Information about the subject

Degree: Bachelor of Science Degree in Medicine

Faculty: Faculty of Medicine and Health Sciences

Code: 340312 **Name:** Radiodiagnostic and Imaging Techniques

Credits: 6,00 **ECTS Year:** 3 **Semester:** 1

Module: Diagnostic and therapeutical procedures.

Subject Matter: Diagnostic procedures **Type:** Compulsory

Field of knowledge: Health Science

Department: -

Type of learning: Classroom-based learning

Languages in which it is taught: Spanish

Lecturer/-s:

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Module organization

Diagnostic and therapeutical procedures.

Subject Matter	ECTS	Subject	ECTS	Year/semester
Diagnostic procedures	39,00	Basic Immunology	3,00	1/2
		Functional Assessment	6,00	This elective is not offered in the academic year 23/24
		Genetics	3,00	1/1
		Introduction to Medicine	3,00	1/2
		Laboratory of Diagnostic Tests	3,00	5/1
		Medical Microbiology and Parasitology	6,00	3/1
		Pathological Anatomy	6,00	2/2
		Physiological Records and Functional Tests	3,00	2/2
		Radiodiagnostic and Imaging Techniques	6,00	3/1
Therapeutic procedure	27,00	Anaesthesia and Resuscitation	3,00	5/1
		Biotechnology	6,00	This elective is not offered in the academic year 23/24
		General and Special Pharmacology	9,00	3/2

Therapeutic procedure	General Procedures of Intervention	6,00	This elective is not offered in the academic year 23/24
	Rehabilitation and Physical Therapy	3,00	4/2

Recommended knowledge

Pre-requisites: knowledge of descriptive and topographic human anatomy.

Learning outcomes

At the end of the course, the student must be able to prove that he/she has acquired the following learning outcomes:

R1	Apply the concepts learned in the subject to the resolution of simple clinical cases
R2	Know the physical bases of the different imaging modalities, as well as their clinical indications.
R3	Recognize with the different imaging techniques the morphology and structure of tissues, organs and systems.
R4	Know the basic radiological semiology of fundamental injuries.
R5	Know the main findings with the different imaging techniques in large clinical syndromes.
R6	Assess the indications and contraindications of imaging techniques.
R7	Assess the risk-benefit ratio and costs of diagnostic procedures.
R8	Know the fundamentals in Radiobiology and radiological protection.
R9	Know and manage radiological language.
R10	Know the installations and basic operation of the different diagnostic modalities by the image.
R11	Know the patient's management in the Radiodiagnosis Service.
R12	Know the global organization and operation of the Radiodiagnosis Service.
R13	Know the systems of acquisition, file and visualization of radiological images.
R14	Using different working techniques at the seminar
R15	Apply general knowledge of human anatomy and physiology.

R16 Search for bibliographic information from different sources and know how to analyze it in a critical and constructive spirit.

R17 Be able to produce documents on functional tests and physiological records and work as a team.

R18 Be able to write understandable and organized text on various aspects of functional tests.

R19 Correctly interpret the specific characteristics of medical language.

R20 Argue with rational criteria based on your work.

R21 Search for bibliographic information from different sources and know how to analyze it in a critical and constructive spirit.

R22 Being able to write an understandable and organized text on various medical topics

Competencies

Depending on the learning outcomes, the competencies to which the subject contributes are (please score from 1 to 4, being 4 the highest score):

BASIC		Weighting			
		1	2	3	4
CB1	Students have demonstrated to possess and understand knowledge in a study area that starts from the base of the general secondary education, and is usually found at a level that, while supported by advanced textbooks, also includes some aspects that involve knowledge from the forefront of their field of study				x
CB2	Students know how to apply their knowledge to their job or vocation in a professional way and possess the competences that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of ??study				x
CB3	Students have the ability to collect and interpret relevant data (usually within their area of study) to make judgments that include a reflection on relevant social, scientific or ethical topics				x
CB4	Students can pass on information, ideas, problems and solutions to both a specialized and non-specialized audience				x
CB5	Students have developed the learning skills needed to undertake further studies with a high degree of autonomy				x

GENERAL		Weighting			
		1	2	3	4
CG1	Recognizing the essential elements of the medical profession, including ethical principles, legal responsibilities, and patient-centered professional exercise				x
CG2	Understanding the importance of such principles for the benefit of the patient, society and profession, with special attention to professional secrecy				x
CG3	Knowing how to apply the principle of social justice to professional practice and understanding the ethical implications of health in a changing global context		x		

