas of dental radiology. Thieme
- Whaites E. Essentials of dental radiography and radiology. Churchill Livingstone.
- Farman G. Panoramic radiology. Seminars on maxilofacial imaging and interpretation. Springer.
- Okeson. Dolor Orofacial según Bell. Quintessence.
- Joachim E. Zöller, Jörg Neugebauer, Cone-beam volumetric imaging in dental, oral and maxillofacial medicine: fundamentals, diagnostics and treatment planning Quintessence, 2008
- Miles, Dale A. Color atlas of cone beam volumetric imaging for dental applications. Hanover Park, IL: Quintessence Pub. 2008
- Ds X-Ray decision support for interpretation and clinical management of radiographic (CD).

11. 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@universidadeuropea.es

12. 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.