**COURSE OUTLINE**

1. **GENERAL**

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| **SCHOOL** | HEALTH SCIENCES | | | | |
| **ACADEMIC UNIT** | DEPARTMENT OF BIOLOGICAL APPLICATIONS AND TECHNOLOGY | | | | |
| **LEVEL OF STUDIES** | UNDERGRADUATE | | | | |
| **COURSE CODE** | BEY 104 | **SEMESTER** | | 1 | |
| **COURSE TITLE** | GENERAL 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 and Tutoring | | | 5 | | 6 |
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| *Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).* | | |  | |  |
| **COURSE TYPE**  *general background,  special background, specialised general knowledge, skills development* | General background | | | | |
| **PREREQUISITE COURSES:** | None | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes | | | | |
| **COURSE WEBSITE (URL)** | http://ecourse.uoi.gr/ | | | | |

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 principal aim of this course is to provide a wide background of Physics necessary for the student of Biological Sciences. The theoretical courses are accompanied with a plethora of examples relative to the science of Biology. Upon successful completion of this course the student will be able to:   * explain the laws of the flow of liquids and apply them in problems related to biological organisms. * describe the fundamentals of Electrism and Magnetism and solve relative problems. * describe the basic principles of the theory of vibration and waves. * describe the fundamentals of Geometrical Optics and solve relative problems. * explain the phenomena of optical interference and diffraction. * describe the fundamentals of Quantum Mechanics, such as the wavefunction, and explain the their role in the atomic structure. * describe the molecular bonds and explain their role in the structure of matter. * describe basic concepts of Nuclear Physics. * describe the production mechanisms of radioactivity and explain its effects on biological organisms. | |
| **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,  - Working independently,  - Production of free, creative and inductive thinking | |

1. **SYLLABUS**

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| * Liquids   + Density, pressure, Pascal principle, buoyancy, Archimedes principle, continuity equation, Bernoulli equation. * Electrism - Magnetism   + Electric charge, conductors, insulators, Coulomb law, electric field, dynamic lines, electric field flow, Gauss law, electric potential, electric dipole moment, electric energy, capacitance, dielectrics.   + Electric current, resistance, Ohm law, Kirchhoff laws, electric potential.   + Magnetic field, magnetic dipole, Biot-Savart law, Ampere law, magnetic materials. * Waves   + Basic concepts: Simple harmonic motion, mechanical waves, superposition principle, interference, stationary waves, electromagnetic waves - light.   + Geometric Optics: reflection, refraction, images, thin lenses, lens systems, polarization, Brewster law, microscope, human eye.   + Wave Optics: Coherence, interference, diffraction, Bragg reflection. * Atomic-Molecular Physics   + De Broglie matterwaves, uncertainty principle, Bohr atomic model, Schrodinger equation, wavefunction, orbitals, spin, quantum numbers, Pauli exclusion principle, periodic table, X-rays.   + Types of molecular bonds: ionic bond, covalent bond, hydrogen bond, Van der Waals bonds. Molecular vibration, molecular rotation, molecular spectra. * Nuclear Physics   + Σύσταση και μέγεθος πυρήνα, ισότοπα, πυρηνικές δυνάμεις, ραδιενέργεια,   ακτινοβολίες α, β και γ, βιολογικές επιπτώσεις ιονίζουσας ακτινοβολίας, ραδιοχρονολόγηση.   * + Composition and size of the nucleus, isotopes, nuclear forces, radioactivity, radiation α, β and γ, biological effects of ionizing radiation, radiochronology. |

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 teaching and 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*** | ***Semester workload*** | | Lectures | 52 | | Tutorials | 26 | | Study of bibliography | 52 | | Non-directed study | 17 | | exams | 3 | |  |  | |  |  | |  |  | |  |  | | Course total | 150 | |
| **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 exams for the evaluation of conclusive understanding and problem solving capabilities |

1. **ATTACHED BIBLIOGRAPHY**

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| *- Suggested bibliography:*   * Notes of the Lecturer (available in the website of the course).   Offered by "Εύδοξος"   * D. HALLIDAY, R. RESNICK, R. WALKER,   "ΦΥΣΙΚΗ", Τόμος Β',  (***Ηλεκτρισμός & Μαγνητισμός, Οπτική, Σύγχρονη Φυσική***)  ISBN: 978-960-01-1492-8 * HUGH D. YOUNG , R. A. FREEDMAN,  "ΠΑΝΕΠΙΣΤΗΜΙΑΚΗ ΦΥΣΙΚΗ με Σύγχρονη Φυσική", Τόμος Β,  (***Ηλεκτρισμός & Μαγνητισμός, Οπτική***)  2η Ελληνική 'Έκδοση ISBN 978-960-02-2473-3   Non-offered by "Εύδοξος"   * D. HALLIDAY, R. RESNICK, R. WALKER,   "ΦΥΣΙΚΗ", Τόμος Α', (***Ρευστά, Κυματική***)  ISBN: 978-960-01-1492-8 * R.A. SERWAY, C.J. MOSES, C.A. MOYER,   "Σύγχρονη Φυσική", (***Σύγχρονη, Ατομική, Μοριακή & Πυρηνική Φυσική***)  ISBN: 978-960-524-059-9 * Σ. ΚΟΕΝ,   "***Οπτική, Σύγχρονη, Ατομική & Μοριακή Φυσική για Βιολόγους*** - Σημειώσεις ",  Τμήμα Φυσικής, Πανεπιστήμιο Ιωαννίνων (2011)   <http://atomol.physics.uoi.gr/index.files/Page3239.htm>   * Ξ. ΑΣΛΑΝΟΓΛΟΥ,   "***Σημειώσεις Πυρηνικής Φυσκής***",  Τμήμα Φυσικής, Πανεπιστήμιο Ιωαννίνων (2014) |