CG4	Developing professional practice with respect to patient autonomy, beliefs and culture				x
CG5	Recognizing the limitations themselves and the need to maintain and update their professional competence, giving special importance to the autonomous learning of new knowledge and techniques and to the motivation for quality				x
CG6	Developing professional practice with respect for other health professionals, acquiring teamwork skills				x
CG12	Understanding the basis of action, indications and efficacy of therapeutic interventions, based on available scientific evidence			x	
CG15	Having the ability to make an initial diagnostic judgment and establish a reasoned diagnostic strategy				x
CG18	Indicating the most appropriate therapeutics of the most prevalent and chronic acute processes, as well as terminally ill patients		x		
CG21	Listening to carefully, obtain and synthesize relevant information about the problems afflicting the patient and understand the content of this information			x	
CG22	Writing medical histories and other medical records in an understandable way to outsiders				x
CG23	Communicating effectively and clearly, both orally and in writing, with patients, family members, media workers and other professionals				x
CG30	Basic knowledge of the National Health System and health legislation		x		
CG32	Knowing how to use information and communication technologies in clinical, therapeutic, preventive and research activities				x
CG33	Maintaining and using records with patient information for further analysis, preserving data confidentiality				x

SPECIFIC		Weighting			
		1	2	3	4
CE61	Assessing the risk-benefit ratio of diagnostic and therapeutic procedures				x
CE62	Knowing the indications of biochemical, haematological, immunological, microbiological, anatomopathological and imaging tests				x

CE63	Knowing the characteristics of tissues in different situations of injury, adaptation and cell death. Inflammation. Cell growth disturbances. Pathological anatomy of the different devices and systems. Biochemical, cytogenetic and molecular biology markers applied to clinical diagnosis		x		
CE64	Knowing the basics of microbiology and parasitology	x			
CE65	Knowing the main techniques of microbiological and parasitological diagnosis and interpret the results	x			
CE66	Knowing the basics of the interaction of radiation with the human organism. Radiological image. Basic radiological semiology of the different devices and systems				x
CE67	Learning about other diagnostic imaging techniques				x
CE68	Assessing the indications and contraindications of radiological studies				x
CE69	Having the ability to apply radiological protection criteria in diagnostic and therapeutic procedures with ionizing radiation				x
CE72	Knowing the main indications of electrophysiological techniques (ECG, EEG, EMG, and others)	x			
CE73	Knowing the pathophysiology of wounds (including burns, frostbites and other types of wounds). Healing. Surgical hemorrhage and thromboembolic prophylaxis	x			
CE77	Knowing how to obtain and process a biological sample for study using the different diagnostic procedures	x			
CE78	Knowing how to interpret the results of the laboratory's diagnostic tests		x		

TRANSVERSAL		Weighting			
		1	2	3	4
CT1	Analytical and synthesis capacity				x
CT2	Planification and organization capacity		x		
CT6	Manage information capacity		x		

CT7	Solving problems			x
CT8	Making decisions			x
CT9	Team work			x
CT10	Interdisciplinary team work		x	
CT12	Interpersonal relationship skills			x
CT14	Critical reasoning			x
CT16	Individual learning			x
CT18	Creativity	x		
CT19	Leadership	x		
CT24	Ability to take responsibility	x		
CT25	Autocriticism capacity	x		
CT26	Knowing how to value personal action and know your own skills and limitations		x	

Assessment system for the acquisition of competencies and grading system

Assessed learning outcomes	Granted percentage	Assessment method
R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R15	50,00%	Tests
R1, R2, R3, R4, R5, R6, R7, R9, R10, R14, R15, R19, R20	30,00%	Practices
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R13, R14, R15, R16, R17, R19, R20, R22	5,00%	Participation in class
R1, R3, R4, R5, R6, R7, R9, R19	15,00%	Practice exam

Observations

Each professor of this subject, will evaluate the contents taught by him, giving them a proportional assessment according to the ECTS. The final grade will be determined by the sum of all the parts. In case of not approving a sitting examination, the parts approved will not be saved for the next sitting examination. The evaluation criteria for the second sitting examination of the course will be the same as those of the first one. The Register of direct questions to the student consists of evaluating the participation of the student when asked directly by the professor and the resolution of questions during the classes. In order to do so, an equitable and objective control will be carried out by the teacher. During the course, questions can be asked to the whole group or individually.

