UAB
Universitat Autònoma de Barcelona

Clinical Radiology

Code: 102929
ECTS Credits: 6

2024/2025

Degree	Type	Year
2502442 Medicine	OB	3

Contact

Name: Jordi Giralt Lopez De Sagredo

Email: jordi.giralt@uab.cat

Teachers

Luis Berna Roqueta

Ricardo Perez Andres

Alberto Flotats Giralt

Teaching groups languages

You can view this information at the end of this document.

Prerequisites

It is advisable to have "Biofísica and Anatomia Humana I and II" completed.

The student will commit to preserve the confidentiality and professional secrecy of the data he or she may access during clinical training. The student will be have according to professional and ethical standards.

Objectives and Contextualisation

"RADIOLOGIA I MEDICINA FÍSICA" "

KNOWLEDGE CONTENTS: Electromagnetic radiation. Basic concepts. Interaction between radiation and the human being. Detection and measurements of radiation. Radioprotection. Image formation. Contrast media. Radiologic technics. Interpretation of images: systematic reading and basic semiology. Echography. Basic concepts. Instrumentation. Image modalities. Doppler ultrasonography. Semiology and indications. Magnetic resonance. Basic concepts. Semiology and indications.

Radiology of the thorax, abdomen, gastrointestinal tract, bone and joins, kidney and urinary tract, nervous system, cardiovascular system. Obstetrics gynecology and breast. Interventional

radiology. Pediatric radiology. Radioisotopes in medicine, radiotracers and radiopharmaceuticals. Morphologic and functional studies with isotopes. SPECT, PET and other technics. Semiology and indications.

Radiotherapy. Response of normal tissues. Tumoral response. Technics for radiotherapy.

ABILITIES: The student will be able to identify the normal anatomic structures and to detected abnormalities in the thorax X-RAY, abdomen and bone structures.

To identify basic semiology in abdominal echography, CT and MR of the thorax, abdomen, and brain. To describe measures of radioprotection.

Under appropriate tutorship, the student will identify the radiological signs of the most prevalent diseases, and will stablish the diagnosis in case of vital risk.

The student will follow procedures of interventional radiology performed by an expert. The student will evaluated radiation therapy fields in various tumors.

The student will evaluated safety and protection in a radiology and nuclear medicine departments.

The student will developed professional and ethical values, and communication skills. The student will learn to handle properly information and will develop critical analysis and research skills.

Competences

- Communicate clearly, orally and in writing, with other professionals and the media.
- Convey knowledge and techniques to professionals working in other fields.
- Critically assess and use clinical and biomedical information sources to obtain, organise, interpret and present information on science and health.
- Demonstrate an understanding of the fundamentals of action, indications, efficacy and benefit-risk ratio of therapeutic interventions based on the available scientific evidence.
- Demonstrate basic research skills.
- Demonstrate knowledge and understanding of descriptive and functional anatomy, both macro- and microscopic, of different body systems, and topographic anatomy, its correlation with basic complementary examinations and its developmental mechanisms.
- Demonstrate understanding of the manifestations of the illness in the structure and function of the human body.
- Demonstrate understanding of the structure and function of the human organism in illness, at different stages in life and in both sexes.
- Demonstrate, in professional activity, a perspective that is critical, creative and research-oriented.
- Formulate hypotheses and compile and critically assess information for problem-solving, using the scientific method.
- Indicate the basic diagnosis techniques and procedures and analyse and interpret the results so as to better pinpoint the nature of the problems.
- Maintain and sharpen one's professional competence, in particular by independently learning new material and techniques and by focusing on quality.
- Maintain and use patient records for further study, ensuring the confidentiality of the data.
- Use information and communication technologies in professional practice.

Learning Outcomes

1. Apply the criteria of radiation protection in diagnostic and therapeutic procedures with ionising radiation.
2. Assess the indications and contraindications of radiological studies.
3. Communicate clearly, orally and in writing, with other professionals and the media.

