**COURSE OUTLINE**

1. **GENERAL**

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| **SCHOOL** | School of Health Sciences | | | | |
| **ACADEMIC UNIT** | Faculty of Medicine | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | **IAY204** | **SEMESTER** | | **4** | |
| **COURSE TITLE** | **MEDICAL PHYSICS** | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
| LECTURES | | | 6 | |  |
| LABORATORY EXERCISES | | | 2 | |  |
| **TOTAL** | | | 8 | | 7 |
| *Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (4).* | | |  | |  |
| **COURSE TYPE**  *general background,  special background, specialised general knowledge, skills development* | General background/specialized general knowledge/skills development | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | GREEK | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | NO | | | | |
| **COURSE WEBSITE (URL)** | <https://ecourse.uoi.gr/course/index.php?categoryid=34> | | | | |

1. **LEARNING OUTCOMES**

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| **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.*  *Consult Appendix 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* | |
| The course offers a comprehensive background in the physical principles governing human body function, along with the diagnostic and therapeutic methods and techniques involving the use of radiation.  Specific topics covered:   * Physics of ionizing and non-ionizing radiation * Optics * Thermodynamics * Biological Mechanics * Bioelectricity * Magnetic Resonance Imaging   The aim of the course is:   * The study of the physical principles of Radiotherapy, Radiology and Nuclear Medicine * The study of the physical principles underlying modern therapeutic and diagnostic methods using ionizing and non-ionizing radiation * The study of the basic principles of radiation protection and radiobiology * The interpretation of biophysical biological processes at the cell, tissue and organ level. | |
| **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 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*  *Production of new research ideas* | *Project planning and management*  *Respect for difference and multiculturalism*  *Respect for the natural environment*  *Showing social, professional and ethical responsibility and sensitivity to gender issues*  *Criticism and self-criticism*  *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 in an interdisciplinary environment.  Showing social, professional and ethical responsibility and sensitivity to gender issues. | |

1. **SYLLABUS**

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| * Radiation physics: Fundamentals of atomic and nuclear physics – Radioactivity – Interaction of photons (X,γ) with matter – Interaction of charged particles with matter – Production of X rays – Dosimetry of ionizing radiation – Radiobiology – Radiation protection – Physical principles of Radiology – Physical principles of Nuclear Medicine – Physical principles of Radiatiotherapy. * Optics: Introductory optics – Reflection, refraction phenomena and medical applications (optical fibres, endoscopes) – Physics of the eye - vision – Optical Microscopy, Electron Microscopy, Bio-Spectroscopy – Medical applications of visible light – Infrared and ultraviolet radiation and interactions with biological tissues – Laser radiation: principles, applications and safety – Applications of photonics in biomedicine. * Elements of thermodynamics of biological systems: Heat, work, energy, 1st law of thermodynamics – Molecular interpretation of thermodynamic quantities – Entropy, free energy and equilibrium, 2nd law of thermodynamics – Biological effects of heat, cold and applications in medicine – Cryosurgery and cryotherapy. * Biological Mechanics: Statics – Wave mechanics – Ultrasound – Dynamics of biological fluids. * Bioelectricity: Electrical properties of cells – Electrical properties of tissues – Bioelectric and Biomagnetic potentials and Clinical applications. * Magnetic Resonance Imaging: Magnetic torque – Magnetic resonance – Recovery times – Image coding. * Non-ionizing radiations: Electromagnetic Spectrum – Absorbed energy – Reference levels – Safety. |

1. **TEACHING and LEARNING METHODS - EVALUATION**

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| **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 laboratory teaching.  Use of ICT in communication with students. |
| **TEACHING METHODS**  *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* | |  |  | | --- | --- | | ***Activity*** | ***Workload of each students group*** | | Lectures | 160 | | Laboratory practice | 20 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | **Total** | **180** | |
| **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.* | Written examination.  Multiple choice questionnaires.  Short-answer questions. |

1. **ATTACHED BIBLIOGRAPHY**

*Teaching notes.*