Honors requirements:

Best students, who must have obtained a minimum grade of 9, may be awarded the honorary registration. If circumstances require so, a special test may be established to determine those students deserving of the honorary registration, considering the limitation of 5% of the registered students. In the second and subsequent examination sittings, only the remaining honorary registrations may be granted.

DEVELOPMENT of the subject in second and subsequent enrolments:

There will be a specific group for students who are not first-time enrollees if they exceed the classroom occupancy limit and a teacher in charge of that group.

The teacher in charge of this group will conduct 6 follow-up and tutoring sessions of 2 hours each. The competences to acquire the skills and abilities of the subject will be done through all the

practices foreseen for the subject. In each session the subject will be developed so that the work of the competences that each student needs to be able to pass the subject will be reinforced.
The content and skills evaluation will be carried out in the exam set in the official calendar for this subject.

MENTION OF DISTINCTION:
According to Article 22 of the Regulations governing the Evaluation and Qualification of UCV Courses, the mention of "Distinction of Honor" may be awarded by the professor responsible for the course to students who have obtained, at least, the qualification of 9 over 10 (“Sobresaliente”). The number of "Distinction of Honor" mentions that may be awarded may not exceed five percent of the number of students included in the same official record, unless this number is lower than 20, in which case only one "Distinction of Honor" may be awarded.

Learning activities

The following methodologies will be used so that the students can achieve the learning outcomes of the subject:

M1	Masterclass
M2	Problems resolution and practical cases
M4	Content presentations by teacher
M5	Knowledges and skills explanation
M6	Laboratory practices
M7	Oral presentation by student
M8	Group activities supervised by professor
M9	Knowledge acquirance through student interaction and activity
M11	Personalised attention by professor
M12	Tests to understand the level of knowledge acquirance and skills

M13	Written work
M14	Online activity on e-learning
M15	Personal study
M16	Information research
M17	Discussion and solving issues in group
M18	Work in team
M19	Group work for searching, discussion and information research
M21	Supervision of clinical histories

IN-CLASS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
Theory class M1, M4, M5	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13	50,00	2,00
Seminar and group practices M2, M5, M7, M8, M9, M14, M16, M17, M18, M19, M21	R2, R4, R6, R8, R13	10,00	0,40
Tutoring M11	R2, R3, R4, R5, R6, R7	10,00	0,40
Evaluation M2, M12	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13	5,00	0,20
TOTAL		**75,00**	**3,00**

LEARNING ACTIVITIES OF AUTONOMOUS WORK

	LEARNING OUTCOMES	HOURS	ECTS
No attendance M13, M14, M15, M16	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14	75,00	3,00
TOTAL		**75,00**	**3,00**

Description of the contents

Description of the necessary contents to acquire the learning outcomes.

Theoretical contents:

Content block	Contents
I.PHYSICAL FUNDAMENTALS OF RADIODIAGNOSIS. RADIATION PROTECTION	Radioprotection I and II. Basics of radiophysics. Creation of the image in radiodiagnosis. Fundamentals of radioprotection and regulatory development.
II.FOUNDATIONS OF IMAGING TECHNIQUES	1.Fundamentals of ultrasound as a diagnostic method. 2.Fundamentals of conventional radiology. Basic interpretation of the image. 3.Fundamentals of Computerized Axial Tomography (CT). 4.Fundamentals of Nuclear Magnetic Resonance (NMR). 5. Fundamentals of Nuclear Medicine and Interventional Vascular Radiology. Bone densitometry 6. Techniques in Neuroimaging.
III. STUDY OF THE IMAGE OF THE THORAX	7. Radiological anatomy of the thorax 8. Patterns of pulmonary pathology 9. Pathology of the pleura and mediastinum 10.Cardiovascular pathology of the thorax. Thrombus Pulmonary Embolism (TPE). 11. Breast imaging techniques.
IV. STUDY BY IMAGE OF THE ABDOMEN	12. Radiological anatomy of the abdomen. 13. Radiological semiology of the abdomen. 14. Radiological semiology of the abdomen II.
V. PATHOLOGY OF CNS IN IMAGE	15. Central Nervous System (CNS) Pathology in image.
VI. MUSCULAR-SKELETAL SYSTEM. NORMAL AND PATHOLOGICAL IMAGE	16. Musculoskeletal System I 17. Musculoskeletal System II 18. Musculoskeletal System III

BIOMEDICAL IMAGING SEMINARS	19. Seminar I. Thorax I. 20. Seminar II. Thorax II. 21. Seminar III. Thorax III. 22. Seminar IV. Abdomen I. 23. Seminar V. Abdomen II. 24. Seminar VI. Neuroimaging. 25. Seminar VII. Musculoskeletal I. 26. Seminar VIII. Musculoskeletal II. 27. Seminar IX. Musculoskeletal III.