4. Convey knowledge and techniques to professionals working in other fields.
5. Demonstrate basic research skills.
6. Demonstrate, in professional activity, a perspective that is critical, creative and research-oriented.
7. Describe the basic radiological semiology of the different body systems.
8. Describe the principles behind the interaction of radiation with the human organism.
9. Differentiate between images of normality and those of abnormality.
10. Explain the use of the different imaging techniques.
11. Formulate hypotheses and compile and critically assess information for problem-solving, using the scientific method.
12. Identify images that do not correspond to normal variants.
13. Identify the indications of imaging tests.
14. Identify the principles and indications of radiotherapy.
15. Indicate diagnostic imaging tests.
16. Indicate other techniques for obtaining diagnostic images.
17. Interpret a radiological image by systematic reading.
18. Interpret diagnostic imaging reports (radiological image, among others).
19. Maintain and sharpen one's professional competence, in particular by independently learning new material and techniques and by focusing on quality.
20. Make correct use of information sources, including textbooks, atlas images, internet resources and other specific bibliographic databases.
21. Make correct use of the international nomenclature.
22. Perform and interpret and electrocardiogram and an electroencephalogram.
23. Understand the basic principles of diagnostic imaging.
24. Use information and communication technologies in professional practice.

Content

1. General descriptions

2. Topics in radiology

3. Topics in nuclear medicine

4. Topics in radiotherapy

    1. Introduction to Radiology and Physical Medicine. Biophysical fundamentals of diagnostic imaging methods. Electromagnetic waves in medicine. Classification of ionizing radiation.
    2. Nuclear Medicine (NM): Radioactivity. Radioactive isotopes. Activity. Effective period. Types and forms of application of radioactive isotopes. Positron emission tomography (PET).
    3. Radiology. X-rays. Production. Spectrum. Modulation in quality and quantity. Attenuation coefficient. Radiological densities. Analogical images and digital images. Contrast media.
    4. Computed Tomography (CT): Image acquisition. CT values. Advantages and disadvantages.
    5. Ultrasound (US): Image acquisition. Sonic interfaces. Ultrasound patterns. Doppler effect.
    6. Magnetic Resonance Imaging (MRI): Image acquisition. Enhancements of magnetic resonance images. Advantages and disadvantages.
    7. Radiobiology (RB): Molecular lesions. Effects at the cellular level. Repair mechanisms. Biological effects at tissue level.
    8. Radiotherapy and Radioprotection (RT): Fundamentals of clinical radiotherapy. Dosimetry. Irradiation techniques. Radioprotection mechanisms.
    9. Radiology of the normal thorax. Projections. Vessels. Cystic fissures. Hilar anatomy.
    10. Pulmonary radiological semiology: Alveolar pattern. Diffuse lesions. Pulmonary hyperclarity. Lobar and pulmonary atelectasis.
    11. Pulmonary radiological semiology: Pulmonary nodule and mass.
    12. Radiological study of the pleura: Pleural effusion. Pneumothorax. Pachypleuritis.
    13. Radiological study of the diaphragm and rib cage.Diaphragmatic alterations. Pathology of the thoracic cage.

