COURSE DATA

DATA SUBJECT

Code: 34690
Name: Radiology and radiation protection
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1206 - Degree in Dentistry	Facultat de Medicina i Odontologia	3	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1206 - Degree in Dentistry	Radiology and radiation protection	COMPULSORY

COORDINATION

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SUMMARY

The subject consists of two units: Radiology and Radiological Protection. Both units must be passed to pass the whole subject.

The radiographic unit includes training in oral radiology (intra and extra-oral) with special emphasis on the periapical series and orthopantomography. Students will also receive training in other techniques such as simple radiology, ultrasound, computed tomography, and magnetic resonance of the cervicofacial area.

The Radiation Protection Unit provides students with the basic technical and operational knowledge for the requirements listed in paragraph 10 set by the Nuclear Safety Council to obtain accreditation as a manager of an X-ray facility for medical and dental diagnosis – once the student has obtained a degree in dentistry.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

1206 - Degree in Dentistry

Obligation to have previously passed the subject(s)	34696 - Human anatomy 34697 - Biology 34698 - Human physiology 34699 - Biochemistry 34702 - Psychology and communication

OTHER REQUIREMENTS

COMPETENCES / LEARNING OUTCOMES

1206 - Degree in Dentistry

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 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.

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.

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.

Tomar e interpretar radiografías y otros procedimientos basados en la imagen, relevantes en la práctica odontológica.

DESCRIPTION OF CONTENTS

1. RADIOLOGY UNIT-THEORY-

1 (*). PHYSICAL CHARACTERISTICS OF X-RAY EQUIPMENTS. X-ray generator. Tube. Associated elements. The formation of the radiological image. Imaging systems. Radiographic film. Digital imaging. PACS.
(*) The contents of this topic are also part of the evaluation of the Radiation Protection Unit.

2. RADIOLOGY AND IMAGING. Concept. Imaging application in medical and dental radiology. Image formation. Procurement methods, support, storage and digitalization. Image processing. Background and clinical applications of conventional radiology. Computed axial tomography. Other techniques of diagnostic imaging.

3. RADIOLOGICAL TECHNIQUE of face and neck. Simple radiology. CT scans. Ultrasound. Computed Axial. Tomography. Sialography. Nuclear medicine.

4. INTRAORAL RADIOLOGICAL TECHNIQUE. Periapical, occlusal, Bitewing.

5. RADIOLOGICAL ANATOMY IN DENTAL AND OCCLUSAL RADIOGRAPHY. DENTAL ANATOMY. During development. For anatomical regions. Occlusal. Identification of anatomical structures in the intraoral radiography. Imaging. Image analysis. Recommendations for proper dental radiology.

6. RADIOLOGICAL TECHNIQUE AND RADIOLOGICAL ANATOMY IN DENTAL PANORAMIC DENTAL. Orthopantomography. Radiological anatomy. Recommendations.

7. GUIDELINES FOR PRESCRIPTION OFDENTAL RADIOGRAPHS. RADIOLOGY IN DENTAL EXPLORATION. In caries. In periodontal disease. Anomalies. In trauma.
the radiological technique of choice

2. RADIATION PROTECTION UNIT- THEORY-

8. BASICS: ATOMS AND RADIATION. The atom. The atomic nucleus. Mass and energy; units. Electromagnetic radiation. The electromagnetic spectrum.

9. X RAYS: PROPERTIES AND INTERACTION WITH THE MATTER. Nature of X-rays X-ray Production: bremsstrahlung and characteristic X-ray. The X-ray spectrum of the x-ray interaction with matter. Photoelectric effect and Compton effect. Attenuation, absorption and scattering of photons. Attenuation exponential law. Inverse square law of distance.

10. BIOLOGICAL EFFECTS OF RADIATION I. General aspects of the interaction of radiation with biological environment. somatic and genetic effects. deterministic effects and stochastic effects.

11. BIOLOGICAL EFFECTS OF RADIATION II. radiation-induced carcinogenesis. cellular response to radiation. Radiosensitivity of organs and tissues. Factors influencing cell response. Types of response. Early and late effects.

12. QUANTITIES AND RADIATION UNITS IN RADIOLOGY. Magnitudes of the issuer and of the radiation beam. Magnitudes of interaction: LET. dosimetric quantities: exposure and absorbed dose. Magnitudes of radiation protection: equivalent dose and effective dose. Magnitudes in patient dosimetry.

13. DETECTION AND MEASUREMENT OF RADIATION. Radiation Detection: types of detectors. Basic principles of detection. Properties detectors.

14. DETECTORS in diagnostic radiology. Ionization chambers. proportional counters and Geiger-Müller. Semiconductor detectors. Thermoluminescence dosimeters. Detectors used in radiodiagnostic dosimetry.