Temporary organization of learning:

Block of content	Number of sessions	Hours
I.PHYSICAL FUNDAMENTALS OF RADIODIAGNOSIS. RADIATION PROTECTION	4,00	8,00
II.FOUNDATIONS OF IMAGING TECHNIQUES	9,00	18,00
III. STUDY OF THE IMAGE OF THE THORAX	6,50	13,00
IV. STUDY BY IMAGE OF THE ABDOMEN	5,00	10,00
V. PATHOLOGY OF CNS IN IMAGE	3,00	6,00
VI. MUSCULAR-SKELETAL SYSTEM. NORMAL AND PATHOLOGICAL IMAGE	5,00	10,00
BIOMEDICAL IMAGING SEMINARS	5,00	10,00

References

BASIC BIBLIOGRAPHY
William Herring. Learning Radiology: Recognizing the Basics, fourth edition. Editorial ELSEVIER, 2020
COMPLEMENTARY BIBLIOGRAPHY
Del Cura Rodriguez, Pedraza Gutierrez, Gayete Cara. Radiología Esencial. 2nd edition. Editorial Panamericana. 2019.
Chen MYN, Pope Jr. TL, Ott DJ. Basic Radiology. Editorial McGraw Hill Interamericana. 2006
Goodman LR. Felson. Principios de radiología torácica. Un texto programado. Editorial McGraw-Hill / Interamericana. 2009
www.wikiradiography.com
http://www.meddean.luc.edu/lumen/meded/medicine/pulmonar/cxr/atlas/cxratlas_f.htm

Addendum to the Course Guide of the Subject

Due to the exceptional situation caused by the health crisis of the COVID-19 and taking into account the security measures related to the development of the educational activity in the Higher Education Institution teaching area, the following changes have been made in the guide of the subject to ensure that Students achieve their learning outcomes of the Subject.

Situation 1: Teaching without limited capacity (when the number of enrolled students is lower than the allowed capacity in classroom, according to the security measures taken).

In this case, no changes are made in the guide of the subject.

Situation 2: Teaching with limited capacity (when the number of enrolled students is higher than the allowed capacity in classroom, according to the security measures taken).

In this case, the following changes are made:

1. Educational Activities of Onsite Work:

All the foreseen activities to be developed in the classroom as indicated in this field of the guide of the subject will be made through a simultaneous teaching method combining onsite teaching in the classroom and synchronous online teaching. Students will be able to attend classes onsite or to attend them online through the telematic tools provided by the university (videoconferences). In any case, students who attend classes onsite and who attend them by videoconference will rotate periodically.

In the particular case of this subject, these videoconferences will be made through:

[X] Microsoft Teams

[ ] Kaltura

Situation 3: Confinement due to a new State of Alarm.

In this case, the following changes are made:

1. Educational Activities of Onsite Work:

All the foreseen activities to be developed in the classroom as indicated in this field of the guide of the subject, as well as the group and personalized tutoring, will be done with the telematic tools provided by the University, through:

- [X] Microsoft Teams
- [ ] Kaltura

Explanation about the practical sessions:

2. System for Assessing the Acquisition of the competences and Assessment System

ONSITE WORK

Regarding the Assessment Tools:

[X] The Assessment Tools will not be modified. If onsite assessment is not possible, it will be done online through the UCVnet Campus.

[ ] The following changes will be made to adapt the subject's assessment to the online teaching.

Course guide		Adaptation	
Assessment tool	Allocated percentage	Description of the suggested changes	Platform to be used

The other Assessment Tools will not be modified with regards to what is indicated in the Course Guide.

Comments to the Assessment System:

Attendance and participation: participation, involvement and progression of the acquired knowledge and skills will be evaluated by the professor during the theoretical and practical non-curricular classes, in this case through the proposed Microsoft Teams platform.