COURSE DATA

DATA SUBJECT

Code: 34462
Name: General radiology
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1204 - Degree in Medicine	Facultat de Medicina i Odontologia	3	Second quarter
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SUBJECT-MATTER

Degree	Subject-matter	Character
1204 - Degree in Medicine	Procedimientos diagnósticos y terapéuticos	BASIC
1204 - Degree in Medicine	Procedimientos diagnósticos y terapéuticos	BASIC

COORDINATION

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DUALDE BELTRAN DIEGO

SUMMARY

Theoretical and practical training of future doctors in the field of General Radiology (techniques and equipment, general anatomy), Radiation Oncology and Physical Medicine-Rehabilitation.

By the end of the course, the student should have acquired:

- Basic knowledge of the fundamentals and principles of Medical Physics, Radiotherapy Oncology, Radioprotection and the techniques used in diagnostic imaging (Radiodiagnosis).
- Knowledge of the different aspects of disability, its diagnosis and treatment, as well as the promotion of personal autonomy, functional adaptation to the environment and the therapeutic use of physical agents.
- Knowledge of the basic principles and scope of application of radiotherapy, as well as the

different therapeutic irradiation modalities.

Article 6.2 of the Law on the Organisation of Health Professions states: "Graduates in Medicine are responsible for indicating and carrying out activities aimed at the promotion and maintenance of health, the prevention of illnesses and the diagnosis, treatment, therapy and rehabilitation of patients, as well as the judgement and prognosis of the processes that are the object of their care".

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

It is recomended to have passed "Anatomy"

COMPETENCES / LEARNING OUTCOMES

1204 - Degree in Medicine

Acknowledge diversity and multiculturality.

Acquire properclinical experience in hospitals, health care centres and other health institutions, under supervision, as well as basic knowledge of clinical management focused on the patient and the correct use of tests, medicines and other resources available in the health care system.

Assesses indications and contraindications of radiological studies.

Be able to formulate hypothesis, gather information and evaluate it critically in order to solve problems by following the scientific method.

Capacity for communicating with professional circles from other domains.

Consideration of ethics as a fundamental value in the professional practise.

Criticism and self-criticism skills.

Establish a good interpersonal communication which may allow professionals show empathy and talk to the patients efficiently,as well as to their relatives, the media and other professionals.

Establish the diagnosis, prognosis and treatment, applying principles based on the bestinformation available and on conditions of clinical safety.

Evaluate the risk-benefit balance of diagnostic and therapeutic procedures.

Have the capacity to make an initial diagnosis and establish a reasonable strategy of diagnosis.

In the professional practise, take a point of view which is critical, creative, constructive and research-oriented.

Is able to apply radiological protection criteria within the diagnostic and therapeutic procedures with ionising radiation.

Is able to interpret a radiological image through systematic reading.

Is aware of the indications in biochemical tests, as well as haematological, immunological, microbiological, anatomical and pathological, and image tests.

Keep and use medical records which contain information about the patient for later analysis, preserving the confidentiality of personal data.

Know how to use IT in clinical, therapeutic and preventive activities, and those of research.

Know how to use the sources of clinical and biomedical information available, and value them critically in order to obtain, organise, interpret and communicate scientific and sanitary information.

Knows other techniques to obtain diagnostic image.

Knows the foundations of radiation interaction with the human body.

Proper organisation and planning of the workload and timing in professional activities.

Team-working skills and engaging with other people in the same line of work or different.

Understands the foundations of basic radiological semiology of various organs and systems.

Understand the foundations of action, indications and efficacy of therapeutic interventions, based on available scientific evidence.

Understand the importance and the limitations of scientific thinking in the study, prevention and management of diseases.

Working capacity to function in an international context.

DESCRIPTION OF CONTENTS

THEORY.

The content of the subject includes medical physics, radiation oncology, radiodiagnosis and rehabilitation-physical medicine

INTRODUCTION.