14. Radiological study of the mediastinum and heart. Radiological anatomy. Diaphragm. Cardiac anatomy.
15. Radiological pathologyof the mediastinum. Pneumomediastinum. Mediastinal masses. Mediastinal widening.
16. Radiological pathology of the heart and aorta. Alterations of the size and morphology of the heart. Aortic, valvular and pericardial pathology.
17. Cardiac Nuclear Medicine:Coronary perfusion. Myocardial ischemia. Acute myocardial infarction. Ventricular function.
18. Complementation contents
19. Abdominal radiological studies.Abdominal radiological anatomy. Liver and biliary tract. Pancreas and retroperitoneum. Spleen.
20. Radiological pathology of the abdomen: Intra and extraluminal air. Ascites. Mechanical obstruction. Paralytic ileus. Abdominal masses.
21. Radiological pathology of the digestive system:Caliber changes. Repletion defects, ulcers and diverticula. Mucosal alterations.
22. Radiological pathology of the abdominal viscera:Changes in shape and size. Focal lesions. Diffuse pathology. Pathology of the biliary tract.
23. Liver. Spleen and pancreas.
24. Basic craniofacial radiological semiology.Normal radiological anatomy.
25. Radiological pathology of the brain. Displacements. Malformations. Supratentorial pathology. Infratentorial pathology. Vascular disorders.
26. Radiological pathology of the spinal cord. Malformations. Degenerative lesions. Tumor lesions.
27. Nuclear Medicine in Neurology and Urology: Applications of planar Nuclear Medicine, SPECT and PET.
28. Radiological anatomy of the kidney, urinary tract and genital system. Anatomical variants of the excretory system. Radiological anatomy of the female and male genital system.
29. Radiological pathology of the kidney and urinary tract: Congenital malformations. Renal lithiasis and tract. Cysts. Hydronephrosis. Inflammatory pathology of the kidney. Abscesses and renal masses. Inflammatory and tumoral pathology of the bladder. Pelvic pathology.
30. Complementation of contents
31. Radiological anatomy of bones and joints. Includes spine.
32. Radiological pathology of bones:Lesions that increase density. Lesions that decrease density. The solitary lesion. Alterations of the periosteum. Fractures.
33. Radiological pathology of joints and spine: Degenerative joint disease. Arthropathies. Inflammatory lesions. Degenerative lesions. Discopathies. Alterations of shape.
34. Osteorticular nuclear medicine: Normal bone scan. Osteoarticular pathology. Benign bone lesions. Bone tumors and metastatic disease.
35. Nuclear medicine Diagnostic imaging of the endocrine system.
36. Nuclear Medicine and Oncology: SPECT-CT and PET-CT: Applications of Nuclear Medicine to Oncology.
37. Radiation Oncology
38. Complementation of contents

Seminars

All seminars consists on clinical cases for groups of10-12 students. The attendance will be mandatory

1. Radioprotection
2. Breast and gynecology
3. Retro peritoneum and large vessels
4. Pediatric radiology
5. Interventional radiology

6. Nuclear medicine
7. Radiotherapy

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Clinical care practices (PCAh)	15	0.6	1, 3, 5, 6, 9, 4, 23, 22, 13, 16, 15, 18, 17, 21, 20, 24
Clinical case seminars (SCC)	15	0.6	1, 8, 7, 9, 23, 10, 14, 12, 13, 16, 15, 18, 17, 20, 2
Contents given as oral lectures (Theory)	38	1.52	1, 8, 7, 9, 23, 10, 11, 14, 12, 13, 16, 15, 18, 17, 2
Type: Autonomous			
Preparations for written works, self-study and reading articles/reports of interest	74.5	2.98	8, 9, 23, 22, 11, 13, 16, 17, 19, 21, 20, 24

This guide describes the frame, contents, methods and general rules of Clinical Radiology, following the current plan in the University. The organization of Clinical Radiology regarding the size and number of groups, calendar distribution, evaluation dates, evaluation criteria, and evaluation reviews will be define in each of the "Unitats Docents Hospitalaries (UDH). Such rules will be available on the respective web sites and will be explaine the first day of the course by the responsible professors in the respective UDHs. Currently, the responsible professors as designed by the Departments at each UDH are: "Medicina Responsable de Facultat": Jordi Giralt "Responsables" UDH UD Vall d'Hebron: Jordi Giralt UD Germans Trias i Pujol: Ricard Pérez Andrés UD Sant Pau: Alberto Flotats Giralt UD Parc Taulí: Lluis Bernà Roqueta

Oral lectures: 38 topics are programmer. The teacher will present each topic in detail, to expose the students to the full contents.

