**COURSE OUTLINE**

1. **GENERAL**

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| **SCHOOL** | Health Sciences | | | | |
| **ACADEMIC UNIT** | Department of Biological Applications & Technology | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | BEE610 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | Introduction to Stem Cells Biology | | | | |
| **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** |
|  | | | 2 | | 2 |
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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* | Specialised general knowledge  Skills Development | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** |  | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

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 topics of the course aim to advance:  (a) the knowledge of different stem cells types,  (b) the knowledge of transcriptional and epigenetic mechanisms controlling the state of pluripotency  and cell reprogramming  (c) the knowledge of multipotent adult stem cells and the applications in regenerative medicine | |
| **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.  Team work.  Working in an international environment.  Working in an interdisciplinary environment.  Production of new research ideas. | |

1. **SYLLABUS**

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| The elective course " Introduction to Stem Cells Biology" aims to present the latest developments in the field of stem cells. Students are taught the properties of both embryonic as well as stem cells from adult tissues, a cutting edge field that is growing rapidly with great application potential for regenerative medicine. The course focuses on the detailed study of the characteristics of self-renewal and differentiation mechanisms and applications that find stem cells in experimental and clinical level . When analyzing the above is blending knowledge of a wide spectrum, ranging from differentiation / cell proliferation , gene expression to the regeneration / tissue regeneration and cancer.  The course covers the following topics : 1. Pluripotent Stem Cells The properties of pluripotent stem cells: embryonic SCs from the blastocyst stage, embryonic germ cells, epiblast-derived stem cells. Isolation, culture conditions, *in-vitro* differentiation methods.  2. Transcription factors and epigenetic regulation Growth and survival factors, gene networks that determine the pluripotent state («stemness»), epigenetic regulation, induced pluripotent stem cells Cell cycle.  3. In vitro differentiation of mouse and human Embryonic Stem Cells.  a) Differentiation Methods  b) Differentiation to endoderm, mesoderm and neuroectoderm  c) Techniques to induce targeted differentiation  d) Imaging on stem cell research: Theory and Microscopy Applications and flow cytometry in the biology of stem cells  4. Somatic stem cells Microenvironment and «niche», somatic stem cells of adult tissues, the problem of "plasticity".  5. Cancer stem cells The biology of teratocarcinoma, cancer stem cells and cancer therapy.  6. Tissue Engineering Applications of stem cells (embryonic and adult) in Regenerative Medicine. The problem of organ regeneration, regenerative ability of animal tissues, preparation of autologous transplants, generation of tissues ex vivo, Cell Therapy. |

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 Powerpoint presentations  Posts for the course in E-course  Announcements at the Department’s website  Direct communication with students through e-mail |
| **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 | 40 | | Seminars | 22 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total | 62 | |
| **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.* | Method of evaluation:  I. Written test (100%)    - open-ended questions |

1. **ATTACHED BIBLIOGRAPHY**

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| *- Suggested bibliography:*  *- Related academic journals:*  1) Books  ΤΑ ΒΛΑΣΤΙΚΑ ΚΥΤΤΑΡΑ (2008) ΓΕΩΡΓΑΤΟΣ ΣΠ.,ΚΟΥΚΛΗΣ Π.,ΛΑΖΑΡΙΔΗΣ Γ.,ΜΕΛΙΔΩΝΗ Α. - ΕΚΔΟΣΕΙΣ ΕΦΥΡΑ  ISBN: 978-960-89692-5-4  Essentials of Stem Cell Biology: Lanza R. Atala A. 2014 - Elsevier  ISBN: 978–0-12–409503–8    2) Research papers and Reviews available on the internet. |