

COURSE OUTLINE

(1) GENERAL

SCHOOL	Health Sciences		
ACADEMIC UNIT	Medicine		
LEVEL OF STUDIES	Post-graduate		
COURSE CODE	MKBB102	SEMESTER	A (1 st)
COURSE TITLE	The biology of stem cells and applications in regenerative medicine		
INDEPENDENT TEACHING ACTIVITIES <i>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</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		3	5
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Specialised general knowledge (post-graduate course)		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek and English		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	http://ecourse.uoi.gr/course/view.php?id=1813		

(2) LEARNING OUTCOMES

Learning outcomes <i>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.</i> Consult Appendix A <ul style="list-style-type: none">• <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i>• <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i>• <i>Guidelines for writing Learning Outcomes</i>																
<p>Students are expected to delve in understanding basic principles of current biology through the study of stem cells and understanding of one of the most modern therapeutic approaches in the field of health biotechnology.</p>																
General Competences <i>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?</i> <table><tr><td><i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i></td><td><i>Project planning and management</i></td></tr><tr><td><i>Adapting to new situations</i></td><td><i>Respect for difference and multiculturalism</i></td></tr><tr><td><i>Decision-making</i></td><td><i>Respect for the natural environment</i></td></tr><tr><td><i>Working independently</i></td><td><i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i></td></tr><tr><td><i>Team work</i></td><td><i>Criticism and self-criticism</i></td></tr><tr><td><i>Working in an international environment</i></td><td><i>Production of free, creative and inductive thinking</i></td></tr><tr><td><i>Working in an interdisciplinary environment</i></td><td><i>.....</i></td></tr><tr><td><i>Production of new research ideas</i></td><td><i>Others...</i></td></tr></table>	<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i>	<i>Project planning and management</i>	<i>Adapting to new situations</i>	<i>Respect for difference and multiculturalism</i>	<i>Decision-making</i>	<i>Respect for the natural environment</i>	<i>Working independently</i>	<i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i>	<i>Team work</i>	<i>Criticism and self-criticism</i>	<i>Working in an international environment</i>	<i>Production of free, creative and inductive thinking</i>	<i>Working in an interdisciplinary environment</i>	<i>.....</i>	<i>Production of new research ideas</i>	<i>Others...</i>
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- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Decision-making
- Working independently
- Team work
- Working in an interdisciplinary environment
- Respect for difference and multiculturalism
- Criticism and self-criticism

(3) SYLLABUS

- **Section 1: Types and properties of stem cells**

Themes taught

Fertilization and pre-implantation embryo development / totipotency, Post-implantation development-organogenesis, Blastocyst cells/pluripotency, Isolation and culture of embryonic stem cells, Assays for pluripotency, Primary spermatocytes, Self-renewal/cell cycle, Methods for maintaining self-renewal/pluripotency in vitro, The gene regulation network of embryonic stem cells, The epigenetic landscape of embryonic stem cells, The signaling pathways of embryonic stem cells, The shift from pluripotency to multipotency, Somatic cell reprogramming / induced pluripotent stem cells, «Plasticity» / transdifferentiation, Adult stem cells / Niche, Cancer “stem cells”

- **Section 2: Laboratory use and applications of stem cells**

2A. Directed stem cell differentiation in vitro

Themes taught

Differentiation of embryonic stem cells to various directions/transient states, Differentiation of adult stem cells / precursors, Signaling pathways and tissue-specific differentiation, In vitro differentiation and malignant transformation

2B. Applications in regenerative medicine

Themes taught

Inherent self-renewal capacity of tissues, Production of tissues *ex vivo*, organoids, Scaffolds / tissue mechanics, Autologous transplants, Cell replacement therapy, Cell therapy of malignancies

Objectives

Deeper understanding of principles of current biology through the study of stem cells and understanding of one of the most modern therapeutic approaches in the field of health biotechnology.