1. Information and general course plan.

MEDICAL PHYSICS.

2. Electromagnetic radiation. Genesis of REM. Electromagnetic spectrum. Energy and intensity: importance in diagnosis and therapy. REM interaction. Interaction mechanisms. Photoelectric effect, Compton and creation of pairs. Dual nature of REM.

3. Physical foundations of X-rays: Origin and properties of X-rays. Spectrography with X-rays. Continuous spectrum. Duane-Hunt law. Characteristic spectrum. Moseley's Law. Microanalysis with X-rays. Formation of the radiological image. Radiological contrast.

4. Nuclear structure and radioactivity: The atomic nucleus: its constitution. Characterization and classification of nuclear species. Mass defect and binding energy. Radioactivity. Laws and constant characteristics. Types of radioactive emission. Radioactive balance. Isotopic generators.

5. Dosimetry of ionizing radiation: linear energy transfer and specific ionization. Exposure. Absorbed dose. Kerma. Equivalent dose. Radiation weighting factors. Effective dose. Tissue weighting factors. Radiological patient magnitudes

RADIATION ONCOLOGY.

6. Radiological protection. General criteria: need and concept. Fundamental principles. Justification, optimization and dose limitation. Basic measurements.

7. Radiotherapy: concept, scope, purpose and objectives. Effects of radiotherapy on tumors and conditioning factors. Dosage in radiotherapy: criteria and requirements. Protraction and conventional fractionation.

8. Unconventional subdivisions. New Radiotherapy techniques

9. Tolerance to radiotherapy. Tumor control vs. morbidity: therapeutic index. Most frequent side effects of radiotherapy: diagnosis, toxicity scales, evaluation criteria and treatment.

10. Stages in the radiotherapy process: objective and equipment Radiotherapy application techniques: types, characteristics, equipment and general indications.
Indications for radiotherapy in the comprehensive treatment of cancer patients.

11. Foundation and strategies of combinations of Radiotherapy with other treatments (surgery, chemotherapy, hormone therapy, immunotherapy). Most common dosage intervals.

12. Digestive Tumors, Sarcomas, Hematological Tumors, Head and Neck.

13. Radiotherapy in breast cancer, brain tumors, prostate cancer, lung cancer.

RADIODIAGNOSIS.

14. Introduction to radiology: concept and historical evolution. Content and scope of application.

15. Conventional radiography: concept, image types and general indications. Ultrasound: concept, types of image.

16. Computed Tomography (CT): concept and general indications. Semiology. CT angiography.

17. Magnetic resonance imaging (MRI): concept, image types.

REHABILITATION-PHYSICAL MEDICINE.

18. Concept of Physical Medicine and Rehabilitation. Promotion of personal autonomy, quality of life and adaptation to the environment. The WHO ICF. The rehabilitation process: clinical-medical and medical-social tasks. Medical diagnosis and assessment of the patient with disabilities, prognosis and medical treatment protocol, functional assessment and ADL. Quality of life.

19. Therapeutic resources: non-ionizing physical therapeutic agents and means (electrotherapeutic, electromagnetic, thermotherapeutic, cryotherapeutic, phototherapeutic, kinesiological, hydrotherapeutic and orthoprosthetic means (medical prescription and indication of technical aids, gait aids, and support products). Logophoniatric and occupational means.

20. Diagnosis, prognosis and medical and rehabilitative treatment of immobilization syndrome and general traumatological and surgical syndrome. Orthopedic rehabilitation.

21. Diagnosis, prognosis and medical and rehabilitative treatment of cardiac and respiratory syndromes. Respiratory rehabilitation program.

22. Diagnosis, prognosis and medical and rehabilitative treatment of neurological syndromes: injuries of the central and peripheral nervous system: stroke, brain damage, spinal cord injury, neurodegenerative diseases.

