COURSE OUTLINE

1. GENERAL

SCHOOL	HEALTH AND CARE SCIENCES		
DEPARTMENT	BIOMEDICAL SCIENCES		
SECTION	RADIOLOGY AND RADIOTHERAPY		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	3065 (6e)	SEMESTER	3rd
TITLE	**INTRODUCTION TO RADIATIONS**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	HOURS/WEEK	CREDITS
Lectures	4	5

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Special Background
	-
LANGUAGE OF INSTRUCTION and EXAMINATIONS	Greek
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses

2. LEARNING OUTCOMES

Learning outcomes *The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will*

acquire with the successful completion of the course are described.

ConsultAppendix A

Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area

Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B

Guidelines for writing Learning Outcomes

Students should be able to display knowledge and comprehension of the basic science topics:

Reference to general concepts and theories of Physical Science and the presentation of key elements of atomic and nuclear physics that are necessary for understanding the nature of ionizing and non ionizing radiation.

Basic overview of the relevant to Radiology mathematics, such as algebra, exponential numbers, logarithms, limits, derivatives, integrals, roots.

Fundamentals of optical, acoustic, ultrasonic, fluid mechanics, laser and electromagnetism.

Introduction to the subject of atomic and nuclear physics, with emphasis on knowledge to be used for understanding the applications of radiation in diagnosis and treatment

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for analysis, synthesis of data information with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and*
Team work	*sensitivity to gender issues*
Working in an international environment	*Criticism and self-criticism*
Working in an interdisciplinary environment new research ideas	*Production of free, creative and inductive thinking*
	Others…….

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Adapting to new situations
- Decision-making
- Working independently Team work

- Working in an international environment Working in an interdisciplinary environment

3. COURSE SYLLABUS

1. Structure of matter. Atom, Bohr's atomic theory. Sizes and units in physics. Energy
2. Quantum theory of light, photon properties, nucleus structure. Shaft and potential barrier.
3. Stable and unstable nuclei. Rays α, β, γ. Radioactivity. Nuclear reactors. Applications of radioisotopes.
4. Principles of Mechanics and Heat. Movement. Forces. Energy.
5. Electric and magnetic field. Electromagnetism. Movement of charged particles inside the range of electric or magnetic fields. Basic electronic devices. Electrical instruments. Conductivity. Semiconductors.
6. Sources, Exposure in Ionizing radiation. X-ray generators, X-ray tube, a, β,γ radiation, neutrons. Production of X-radiation, X-radiation spectrum. Filters.
7. Interaction of radiation with matter, Photoelectric, Compton, etc. effects
8. Interaction of photons, electrons and other heavy ions with matter Use of radiation for imaging and therapy.
9. Attenuation and absorption of ionizing radiation.
10. Modern imaging equipment. Digital radiography, Mammography, DEXA, DENTAL, CT, PET.
11. Non ionizing radiation, Heat, MRI, Ultrasound, Thermography.
12. Laser as light source - Properties, Applications.
13. Microwaves
14. Fluid mechanics, fluid pressure, hydrodynamics.
15. Solved problems with physical quantity units.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc*	Face to face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of ICT in teaching, laboratory education, communication with students. Lesson e-class notes and data.	
TEACHING METHODS	*Activities*	*Semester workload*

The manner and methods of teaching are described in detail. *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning* *activity are given as well as the hours of non directed study according to the principles of the ECTS*	Lectures	52
	Essay	30
	Study	58
	Course total	140
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple-choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Final written evaluation on 5 topics Alternatively written final evaluation with a weighting factor of 0,7 and participation in a working group that will present the work in an audience, with a weighting factor of 0,3. In this way the cooperation between the students is promoted	

5. RECOMMENDED BIBLIOGRAPHY

1. Serway R, Moses C, Majer C. Modern Physics. University Publications of Crete 2002.
2. Cameron, J.R, Skofronick, J.G Medical Physics J. Wiley, 1979.
3. Nave CR and Nave BC. Physics for health sciences. Saunders Co 3rd Edition, 1985. ISBN 0721613098.
4. Lambourne R. and Tinker M. Basic Mathematics for the Physical Sciences. Wiley, 2000. ISBN 0-471-85207-4.

- Related academic journals:

1) *Physics in Medicine and Biology LINK*
2) *Medical Physics LINK*
3) *Radiotherapy and Oncology LINK*
4) International Journal of Radiation Oncology, Biology, Physics *LINK*