

## COURSE OUTLINE “MOLECULAR NEUROBIOLOGY”

### 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>MBG403</b>	<b>SEMESTER</b>	7 <sup>th</sup>
<b>COURSE TITLE</b>	MOLECULAR NEUROBIOLOGY		
<b>TEACHING ACTIVITIES</b> <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>	
	3	4	
<b>COURSE TYPE</b> <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		
<b>THE COURSE IS OFFERED TO ERASMUS STUDENTS</b>	NO		
<b>COURSE WEBSITE (URL)</b>	<a href="https://eclass.duth.gr/courses/ALEX01139/">https://eclass.duth.gr/courses/ALEX01139/</a>		

### 2. LEARNING OUTCOMES

<p><b>Learning outcomes</b> <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>To acquire basic knowledge of the molecular/cellular biology of the neurons</li> <li>to acquire an understanding of the basic molecular mechanisms underlying the development and function of the Nervous System</li> <li>to understand the molecular basis of a series of Nervous System diseases.</li> </ol> <p>Learning outcomes Upon successful completion of the course the student is able:</p> <ul style="list-style-type: none"> <li>• to describe and analyze the basic principles of molecular/cellular biology of the neurons and of synaptic transmission.</li> <li>• to understand the basic principles of nervous system development in vertebrates and invertebrates from induction to synaptogenesis and network development.</li> <li>• comparatively analyze the molecular mechanisms of development between vertebrates and invertebrates</li> <li>• to describe and analyze the molecular basis of the sense of smell in vertebrates and invertebrates and the molecular mechanisms of learning and memory.</li> <li>• to gain an understanding of the experimental approaches in Molecular Neurobiology and emerging applications</li> <li>• to analyze, evaluate and interpret experimental results in Molecular Neurobiology</li> <li>• to propose solutions to problems / questions of Molecular Neurobiology.</li> </ul>		
<p><b>General Skills</b> <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>Research, analysis and synthesize of data and information, using the necessary technologies</li> <li>Adaptation to new situations</li> <li>Decision making</li> <li>Autonomous work</li> <li>Team work</li> <li>Work in an international environment</li> </ul> </td> <td style="vertical-align: top; padding-left: 20px;"> <ul style="list-style-type: none"> <li>Work in an interdisciplinary environment</li> <li>Production of new research ideas</li> <li>Project design and management</li> <li>Respect for diversity and multiculturalism</li> <li>Respect for the natural environment</li> <li>Development of social, professional and moral responsibility and gender sensitivity</li> <li>Promotion of free, creative and inductive thinking</li> </ul> </td> </tr> </table>	<ul style="list-style-type: none"> <li>Research, analysis and synthesize of data and information, using the necessary technologies</li> <li>Adaptation to new situations</li> <li>Decision making</li> <li>Autonomous work</li> <li>Team work</li> <li>Work in an international environment</li> </ul>	<ul style="list-style-type: none"> <li>Work in an interdisciplinary environment</li> <li>Production of new research ideas</li> <li>Project design and management</li> <li>Respect for diversity and multiculturalism</li> <li>Respect for the natural environment</li> <li>Development of social, professional and moral responsibility and gender sensitivity</li> <li>Promotion of free, creative and inductive thinking</li> </ul>
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<p>Search, analysis and synthesis of data and information, ICT Use Adaptation to new situations</p>		

Production of new research ideas  
Equity and Inclusion  
Critical thinking  
Promoting free, creative and inductive reasoning

### 3. COURSE CONTENT

1. The molecular and cellular biology of the neuron and the glial cell
2. Ion Channels - Membrane Potential - Action Potential: From Physiology to Molecular Biology
3. Molecular / cellular mechanisms in synaptic transmission
4. Transmission in the neuromuscular junction
5. Synaptic transmission; Second messengers and signaling pathways
6. Neurotransmitters: Molecular / cellular mechanisms underlying in neurotransmitter release - Diseases of chemical transmission in neuromuscular junction: myasthenia gravis
7. Molecular / cellular mechanisms underlying the induction and organization of the nervous system and in the birth/survival of nerve cells
- 8-9. Molecular / cellular mechanisms underlying the formation and regeneration of synapses
10. Molecular biology of smell
11. Aging of the brain - molecular basis of Alzheimer's disease
12. Learning and memory
13. Cellular mechanisms of learning and memory

### 4. TEACHING and LEARNING METHODS - EVALUATION

<b>TYPE OF TRAINING</b> <i>Face-to-face, Distance learning, etc..</i>	Face to face										
<b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b> <i>Use of ICT in teaching, laboratory education, and in communication with the students</i>	Use of ICT in teaching Use of ICT in communication with the students										
<b>MODES OF DELIVERY</b>  <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>	In order to support and develop the student's scientific thinking, participatory teaching methods are used. Therefore, the student not only acquires knowledge, but also develops experimental design and interpretation skills, while at the same time he cooperates with both his colleagues and the instructor.  <table border="1" style="width: 100%; text-align: center;"> <thead> <tr style="background-color: #e0e0e0;"> <th>Activity</th> <th>Workload/semester</th> </tr> </thead> <tbody> <tr> <td>Lectures</td> <td>39</td> </tr> <tr> <td>Study and analysis of bibliography</td> <td>81</td> </tr> <tr> <td><b>Course Total</b></td> <td><b>120</b></td> </tr> </tbody> </table>	Activity	Workload/semester	Lectures	39	Study and analysis of bibliography	81	<b>Course Total</b>	<b>120</b>		
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<b>STUDENT PERFORMANCE EVALUATION</b>  <i>Describe of the methods of evaluation 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>  <i>Are evaluation criteria known to the students?</i>	<p><b>Student evaluation languages:</b> Greek</p> <p><b>Method (Formative or Concluding):</b> Summative</p> <table border="1" style="width: 100%; text-align: center;"> <thead> <tr style="background-color: #e0e0e0;"> <th>Student evaluation methods</th> <th>Rate (%)</th> </tr> </thead> <tbody> <tr> <td>Written exam with multiple choice test</td> <td>30</td> </tr> <tr> <td>Written Exam with Short Answer Questions</td> <td>30</td> </tr> <tr> <td>Written Exam with Essay Development Questions</td> <td>30</td> </tr> <tr> <td>Written Exam with Problem Solving</td> <td>10</td> </tr> </tbody> </table>	Student evaluation methods	Rate (%)	Written exam with multiple choice test	30	Written Exam with Short Answer Questions	30	Written Exam with Essay Development Questions	30	Written Exam with Problem Solving	10
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Written Exam with Problem Solving	10										

	The evaluation criteria are presented in the course guide available on the course's website.
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#### **5. SUGGESTED BIBLIOGRAPHY**

1. Principles of neural science. Author: Kandel Eric R., Schwartz James H., Jessell Thomas M.  
Eudoxus Code: 45097.
2. Neuroscience and Behavior. Author: Kandel Eric R., Schwartz James H., Jessell Thomas M.  
Eudoxus Code: 467

#### Course Notes

Title: Molecular Neurobiology –Powerpoint presentations and handouts.

Author: M. Grigoriou – K. Paleologou, Place & Publication Year: Αλεξανδρούπολη, 2017