23. Diagnosis, prognosis and medical and rehabilitative treatment of pain and musculoskeletal syndromes: spinal pain and spinal disorders, fibromyalgia and myofascial syndrome.

24. Vascular rehabilitation: Lymphedema. Amputees

SEMINARS

1. Medical Physics Seminar I: exercises. Radiophysics in radiotherapy. (1st part)

2. Medical Physics Seminar II: exercises. Radiophysics in radiotherapy. (2nd part)

3. Medical Physics Seminar III: physical aspects of calculating treatments in radiotherapy.

4. Basic aspects of reading and radiological semiology (radiography, ultrasound, CT and MRI). Bone densitometry: procedures and indications. (1st part)

5. Basic aspects of reading and radiological semiology (radiography, ultrasound, CT and MRI). Bone densitometry: procedures and indications. (2nd part)

6. Basic aspects of image-guided therapy. Diagnostic and interventional procedures, vascular and non-vascular.

7. Integration of radiotherapy in the treatment of Head and Neck tumors. Learning based on clinical cases.

8. Integration of radiotherapy in the treatment of Lung tumors. Learning based on clinical cases.

9. Integration of radiotherapy in the treatment of digestive tumors. Learning based on clinical cases.

10. Integration of radiotherapy in the treatment of gynecological and urological tumors and the role of brachytherapy in its treatment. Learning based on clinical cases.

11. Integration of radiotherapy in the treatment of breast cancer. Learning based on clinical cases.

12. Integration of radiotherapy in the treatment of CNS tumors. Learning based on clinical cases.

13. Indications for palliative radiotherapy. Indications for radiotherapy in non-neoplastic diseases.

14. Rehabilitation: Practical cases of musculoskeletal pathology. (1st part)

15. Rehabilitation: Practical cases of musculoskeletal pathology. (2nd part)

CLINICAL AND LABORATORY PRACTICES

HOSPITAL CLINICAL PRACTICES.
During the hospital practices, students will be taught, according to the resources of each hospital:

1. Recognition of the various treatment techniques with Radiotherapy.
2. Recognition of the various exploration and treatment techniques in Rehabilitation.

3. Recognition of the various Radiodiagnosis techniques
4. Structure and functions of a Radiological Protection and/or Radiotherapy service.

MEDICAL PHYSICS LABORATORY PRACTICES

1. Study of the laws of attenuation of electromagnetic radiation.
2. Experiences with X-rays. Radiological contrast.
3. Radioactive balance: isotopic generators.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	26,00
Seminars	20,00
Laboratory	9,00
In-class tutorials	0,00
Clinical practice	20,00
Total hours	**75,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	0,00
Independent study and work	55,00
Preparation of lessons	15,00
Preparation for assessment activities	0,00
Resolution of case studies	5,00
Preparation of supplementary reports	0,00
Preparation of the internship report and evaluation of the internship	0,00
Total hours	**75,00**

TEACHING METHODOLOGY

- Theoretical classes supported by audiovisual material available to students in the virtual classroom.
- Practical seminar classes taught in hospitals, with proposed clinical cases and problems to be addressed in the classroom.
- Laboratory practice with a practice guide available to students in the virtual classroom prior to the practice, including a breakdown of the theoretical foundation, objectives, results to be obtained, and a results sheet with graphs and values obtained in each practice.
- Clinical practice in hospital-based Radiodiagnosis and/or Radiation Oncology and/or Physical Medicine-Rehabilitation Services, participating in the usual activities of these services.

A gender perspective, respect for diversity, and the Sustainable Development Goals (SDGs) will be incorporated into teaching, whenever possible.