Clinical practice: 15 hours (3 hours x 5 days) will be offer. The teacher will present series of demonstrative clinical cases. The students will discuss the findings and will learn the appropriate image reading methodology, as well as the diagnostic value in the clinical context of the patients. The attendance will be mandatory

Seminars: 15 hours will be programmer. The students will review, together with the teacher, different key topics in Clinical Radiology, learning the contents, discussing clinical indications and clinical applications. Tutorships: under defined mentorship, the students will prepare and discuss case examples in diagnosticimaging. The attendance will be mandatory

Autonomous activities: the students will prepare the contents of Clinical Radiology following the recommended bibliography and preparing all programmed activities.

In the current exceptional circumstances, at the discretion of the teachers and also depending on the resources available and the public health situation, some of the theoretical classes, practicals and seminars organized by the Teaching Units may be taught either in person or virtually.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Practical evaluations: Objective and	30%	4	0.16	1, 3, 9, 22, 11, 13, 16, 15, 18, 17, 24
Written evaluations: objective tests: Multiple choice questions	70%	3.5	0.14	1, 5, 6, 8, 7, 9, 4, 23, 10, 14, 12, 19, 21, 20, 24, 2

This subject does not provide for the single assessment system

The continuous evaluation of the subject will be carried out through:

- Two partial exams, each of which will have a weight of 45% of the final grade of the subject. Each partial exam will include a theoretical part (35%) and a practical part (10%), using multiple choice questions and/or short questions.

- The evaluation of the internships, which will take into account the attendance and participation in the internships and seminars, with a weight of 10% of the final mark of the subject.

Therefore, the practical part will have a weight of 30% of the final mark of the subject

If the student does not appear in the partial exams, he will be considered "Not Evaluable".

For students who have not passed the subject through continuous assessment, they can sit a final remedial exam, with the same characteristics as the partial exams.

Bibliography

- Diagnóstico por imagen. Compendio de Radiologia Clínica. César S. Pedrosa, Rafael Casanova. Interamericana McGraw-Hill, 1995

- Atlas y texto de imágenes radiológicas clínicas. Weir J, Murray AD. Harcourt Brace de España SA. 1999

- Fundamentos de TAC body. Webb RW, Brand WE, Helms CA. Marban Libros SL, 1999

- Radiologia de Tórax Felson B. ED SAlvat. Barcelona

- Abdomen Agudo Felson B, Ed Toray

- Fundamentos de Radiologia Noveline RA. Masson, Barcelona, 2000

- Radiologia del Sistema óseo Edeiken J. Ed Salvat, 1997

- Radiologia Gastrointestinal Eisenberg RL. Marban Ed. 3, 1997

- Radiologia del aparato Genitourinario Barbaric ZL. Marban Ed, 2 1995

- Torax. "FELSON. Principios de Radiologia Torácica: un texto programado". Autor. Lawrence R. Goodman. Editorial MC Graw Hill

- Radiologia Esencial. SERAM. Editorial Panamericana, 2010

- Medicina Nuclear. Aplicaciones clínicas. Ed. Carrió, González. Masson, 2003

- Medicina Nuclear en la práctica clínica. Ed. Soriano Castrejón, Martín Comín, García Vicente. Biblioteca Áula Médica SL, 2009

- Radioterapia en el tratamiento del cáncer. Biete Solá, Alberto. Doyma: 1990.

- Principies and practice of Radiation Oncology. (3rd edition). Pérez CA; Brady LW. Edits. Lippincott-Raven publishers. Philadelphia. New York. 1998

- Radiology for the radiologist. HAll, Enric J. Lippincott Williams & Wilkins: 20000(5th edition)

- http://campusvirtual.uma.es/rgral/ameram.html

- http://www.radiologico.org/archivo/index.php

- http://www. e-anatomy.org

- http://www.e-mri.org

-

Software

No specific software required

Language list

Information on the teaching languages can be checked on the CONTENTS section of the guide.