15. RADIATION PROTECTION. GENERAL CRITERIA. Concept and objectives of the Radiological Protection (PR). Fundamental principles of PR: justification, optimization and dose limitation. basic measures of PR. Competent bodies in PR.

3. RADIATION PROTECTION UNIT -THEORY- (continuation)

16. OPERATIONAL RADIATION PROTECTION. Introduction. exposed workers (TE): training and classification. Classification and signaling areas. Exposure assessment: monitoring and recording. TE health surveillance. Inspection and sanctions. Shields.

17. RADIATION PROTECTION IN FACILITIES OF DENTAL RADIODIAGNOSIS. Considerations: Common recommendations to all facilities. Equipment and techniques in dental radiology: intraoral radiography, extraoral radiography (cephalometric), ortopantomografía and digital radiology. Standards for patient protection in dental radiology. Organization and control.

18. QUALITY ASSURANCE IN FACILITIES OF DENTAL RADIODIAGNOSIS. Introduction. Quality control in diagnostic radiology. Quality assurance program in diagnostic radiology: general aspects. Action levels. Implementation of a quality assurance program. Quality indicators. Technical parameters of quality control equipment. Audits.

19. SPANISH APPLICABLE LEGISLATION TO FACILITIES OF DENTAL RADIODIAGNOSIS. Introduction to the national regulatory framework. Spanish legislation: basic laws. Basic Spanish legislation: regulations. Other standards of interest. Community legislation.

4. RADIOLOGY UNIT -PRACTICES-

1. DIGITAL SYSTEMS.

2. SYSTEMATIC READING OF RADIOLOGICAL IMAGES.

3. INTRAORAL RADIOGRAPHS.

4. DENTAL PANORAMIC X-RAY.

5. CONE BEAM COMPUTED TOMOGRAPHY AND MAGNETIC RESONANCE IMAGING.

RADIOLOGICAL SEMIOLOGY IN DENTISTRY.

5. RADIATION PROTECTION UNIT -PRACTICES-

1. DESCRIPTION AND MANAGEMENT OF RADIATION MONITORS AND DOSIMETERS.

2. VERIFICATION OF BASIC CONDITIONS OF RADIATION PROTECTION IN A DENTAL OPERATING ROOM.

3. QUALITY CONTROL OF X RAYS EQUIPMENT AND RADIATION BEAM.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	33,00
Odontology practices	5,00
Laboratory	22,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	5,00
Individual or group project	5,00
Independent study and work	45,00
Preparation of lessons	10,00
Preparation for assessment activities	20,00
Resolution of case studies	5,00
Total hours	**90,00**

TEACHING METHODOLOGY

Theoretical classes are based on a presentation by the lecturers with some participation by students. Appropriate support elements will be provided through the virtual classroom.

The aim of the practical classes is the acquisition of skills in the use of equipment and measuring instruments, as well as the processing and/or interpretation of results relating to programme content.

The tutorials are based on personal interviews with the students involved, or in electronic consultation (via e-mail).

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

EVALUATION

Radiology Unit
Final Exam: Total 6 points

· 20 short-answer questions, not multiple choice. Each correct answer scores 0.15 (incorrect answers do not subtract points, and partial answers are not accepted). Value: 3 points

· 20 IMAGES, each correct answer scores 0.15 (incorrect answers do not subtract points, and partial answers are not accepted). Value: 3 points

Continuous Assessment (maximum 4 points):
1.- A 10-question multiple choice test on theory and practical lessons covered up to the date of the test. Incorrect answers do not subtract points. Value: 1 point
2.- At the end of Practical 6, there will be a continuous assessment test on RADIOLOGICAL IMAGES: 20 images, each correct answer scores 0.15 (incorrect answers do not subtract points, and partial answers are not accepted). Value: 3 points

Radiological Protection Unit
This unit has two aspects with different requirements for evaluation:

1.- **Degree course subject**: Total value 10 points

· Exam: 60 multiple-choice questions. At least 75% must be answered correctly. Incorrect answers do not subtract points. This section, once 45 or more correct answers are achieved, will account for 9 out of 10 points of the final grade.

· Attendance at Laboratory Practices as stated in the final paragraph common to both units

· Practice assessment: 1 point

2.- **Certification as Director of X-ray Facilities for Dental Medical Diagnostic Purposes from the Nuclear Safety Council (CSN).** Evaluation: Pass
In addition to meeting the requirements to pass the course, the following must also be fulfilled:

· Register at least 90% attendance at theoretical classes

· 100% attendance at practical sessions

· Submit the practice reports

IMPORTANT NOTE: Therefore, if the requirements of this aspect of the subject, which are those demanded by the CSN for the issuance of the certificate, are not met, it is possible to pass the subject (if the course requirements are met), but not to obtain the **CSN certification**.

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