

APPLICATIONS OF RADIATION IN MEDICINE AND INDUSTRY

MODULE	TOPIC	SUBJECT	COURSE	SEMESTER	ECTS	CHARACTER
Physics and Technology of Radiations	Medical Physics	Applications of Radiation in Medicine and Industry	1	2nd	6 ECTS	Optional
LECTURERS			CONTACT			
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Manuel Vilches Pacheco Instituto de Medicina Oncológica y Molecular de Asturias manuelvilchesspa@gmail.com			TUTORING SCHEDULE			
			Tuesday, Wednesday and Thursday: 16:00-18:00			
MASTER						
Máster Universitario en Física: Radiaciones, Nanotecnología, Partículas y Astrofísica						
REQUISITES AND/OR RECOMMENDATIONS						
To follow or to have followed the courses “Radiation-Matter interaction” and “Detection of Radiation and Dosimetry”.						
BRIEF DESCRIPTION OF CONTENTS						
Applications in Radiology, Radiotherapy and Nuclear Medicine. Applications in control and optimization of industrial problems. Non destructive testing. Materials treatment.						
OBJETIVES						
<i>The student will know/understand:</i>						
<ul style="list-style-type: none"> The applications of ionizing radiations in Medicine and Industry. The physic theory behind each application. 						
<i>The student will be able to:</i>						
<ul style="list-style-type: none"> To relate the physics fundament with the development of each theory. 						



- To analyze the complexity of each application, and the possible improvements.

CONTENTS OF THE COURSE

1. Optimization and process control in industrial plants. Diagnosis of problems. Nucleonic gauges. Non destructive testing. Techniques to obtain welding images.
2. Treatment of materials. Composition analysis and structure. Sterilization and modification of properties.
3. Radiology. X-ray equipment. Computerized tomography (CT).
4. Radiotherapy. Equipment for external radiotherapy: Linear Accelerator (LINAC). Brachytherapy: radioisotopes and equipment. New techniques in radiotherapy.
5. Nuclear Medicine. Diagnosis applications: characteristics of the radioisotopes and procedure to obtain them. Gamma camera. Single photon emission computer tomography (SPECT). Positron emission tomography (PET). Applications in therapy.

REFERENCES

- J.E. Turner, Atoms, Radiation and Radiation Protection (John Wiley and Sons, 1995).
- P. Metcalfe, T. Kron and P. Hoban, The Physics of Radiotherapy X-rays from Linear Accelerator (Medical Physics Publishing, Madison, Wisconsin, 1997).
- H.N. Wagner Jr, Z. Szabo and J.W. Buchanan (editors), Principles of Nuclear Medicine (W.B. Saunders Company, Philadelphia, Pennsylvania, 1995) 2nd edition.
- S. Webb (editor), The Physics of Medical Imaging (Institute of Physics Publishing, Bristol, 1998),
- G.C. Lowenthal and P.L. Airey, Practical Applications of Radioactivity and Nuclear Radiations (Cambridge University Press, 2004).

USEFUL LINKS

METHODOLOGY

Lectures: To transmit the contents of the subject, motivating the students to reflection, facilitating the discovery of relationships between different concepts and promoting a critical mindset.

Seminars: To develop in the students the cognitive and procedural skills of the subject.

Academic tutoring: To guide the autonomous and team work of students, focusing on different aspects of the subjects and guide the comprehensive academic training of the student.

Study and independent work of students: To foster in the student the ability to self-regulate their learning, by planning, designing, evaluating and adapting it to their particular conditions and interests.

Teamwork: To encourage students in the generation and exchange of ideas, identification and analysis of different views on a topic, generalization or transfer of knowledge and critical assessment of it.



EVALUATION SYSTEM

1. Seminars. Oral presentation of work developed independently.
Minimum weight: 40 - Maximum weight: 70.
2. Personal and team work: Active participation in lectures and discussions
Minimum weight: 30 - Maximum weight: 60

ADDITIONAL INFORMATION