**COURSE OUTLINE**

1. **GENERAL**

|  |  |
| --- | --- |
| **SCHOOL** | HEALTH SCIENCES |
| **ACADEMIC UNIT** | BIOLOGICAL APPLICATIONS AND TECHNOLOGY |
| **LEVEL OF STUDIES** | UNDERGRADUATE |
| **COURSE CODE** | **ΒΕΕ609** | **SEMESTER** | **8th**  |
| **COURSE TITLE** | CELLULAR NEUROBIOLOGY |
| **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 & LABORATORY COURSES | 3 | 4 |
|  |  |  |
|  |  |  |
| *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* | Specialised general knowledge, Skills development |
| **PREREQUISITE COURSES:** | ANIMAL PHYSIOLOGY I |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | GREEK |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | YES (offered in ENGLISH) |
| **COURSE WEBSITE (URL)** | http://ecourse.uoi.gr/course/view.php?id=344 |

1. **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.**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 aims at providing students with a deeper and synthetic view of the biology and physiology of nerve cells. Emphasis will be given to the function of ion channels and mechanisms of neuronal signaling and plasticity. State of the art techniques and methodologies used in the study of the nervous system at the cellular level will be analyzed.Upon completion of the course students (1) will understand the basic principles of nerve cell function and how they process and transmit biological information, (2) they will become familiar with techniques and research strategies used in cellular neurobiology, (3) they will acquire skills in highlighting and communicating scientific questions and will practice searching, evaluating, selecting, editing and presenting specialized literature and (4) they will improve their comprehension of scientific articles in cellular neurobiology |
| **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…**…….* |
| Searching, analyzing and synthesizing data and informationDecision makingAutonomous work |

1. **SYLLABUS**

|  |
| --- |
| **Lectures:** * Introduction to ion channel biology: from genes to evolution
* Ion channel structure
* Methods and techniques in cellular neurosciences
* The electrical properties of cellular membranes.
* Neuronal dendrites and spines
* The axon
* The action potential.
* Electrophysiological and pharmacological properties of voltage- and ligand- gated ion channels
* Case study: the pyramidal cell

**Laboratory courses:** Coursework utilizing the NEURON simulation environment: * The cellular membrane as a capacitor
* Membrane resistance and capacitance determine the membrane potential response.
* A simple computational model of a dendrite.
* Simulation of an action potential - the Hodgkin and Huxley model.
* Simulating action potential conduction velocity in a demyelinating disease model.

**Assignments:** A literature review assignment that includes an oral presentation. |

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

|  |  |
| --- | --- |
| **DELIVERY***Face-to-face, Distance learning, etc.* | Classroom  |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Use of specialized software (NEURON simulation enviroment). Use of the e-course learning platformStudents will be expected to make use of the electronic databases for seeking additional literature |
| **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 | 27 |
| Laboratory course | 12 |
| Study and literature assignments | 46 |
| Homework and presentation | 38 |
|  |  |
|  |  |
| Course total  | **120** |

 |
| **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.* | Assessment by a written test (weight 55%), Laboratory course assignments (weight 5%) Literature assignment and oral presentation (weight 40%) |

1. **ATTACHED BIBLIOGRAPHY**

|  |
| --- |
| *- Suggested bibliography:**- Related academic journals:*NEUROSCIENCE: PURVES, AUGUSTINE, FITZPATRICK, HALL, LAMANTIA, MCNAMARA, WILLIAMS. ISBN: 978-960-394-596-3ESSENTIALS OF NEURAL SCIENCE AND BEHAVIOR: KANDEL , SCHWARTZ , JESSELL. ISBN: 978-960-524-075-2CELLULAR AND MOLECULAR NEUROPHYSIOLOGY: HAMMOND. ISBN: 9780123970329*Research Literature*:Journal of NeurophysiologyBiophysical JournalJournal of NeuroscienceNeuronNature Neuroscience |