

UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Biomedicina, Neuroscienze e Diagnostica avanzata				
ACADEMIC YEAR	2023/2024				
MASTER'S DEGREE (MSC)	DIAGNOSTIC TECHNICAL HEALTH PROFESSIONS				
INTEGRATED COURSE	INTERDISCIPLINARY PROFESSIONALIZING PATH I - INTEGRATED COURSE				
CODE	22306				
MODULES	Yes				
NUMBER OF MODULES	2				
SCIENTIFIC SECTOR(S)	MED/36, FIS/07				
HEAD PROFESSOR(S)	MARRALE MAURIZIO		0	Professore Associato	Univ. di PALERMO
OTHER PROFESSOR(S)	GRASSEDONIO EMANUELE			Ricercatore a tempo determinato	Univ. di PALERMO
	MARRALE M	/AURIZ	0	Professore Associato	Univ. di PALERMO
CREDITS	6				
PROPAEDEUTICAL SUBJECTS					
MUTUALIZATION					
YEAR	2				
TERM (SEMESTER)	1° semester				
ATTENDANCE	Mandatory				
EVALUATION	Out of 30				
TEACHER OFFICE HOURS	GRASSEDONIO EMANUELE				
	Thursday 12	2:00 13:	:00	STANZA 125 SECONDO PIA RADIOLOGIA	NO ISTITUTO DI
	MARRALE MAURIZIO				
	Thursday 15	5:00 17:	:00	Dipartimento di Fisica e Chimi Scienze, Edificio 18. Tel dirett richiedere appuntamento alme (maurizio.marrale@unipa.it).	ica "Emilio Segre" Viale delle o 09123899073. Si prega di eno tre giorni prima via e-mail

PREREQUISITES	No prerequisites required.
LEARNING OUTCOMES	Knowledge and understanding Knowledge and understanding of the main techniques for radiological imaging. Acquisition of the basic notions relating to the biological effects produced by ionizing radiation.
	Applying knowledge and understanding Ability to know the risks related to the different practices that make use of ionizing radiation.
	Making judgments Ability to evaluate the most suitable procedures to reduce radiation exposure.
	Communication skills Ability to describe the physical principles of diagnostic and radiotherapy procedures and instruments and the principles of radiation protection related to these practices to medical staff, patients and family members who request it.
	Learning skills Ability to update their knowledge on the instruments used and on the legislation relating to radiation protection.
ASSESSMENT METHODS	The final exam consists of an oral exam on the physical principles and applications of the various radiological imaging techniques and on the fundamental concepts of radiation protection. This test allows to evaluate, in addition to the candidate's knowledge and ability to apply them, also the possession of scientific language properties and clear and direct exposure skills. The final evaluation, suitably graded, will be formulated based on the following conditions: a) only basic knowledge of the physical principles and applications of the various radiological imaging techniques and of the fundamental concepts of radiation protection, and limited ability to develop the relevant arguments or derivations, sufficient capacity for exposure, analysis of phenomena and problem solving (vote 18-21); b) good knowledge of the physical principles and applications of the various radiological imaging techniques and of the fundamental concepts of radiation protection and good ability to develop arguments, good ability to present and analyze phenomena as well as conceptual problems and their solutions (grade 22- 25); c) in-depth (but not full) knowledge of the physical principles and applications of the various radiological imaging techniques and of the fundamental concepts of radiation protection, detailed exposure and analysis, but with some hesitation, of the phenomena, problems and relative solutions (grade 26-28); d) in-depth and full knowledge of the physical principles and applications of the various radiological imaging techniques and of the fundamental concepts of radiation protection and full mastery in developing the arguments, excellent ability to exhibit and analyze, even critical, phenomena, problems and solutions, in the best cases with original study and analysis contributions as well as excellent communication skills (grade 29-30L).
TEACHING METHODS	The integrated course is six-monthly and takes place in the second semester of the first year. The didactic activity includes frontal lessons. The lessons are carried out by the teachers of the various courses, who develop discursive lectures by proposing arguments and calculations on the blackboard or using projections: this method allows a better and more gradual understanding of the topic by the students and a better interaction with them. Discussions with students are encouraged during the explanations.

