COURSE OUTLINE

(1) GENERAL

SCHOOL			
ACADEMIC UNIT	**Interdisciplinary Graduate Programme in the BRAIN and MIND sciences**		
LEVEL OF STUDIES	7		
COURSE CODE	**B&M-R-107**	SEMESTER	**depending on availability**
COURSE TITLE	Neurophysiology of Visual perception and attention		

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
laboratory exercises	6	9-27
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*	Special background, skills development
PREREQUISITE COURSES:	B&M -102 Introduction to Systems Neuroscience I. Perception B&M -102A Introduction to Systems Neuroscience II. Movement & Cognitive Functions B&M -103 Introduction to Computational Neuroscience B&M 232 Introduction to Statistics and Programming in Matlab Also recommended: B&M-210 Cerebral Cortex: Perception & Movement B&M-236 Introduction to signal processing with applications in the analysis of discrete and continuous neuronal signals
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES
COURSE WEBSITE (URL)	https://elearn.uoc.gr/course/view.php?id=4456

(2) 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 Physiology of Cognitive Functions Laboratory at the Medical School of the University of Crete focuses its research efforts on the understanding of the mechanisms underlying cognitive functions such as visual attention and working memory. To this end, lab members employ electrophysiological

approaches in animal models to record neuronal activity simultaneously from different regions of the cerebral cortex in different behavioral tests. The analysis of the neuronal data and their correlation with behavioral parameters aims to reveal how activity of individual neurons, neuronal populations and interactions between different populations contribute to perception and behavior.

At the end of the laboratory exercise the students will be able to:

- apply the knowledge acquired in the compulsory and elective courses of the programme to design experiments and propose as well as implement analysis of experimental data to answer the questions they examine in the context of their laboratory practice
- reproduce current knowledge and theories in the field of neural mechanisms of visual attention and working memory
- apply analytical approaches described in the literature
- design and develop new methods for the analysis of experimental data
- critically evaluate original literature relevant to the subject of their research
- write a research paper presenting the research hypothesis, the results and discussing their findings in the context of the relevant literature.
- collaborate with other members of the laboratory and contribute responsibly to the research work produced in the lab
- communicate clearly and accurately to specialist and non-specialist audiences conclusions and knowledge that may be the result of original research, self-study or experience

In cases where the research conducted in the lab constitutes a MSc thesis the students will be able to:

- answer comprehensive research questions
- ask original and innovative research questions about the neural mechanisms of visual attention and working memory
- approach research questions in the context of their work in a creative and thorough manner
- work in an autonomous manner to generate new knowledge
- formulate new hypotheses and design integrated approaches to investigate them
- discuss their results and the results' implications in front of a specialized scientific audience
- apply the knowledge gained from the study of compulsory and optional courses to design experiments and propose the design of experiments the optimal methodology for analyzing experimental data to answer the questions they examine in the context of their laboratory practice
- reproduce current knowledge and theories in the field of neural mechanisms of visual attention and working memory
- apply analytical approaches described in the literature
- design and develop new methods for the analysis of experimental data
- write a research paper presenting the research hypothesis, the results and discuss their findings in the context of the relevant literature.

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
- 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
- Showing social, professional and ethical responsibility and sensitivity to gender issues
- Criticism and self-criticism
- Production of free, creative and inductive thinking

(3) SYLLABUS

Training in research methods used to investigate the neural mechanisms of cognitive functions with emphasis on visual attention and working memory. More specifically the students will be trained in some of the following techniques:

- Animal handling and recognition of specific behavioral signs
- Animal training in behavioral tasks associated with visual attention/working memory in the laboratory setting
- Writing and validation of computational code for the control of behavior during animal training
- Recording and analysis of behavioral parameters
- Participation in extracellular recordings of single-neuron and neuronal population activity in behaving animals using electrode arrays
- Writing of computational code for the analysis of (a) single neuron activity, (b) population activity and (c) Local Field Potential (LFP) activity
- Use of machine learning techniques to decode behavioral parameters from neuronal activity
- Application of intra- or trans-cranial stimulation
- Application of reversible inactivation of neuronal activity techniques
- Basic training in surgical techniques

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>Use of shared analysis codes.
Use of publisher databases/electronic repositories of scientific articles</td></tr>
<tr><td>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</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Study and analysis of bibliography</td><td>50-150</td></tr>
<tr><td>project</td><td>100-300</td></tr>
<tr><td>essay writing</td><td>25-75</td></tr>
<tr><td>non-directed study</td><td>50-150</td></tr>
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<tr><td>Course total</td><td>225-675</td></tr>
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<tr><td>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.</td><td>Evaluation Language: English
The student's dedication to conducting the study, autonomy and independence, critical review and analysis of the literature, progress over time, and the quality of the report are evaluated.
Evaluation criteria are outlined in the study guide and communicated to students at the beginning of the course.</td></tr>
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(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:
Scientific articles published in reputable scientific journals within the research interests of the Laboratory of Movement Physiology.