EVALUATION

- To pass the subject it is necessary:
  - Pass the final evaluation with a grade equal to or greater than 5.
  - Attend 80% of the hospital practices.
  - Attend 80% of the laboratory practices and seminars
- Attendance at practical activities (hospital clinical practices, medical physics laboratory practices and seminars) is mandatory. The student is considered to meet this requirement if he or she has attended a minimum of 80% of these activities and has adequately justified the impossibility of attending the remaining sessions due to the occurrence of a cause of force majeure. Unjustified non-attendance in 80% of them will mean the impossibility of passing the subject.
- The final evaluation (continuous evaluation and final exam) will include 50% theoretical content and 50% practical content. To pass it, you must obtain a grade equal to or greater than 5, out of 10 total points.
- Continuous evaluation (1 point out of 10): on the study of 4 clinical cases and assessment of these cases through an exam of 8 questions, 2 for each clinical case. The questions will be test type with multiple choice answers (4 possible answers and only one correct).
- Final exam (9 points out of 10): 64 multiple choice questions with multiple choice answers (4 possible answers and only one correct one), on theoretical topics, seminars and laboratory and clinical practices.
- In all multiple choice exams, for every three wrong answers, 1 valid answer is deducted.
- If a student attends 80% of the practices and fails the final evaluation, the approved practices will be kept for one more year. If you enroll for a third time in the subject, you must attend again to 80% of the practices.

Students are reminded of the importance of carrying out evaluation surveys to all teaching staff of the degree subjects.

REFERENCES

- FÍSICA MÉDICA

1. CAMERON J.R., SKOFRONICKJ.G. Medical Physics. Ed. John Wiley and Sons, New York, 1978.
2. CATALA J. Física. Ed. Cometa SA, Madrid 1988.
3. FRUMENTO A.S. Biofisica,3ª Edición. Ed. Mosby / Doyma Libros, Madrid 1995.
4. GREMY F (ed). Biophysique. Ed. Flammarion Medicine-Sciences,1982.
5. KANE J.W. STERNHEIM M.M., Física, 2ª Edición. Ed. Reverte, Barcelona 1989.
6. STROTHER G.K. Física Aplicada a las Ciencias de la Vida. 2ª Edición. Ed. McGraw-Hill, Bogotá 1977.
7. DALMASES F, ROMERO C. Fundamentos físicos de la protección radiológica en odontología. Publicaciones de la Universidad de Valencia, 2016

ONCOLOGÍA RADIOTERÁPICA:

1. Calvo, Felipe; Oncología radioterápica: Principios, métodos, gestión y práctica clínicas. Arán Ed.
2. Lara, Pedro: Principios generales del cáncer. Arán Ed.
3. Pérez, Carlos: Principles and Practice of Radiation Oncology. Lippincott, Williams and Wilkins Ed.
4. Clifford Chao, K.S.: Radiation Oncology Management Decisions. Walters, Kluwer and Lippincott, Williams and Wilkins Ed.
5. D.Rizo Potau, A.Nájera López, M. Arenas Prat. Conocimientos básicos de Oncología Radioterápica para la enseñanza Pre-grado. Ediciones de la Universidad de Castilla-La Mancha 2016.DOI: http://dx.doi.org/10.18239/man_09.2016.01 .

RADIOLOGÍA:

1. SERAM, Radiología esencial. Ed. Médica Panamericana. 2ª edición 2019.

MEDICINA FÍSICAY REHABILITACIÓN:

1. Manual SERMEF de Medicina Física y Rehabilitación. Sánchez, I. et al.Ed. Panamericana. Madrid. 2006.
2. Rehabilitation medicine. Principles and practice. DeLisa, JA. y Grans, BM. JB. Lippincot Cº.5ª ed. Philadelphia. 2010.
3. Physical Medicine & Rehabilitation. Braddom, RL. et al. Philadelphia. WB Saunders Cº. 2016.
4. Frontera W, Silver J, Rizzo T. Essentials of Physical Medicine and Rehabilitation Musculoskeletal Disorders, Pain, and Rehabilitation. Elsevier. 2018.
5. Hernández D, Jiménez F, Vázquez MJ. Manual básico para residentes de Medicina Física y Rehabilitación. Edición online. 2019

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