MODULE IMAGE DIAGNOSTICS AND RADIOTHERAPY

Prof. EMANUELE GRASSEDONIO

SUGGESTED BIBLIOGRAPHY Dispense del docente Cittadini. Diagnostica per immagini e radioterapia. Ediz. illustrata Copertina flessibile – 30 giu 2015 AMBIT 20417-* Scienze e tecniche di radiologia medica per immagini e radioterapia **INDIVIDUAL STUDY (Hrs)** 51 **COURSE ACTIVITY (Hrs)** 24 EDUCATIONAL OBJECTIVES OF THE MODULE

Acquire basic knowledge on ionizing and non-ionizing radiation, health problems related to radiation exposure and relative legislative principles that protect workers exposed to radiation-associated risks. Acquire radiation exposure prevention methods. Acquire patient management methods in a radiology or nuclear medicine unit.

31LLAB03		
Hrs	Frontal teaching	
8	Knowledge of fundamentals of physics, characterization of ionizing radiation, health problems related to exposure to ionizing radiation	
2	Non-ionizing radiation: physical characteristics and application in diagnostic imaging.	
8	Pinciples of Radiobiology	
2	Contrast media: classification and characteristics; clinical applications; adverse reactions and related measures. Patient preparation and management.	
8	Risks related to exposure to radiation and protective devices. Examples and discussion.	
2	Italian Health legislation with particular regard to the principles of applicability of radiation protection for workers exposed to radiation-related risks. Assessment of risks related to radiation exposure.	

MODULE APPLIED PHYSICS

Prof. MAURIZIO MARRALE

SUGGESTED BIBLIOGRAPHY

Basic Textbook

D. Scannicchio: Fisica Biomedica. EdiSES. ISBN: 978-8879597814 (http://www.edises.it).

Supplementary Textbooks

• Diagnostic radiology physics: a handbook for teachers and students: International Atomic Energy Agency, 2014. ISBN 978–92–131010–1

• Bushberg, J. T., Seibert, J. A., Leidholdt, E. M., & Boone, J. M. The essential physics of medical imaging (3rd ed.). Lippincott Williams and Wilkins, 2011, ISBN : 978-0781780575

AMBIT	20411-Scienze propedeutiche
INDIVIDUAL STUDY (Hrs)	51
COURSE ACTIVITY (Hrs)	24

EDUCATIONAL OBJECTIVES OF THE MODULE

The objective of the module is to provide the fundamentals of advanced diagnostic and radiotherapy techniques that make use of ionizing and non-ionizing radiations and to provide the principles of radiation protection for patients and workers to be followed in facilities where these diagnostic and radiotherapeutic activities are carried out.

SYLLABUS

Hrs	Frontal teaching
5	Review of electromagnetism. Structure and properties of the atomic nucleus. Ionizing radiations and their classification. Natural and artificial radioactivity. Radioactive decay: alpha, beta and gamma.
3	Interaction of heavy and light charged particles with matter. Interaction of photons with matter. Interaction of neutrons with matter.
3	Basis of dosimetry. Dosimetric quantities. Personal and environmental radiation monitors. Biological effects of ionizing radiation: stochastic effects, deterministic and genetic effects.
3	Principles of Radiation Protection. Legislation related to ionizing radiation use. Dose limits for exposed workers and the population .
3	Description of the following diagnostic techniques, equipment and radiation protection: radiography, radioscopy, computed tomography (CT). Radiation protection for X-ray techniques.
2	Nuclear medicine (SPECT, PET): Radiation protection in nuclear medicine.
3	Magnetic resonance imaging(MRI). Safety in magnetic resonance imaging (MRI).
2	Description of the following techniques, equipment and radiation protection used in therapy: radiotherapy with electron and photon beams, metabolic radiotherapy, brachytherapy, elements of radiotherapy with proton and neutron beams. Radiation protection in radiotherapy.