GUIDE OF THE COURSE

RADIATION DETECTION AND DOSIMETRY

(updated: 03/06/2019)
Academic year: 2019-20

MODULE	TOPIC	SUBJECT	COURSE	SEMESTER	ECTS	CHARACTER
Radiation Physics and technology	Medical physics	Radiation detection and dosimetry	1	2	6	Optional/Compulsory

LECTURERS	CONTACT
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	TUTORING SCHEDULE
	Amaro: M,W,F, 12:00--14:00 Gálvez: T 11-13, W 11—13 and 17--19
MASTER	
Master in physics: radiation, nanotechnology, particles and astrophysics	

REQUISITES AND/OR RECOMMENDATIONS

BRIEF DESCRIPTION OF CONTENTS

Radiation detectors: gas, scintillator and semiconductor. Radiation transfer in matter media. Dosimetric models. Radiation protection.

OBJETIVES

The student will know/understand:

The studend shall learn different aspects, basic and advanced, related to the charged and neutral radiation interaction processes with matter, and the applications of its fundamental and specific characteristics to the

radiation detection, the dosimetry, and its importance in radiation protection.

***The student will be able to*:**

To quantify the interaction of the different kinds of radiation with matter. To define the dosimetry units. To compute dosymetry quantities. To define the radiation protection units. To estimate the dosis and other quatities related to radiation protection. To find the data of public exposure to the natural radiation sources. To determine the exposure values to man-made radiation sources. To know the effects and the exposure for the medical use of radiation and radionuclides. To identify the occupational radiation exposures in practical cases.

CONTENTS OF THE COURSE

1. Radiation detectors: kinds and general properties.
2. Gas detectors: proportional, Geiger-Mueller, ...
3. Scintillator detectors: organic and inorganic.
4. Solid-state detectors.
5. Ionization chambers.
6. Interaction and radiation transfer.
7. Dosimetric quantities and units
8. radiation protection quantities and units.
9. Exposure from natural radiation and from man-made sources.
10. Occupatinal radiation exposures and exposures from the medical use of radiation and radionuclides.

REFERENCES

J. Sabol, P.S. Weng. Introduction to radiation protection dosimetry (World Scientific 1995)

M. Eisenbud, T. Gesell, Environmental radioactivity, fourth edition (Academic Press, 1997)

D. Brune, et al., Radiation at home, outdoors and in the workplace, Scandinavian Science Publisher, 2001.

K.S. Krane, Introductory Nuclear Physics (JohnWiley and Sons, 1987).

W.R. Leo, Techniques for Nuclear and Particle Physics Experiments (Springer, Berlin, 1994).

G.F. Knoll, Radiation Detection and Measurement, John Wiley and Sons, New York, 2000.

J.E. Martin, Physics for radiation protection (John Wiley and Sons, 2000)

Leroy y P.G. Rancoita, Radiation interaction in matter and detection (World Scientific, 2004)

X. Ortega, J. Jorba, Las radiaciones ionizantes. Su utilización y riesgos, UPC, 1994 (Vol 1), 1996 (Vol 2).

James E. Turner, Atoms, Radiations, and Radiations Protection. John Wiley & Sons, 1995

Jacob Shapiro, Radiation Protection. A guide for Scientific and Physicians. Harvard University Press, 1972

K. Almenas and R. Lee, Nuclear Ingeniering. An Introduction (Springer-Verlag, 1992)

USEFUL LINKS
Ministerio de sanidad. Centro nacional de dosimetría http://www.cnd.es/cnd/index.php CIEMAT. Portal de protección radiológica http://www.ionizantes.ciemat.es/sobre_dosimetria.php
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. Final exams: Evaluation of the results of a work proposed by the teacher Minimum weight: 50% - Maximum weight: 70% 2. Seminars. Oral presentation of works written independently proposed by the teacher Minimum weight: 10% - Maximum weight: 25% 3.- Personal and team work: Active participation in lectures and discussions Minimum weight: 10% - Maximum weight: 25% 4.- Laboratory Minimum weight: 10% - Maximum weight: 25%
ADITIONAL INFORMATION