

## COURSE OUTLINE “STEM CELL AND REGENERATIVE BIOLOGY”

### 1. GENERAL

|  |   |                     |                                     |
|--|---|---------------------|-------------------------------------|
| <b>SCHOOL</b>  | HEALTH SCIENCES   |                     |                                     |
| <b>DEPARTMENT</b>  | MOLECULAR BIOLOGY AND GENETICS  |                     |                                     |
| <b>STUDY LEVEL</b>   | ISCED LEVEL 6   |                     |                                     |
| <b>COURSE CODE</b>   | <b>MBG605</b>   | <b>SEMESTER</b>     | 6 <sup>th</sup> and 8 <sup>th</sup> |
| <b>COURSE TITLE</b>  | STEM CELL AND REGENERATIVE BIOLOGY  |                     |                                     |
| <b>TEACHING ACTIVITIES</b><br><i>In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits</i> | <b>HOURS/WEEK</b>   | <b>ECTS CREDITS</b> |                                     |
|  | 2   | 3                   |                                     |
| <b>COURSE TYPE</b><br><i>General, Background, Scientific field course, Expertise Course, Skills Development etc</i>  | SCIENTIFIC FIELD  |                     |                                     |
| <b>PREREQUISITE COURSES:</b>   | NO  |                     |                                     |
| <b>LANGUAGE OF TEACHING AND EXAMINATIONS:</b>  | GREEK<br>ENGLISH FOR ERASMUS STUDENTS   |                     |                                     |
| <b>THE COURSE IS OFFERED TO ERASMUS STUDENTS</b>   | YES   |                     |                                     |
| <b>COURSE WEBSITE (URL)</b>  | <a href="https://eclass.duth.gr/courses/ALEX01138/">https://eclass.duth.gr/courses/ALEX01138/</a> |                     |                                     |

### 2. LEARNING OUTCOMES

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|---|--|--|
| <p><b>Learning outcomes</b></p> <p><i>Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.</i></p> <ul style="list-style-type: none"> <li>• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework</li> <li>• Descriptive Indicators of Levels 6, 7 &amp; 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide</li> </ul>   |  |  |
| <p>The main objectives of the course are:</p> <ol style="list-style-type: none"> <li>a) to acquire basic knowledge of Molecular Biology of the Regeneration</li> <li>b) to study the basic molecular mechanisms underlying stem cell biology and</li> <li>c) to realize the potential to develop innovative cell-based stem cell therapies for regeneration</li> </ol> <p>Learning outcomes</p> <p>Upon successful completion of the course the student:</p> <ul style="list-style-type: none"> <li>• have an understanding of the basic principles of regeneration biology and tissue engineering</li> <li>• is able to describe and analyze the characteristics of the different stem cell types and the basic molecular mechanisms underlying their maintenance</li> <li>• Identify basic applications of stem cells and be able to propose new ones</li> <li>• Identify key ethical and legal issues emerging from stem cell applications.</li> </ul>   |  |  |
| <p><b>General Skills</b></p> <p><i>Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?</i></p> <table style="width: 100%; border: none;"> <tr> <td style="vertical-align: top;"> <ul style="list-style-type: none"> <li><i>Research, analysis and synthesize of data and information, using the necessary technologies</i></li> <li><i>Adaptation to new situations</i></li> <li><i>Decision making</i></li> <li><i>Autonomous work</i></li> <li><i>Team work</i></li> <li><i>Work in an international environment</i></li> </ul> </td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> <li><i>Work in an interdisciplinary environment</i></li> <li><i>Production of new research ideas</i></li> <li><i>Project design and management</i></li> <li><i>Respect for diversity and multiculturalism</i></li> <li><i>Respect for the natural environment</i></li> <li><i>Development of social, professional and moral responsibility and gender sensitivity</i></li> <li><i>Promotion of free, creative and inductive thinking</i></li> </ul> </td> </tr> </table> | <ul style="list-style-type: none"> <li><i>Research, analysis and synthesize of data and information, using the necessary technologies</i></li> <li><i>Adaptation to new situations</i></li> <li><i>Decision making</i></li> <li><i>Autonomous work</i></li> <li><i>Team work</i></li> <li><i>Work in an international environment</i></li> </ul>   | <ul style="list-style-type: none"> <li><i>Work in an interdisciplinary environment</i></li> <li><i>Production of new research ideas</i></li> <li><i>Project design and management</i></li> <li><i>Respect for diversity and multiculturalism</i></li> <li><i>Respect for the natural environment</i></li> <li><i>Development of social, professional and moral responsibility and gender sensitivity</i></li> <li><i>Promotion of free, creative and inductive thinking</i></li> </ul> |
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| <ul style="list-style-type: none"> <li>• Research, analysis and synthesize of data and information</li> <li>• Development of research skills</li> <li>• Production of new research ideas</li> <li>• Development of critical thinking</li> <li>• Promotion of free, creative and inductive reasoning</li> <li>• Decision making</li> <li>• Project design</li> <li>• Exposure to the workplace environment of the Molecular Biologist-Geneticist</li> <li>• Use of knowledge-based skills to solve practical problems</li> <li>• Development of time management abilities</li> </ul>   |  |  |

