**COURSE OUTLINE**

1. **GENERAL**

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| **SCHOOL** | HEALTH SCIENCES | | | | |
| **ACADEMIC UNIT** | BIOLOGICAL APPLICATIONS AND TECHNOLOGY | | | | |
| **LEVEL OF STUDIES** | UNDERGRADUATE | | | | |
| **COURSE CODE** | **ΒΕΥ204** | **SEMESTER** | | **3** | |
| **COURSE TITLE** | PHYSICAL CHEMISTRY IN BIOLOGICAL SYSTEMS | | | | |
| **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 | | | 3 | | 5 |
| TUTORIAL | | | 1 | |  |
|  | | |  | |  |
| *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:** | MATHEMATICS, PHYSICS | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | GREEK | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** |  | | | | |
| **COURSE WEBSITE (URL)** | http://www.bat.uoi.gr/show-lesson?l\_id=77 | | | | |

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 aim of the course is to understand on the part of students the processes that take place in the animal and plant organisms as well as in microorganisms from a physicochemical point of view. Understanding the chemical kinetics of the reactions and their chemical equilibrium, as well as the energy requirements and the energy benefits for their realization. Also, the understanding of the equilibrium between the different phases, as well as the balance in the various membranes and the ability to permeate them from the various molecules.  Finally, they will come into contact with the modern spectroscopic methods used in the study of biological systems and will understand their theoretical background. Upon completion of the course students will understand the energy changes taking place in the organisms, the equilibrium of the reactions as well as phase equilibrium and the chemical kinetics of reactions within a living organism and how it can affect the disruption of these lives. They will also be familiar with the basic spectroscopic methods, which are used for the study of biological systems and as methods of diagnosis in the medical professions. | |
| **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…*  *…….* |
| Working independently  Team work  Production of new research ideas  Analysis and data synthesis  Learning of complex natural processes | |

1. **SYLLABUS**

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| **Conservation of Energy**  Work, Heat  **Thermodynamics**  1st Law of Thermodynamics (Internal Energy, Enthalpy)  2nd Law of Thermodynamics (Entropy)  3rd Law of Thermodynamics  Spontaneous Reactions (Gibbs Energy)  **Chemical Equilibrium**  Activity  Equilibrium and Gibbs Energy  Equilibrium Constant  Biochemical Standard Gibbs Energy  **Electrochemistry**  Galvanic Cells  Standard Electrode Potentials  Ionic Strength  **Equilibrium between Phases**  Chemical Potential  Equilibrium of Dialysis  Surfaces, Membranes  Surface Tension  Colligative Properties  Molecular Weight Determination  **Chemical Kinetics**  Rate Law  Zero-order Reactions  First-order Reactions  Second-order Reactions  Parallel Reactions  Consecutive Reactions  **Enzyme Kinetics**  Equations of Enzyme Kinetics  Enzyme Inhibition  **Spectroscopy**  Absorption and Emission of Radiation  Beer’s Law  Ultraviolet Spectra  Fluorescence  Polarized Light, Optical Rotation  Optical Rotatory Dispersion  Circular Dichroism  Nuclear Magnetic Resonance |

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

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| **DELIVERY** *Face-to-face, Distance learning, etc.* | AT THE CLASSROOM |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, 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 | 39 | | Exercises - problems | 13 | | Independent Study | 73 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total | ***125*** | |
| **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 that includes questions of theory understanding, as well as exercises - problems related to situations that the student will face in his / her workplace. |

1. **ATTACHED BIBLIOGRAPHY**

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| *- Suggested bibliography:*  *- Related academic journals:*  ΦΥΣΙΚΟΧΗΜΕΙΑ ΣΤΙΣ ΒΙΟΛΟΓΙΚΕΣ ΕΠΙΣΤΗΜΕΣ, HAMMES  ΦΥΣΙΚΟΧΗΜΕΙΑ, ATKINS PETER - DE PAULA JULIO  ΦΥΣΙΚΟΧΗΜΕΙΑ, ΚΑΤΣΑΝΟΣ ΝΙΚΟΛΑΟΣ |