(4) TEACHING and LEARNING METHODS - EVALUATION

<p>DELIVERY <i>Face-to-face, Distance learning, etc.</i></p>	<p>Teaching courses to small groups of students given by several instructors (academic personnel from different disciplines and research specialties).</p>
<p>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i></p>	<p>Powerpoint slides and videos are used in the lectures. Predicted use of electronic voting systems. The powerpoint slides and videos presented, as well as complementary teaching material (videos, links to important research articles or related textbooks, etc.), are freely accessible to the students through the e-course system of the University of Ioannina. Teaching material is updated at least annually. Other</p>

	<p>possibilities offered by the e-course system are also applied (e.g. uploading of quizzes or short problems of study and feedback to the students' answers with comments by the teaching staff). The e-course is also used for communication with the students (http://ecourse.uoi.gr/course/view.php?id=1813). E-mail addresses of the teaching staff are made available to the students and are also freely used as a means of communication.</p>																						
<p>TEACHING METHODS</p> <p><i>The manner and methods of teaching are described in detail.</i></p> <p><i>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.</i></p> <p><i>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>	<table> <tr> <th><i>Activity</i></th><th><i>Semester workload</i></th></tr> <tr> <td>Lectures</td><td>35</td></tr> <tr> <td>Analysis of bibliography</td><td>10</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr> <td>Course total</td><td>45</td></tr> </table>	<i>Activity</i>	<i>Semester workload</i>	Lectures	35	Analysis of bibliography	10															Course total	45
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<p>STUDENT PERFORMANCE EVALUATION</p> <p><i>Description of the evaluation procedure</i></p> <p><i>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</i></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p>	<p>Language of evaluation: Greek and English</p> <p>Methods:</p> <p>(a) Intermediate evaluation through short questions and quizzes that are discussed with the students in the context of each thematic module taught.</p> <p>(b) Evaluation of the students in the analysis and presentation of peer-reviewed articles that are assigned to them by the teaching staff: presentations are given at the end of the semester and the grades from these presentations contribute by 20% to their final grade</p> <p>(c) Written exam (which contributes to their final grade by 80%)</p> <p>Each written exam may include:</p> <p>Short-answer questions</p> <p>Open-ended questions</p> <p>Questions requiring combination of knowledge from different chapters</p> <p>Questions requiring critical thinking/interpretation</p> <p>Evaluation criteria:</p> <p>Successful performance (grade 5/10) in the written exam evaluating students on comprehension of the course material, based on the lessons taught and the corpus of teaching material that is accessible in page http://ecourse.uoi.gr/enrol/index.php?id=1813.</p> <p>Student grades are based on a decimal scale and are given with accuracy of ± 0.5 (grades from +0.25 and above or +0.75 and above are approximated by +0.5 or +1.0, respectively; grades below +0.25 or +0.75 are approximated by +0.0 or +0.5 respectively). The final grade includes a 20% contribution from student grades in article presentations. Written exams are kept officially in the PPS files (Director's office) for at least two years and are accessible to students for</p>																						

	analysis of questions and comments on the themes and the student answers. Reexamination dates after exam failure are scheduled in collaboration with the course Coordinator until the end of the second (first re-exam) or the third semester (second re-exam), at latest. Failure in the second re-exam is considered as a reason for discontinuation of the student affiliation to the program by the Steering Committee. All exam procedures and evaluation criteria are included in the study program rules and regulations, which are accessible at the website http://msc-mcbb.ac.uoi.gr
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(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

Peer-reviewed articles from the literature and textbook chapters that are suggested by the academic teachers on the thematic chapter they teach. This bibliography is available to the students in the corresponding webpage at e-course. Indicatively, the proposed bibliography includes chapters from *Molecular Cell Biology 8e* (Lodish, 2019), review and/or original research articles from *Nature*, *Cell*, *Science*, *Mol Cell*, *Dev Cell*, *Dev Growth Differ*, *Stem Cell Res*, *Biomaterials*, etc..

- Related academic journals:

See <http://ecourse.uoi.gr/course/view.php?id=1813>