- Awareness regarding safety in the lab
- Teamwork
- Autonomous work
- Decision-making
- Adaptation to new situations
- Development of data evaluation skills
- Development of oral and written scientific communication skills

### 3. COURSE CONTENT

1. Stem cells, cloning and regeneration biology
2. Isolation and culture of embryonic stem cells.
3. Differentiation of embryonic stem cells.
4. The Molecular Basis of Multiplicity.
5. Embryonic stem cell applications.
6. Isolation and culture of tissue-specific stem cells.
7. Differentiation and applications of tissue-specific stem cells.
8. Applications of Tissue Stem Cells.
9. Induced stem cells, methods of creation and their applications.
10. Gene therapy, cloning and stem cells - emerging applications.
11. Cancer Stem Cells.
12. Principles of Mechanical Tissue.
13. Research, applications and bioethics - the example of stem cells

### 4. TEACHING and LEARNING METHODS - EVALUATION

| <p><b>TYPE OF TRAINING</b><br/><i>Face-to-face, Distance learning, etc..</i></p>   | Face to face   |                 |                          |          |   |                      |    |         |    |                                    |    |               |    |                     |           |
|--|--|-----------------|--------------------------|----------|---|----------------------|----|---------|----|------------------------------------|----|---------------|----|---------------------|-----------|
| <p><b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b><br/><i>Use of ICT in teaching, laboratory education, and in communication with the students</i></p>   | <p>Use of ICT in Teaching<br/>Use of ICT in Laboratory Education<br/>Use of ICT in Communication with students</p>   |                 |                          |          |   |                      |    |         |    |                                    |    |               |    |                     |           |
| <p><b>MODES OF DELIVERY</b><br/><i>Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, 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</i></p> | <p>The lesson is based on active learning. In each module the basic concepts are presented by the instructor while the students, working in groups in the classroom, "follow" the research of a scientific group with a key-role in the specific field of science, through selected experiments and key scientific publications. Teaching involves the analysis and interpretation of real experimental data, the formulation of new hypotheses, and the design of the experiments needed to test them. In this way the student not only acquires knowledge but also understands, evaluates and processes primary experimental results, formulates assumptions, designs experiments to test them, while at the same time co-operates with his/her colleagues and the instructor in an environment which, to a large extent, simulates the way a scientific research group operates in the lab.</p> <table border="1" data-bbox="644 1576 1362 1872"> <thead> <tr> <th><i>Activity</i></th> <th><i>Workload/semester</i></th> </tr> </thead> <tbody> <tr> <td>Lectures</td> <td>4</td> </tr> <tr> <td>Interactive teaching</td> <td>22</td> </tr> <tr> <td>Project</td> <td>30</td> </tr> <tr> <td>Study and analysis of bibliography</td> <td>24</td> </tr> <tr> <td>Essay writing</td> <td>10</td> </tr> <tr> <td><b>Course Total</b></td> <td><b>90</b></td> </tr> </tbody> </table> | <i>Activity</i> | <i>Workload/semester</i> | Lectures | 4 | Interactive teaching | 22 | Project | 30 | Study and analysis of bibliography | 24 | Essay writing | 10 | <b>Course Total</b> | <b>90</b> |
| <i>Activity</i>  | <i>Workload/semester</i>   |                 |                          |          |   |                      |    |         |    |                                    |    |               |    |                     |           |
| Lectures   | 4  |                 |                          |          |   |                      |    |         |    |                                    |    |               |    |                     |           |
| Interactive teaching   | 22   |                 |                          |          |   |                      |    |         |    |                                    |    |               |    |                     |           |
| Project  | 30   |                 |                          |          |   |                      |    |         |    |                                    |    |               |    |                     |           |
| Study and analysis of bibliography   | 24   |                 |                          |          |   |                      |    |         |    |                                    |    |               |    |                     |           |
| Essay writing  | 10   |                 |                          |          |   |                      |    |         |    |                                    |    |               |    |                     |           |
| <b>Course Total</b>  | <b>90</b>  |                 |                          |          |   |                      |    |         |    |                                    |    |               |    |                     |           |
| <p><b>STUDENT PERFORMANCE EVALUATION</b><br/><i>Describe of the methods of evaluation</i></p>  | <p><b>Student evaluation languages</b><br/>Greek, English</p>  |                 |                          |          |   |                      |    |         |    |                                    |    |               |    |                     |           |

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| <p><i>language, methods of evaluation, types of exams, 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</i></p> <p><i>Are evaluation criteria known to the students?</i></p> | <p><b>Method (Formative or Concluding)</b><br/>Formative</p> <p><b>Student evaluation methods</b><br/>Work in the room and oral presentation (10%, Formal, Concluding)<br/>Extensive Response Questions (30%, Configuration, Conclusion)<br/>Work in the room with problem solving (30%)<br/>Working in the Chamber with Short Response Questions (30%, Formative, Concluding).</p> <p>The evaluation criteria are presented in the course guide available on the course's website.</p> |
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## 5. SUGGESTED BIBLIOGRAPHY

Title: The stem cells Author: Georgatos Sp et al. Eudoxus code: 2519

The book covers part of the material, the rest is covered by original publications and notes distributed electronically

Course Notes

Title: Stem cell biology – Powerpoint presentations and handouts.

Author: M. Grigoriou Place & Publication Year: Alexandroupolis, 2019