COURSE OUTLINE

(1) GENERAL

SCHOOL			
ACADEMIC UNIT	**Interdisciplinary Graduate Programme in the BRAIN and MIND sciences**		
LEVEL OF STUDIES	Post-graduate studies		
COURSE CODE	E&N-R-134	SEMESTER	Depending on availability
COURSE TITLE	Rotation in "CORTICAL CIRCUIT FUNCTION IN OBJECT RECOGNITION"		

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
Rotation	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:	E&N-102 Introduction to systems neuroscience I - perception E&N-102A Introduction to systems neuroscience II - movement and cognitive functions E&N-103 Introduction to Computational Neuroscience E&N 232 Introduction to Statistics and Programming in Matlab Also recommended are: E&N-210 Cerebral Cortex: Perception and Movement, E&N-236 Introduction to signal processing with applications in the analysis of discrete and continuous neuronal signals
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	English/Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://elearn.uoc.gr/course/view.php?id=4450

(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*

Research done in Systems Neuroscience Lab aims to understand how cortical circuits interact to represent external information that can then be used to guide behavior. To address this question, techniques for recording neural activity are combined with high-throughput behavioral training and computational modeling.

At the end of the laboratory exercise, the student:

- Reproduces, analyzes, integrates, and applies the knowledge gained from the study of the compulsory and optional compulsory courses of the program in the research context of the subject of his exercise.
- Can use this knowledge as a basis for original ideas and research.
- Can use acquired knowledge at a high level of abstraction.
- Can think conceptually, develop, and deepen arguments.
- Analyzes and carries out complex scientific tasks.
- Can cooperate with colleagues and supervisors.
- Takes responsibility for the results of the work.
- Communicates to specialized and non-specialist audiences with clarity and precision conclusions and knowledge that may be the result of original research, self-study or experience.

If the laboratory exercise develops into a diploma thesis, the student's further engagement with the research topic enables him/her to:

- Completes, independently, fundamental research based on methodological knowledge.
- Contributes primarily to the development and implementation of ideas in the field of research.
- Recognizes the limitations of existing knowledge in the scientific field of his activity and at the interface between neighboring scientific fields and adapts his action accordingly.
- Identifies and analyzes complex problems and solves them strategically and creatively.
- Assumes responsibility for managing complex processes.
- Communicates in a targeted manner with colleagues, specialists, and non-specialists, as well as supervisors, depending on the context, using conventions related to the field of knowledge.

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, analysis and synthesis of data and information, using the necessary technologies.
- Adaptation to new situations
- Decision making
- Autonomous work.
- Teamwork.
- Work in an international environment.
- Work in an interdisciplinary environment.
- Generation of new research ideas.
- Project planning and management.
- Demonstrate social, professional, and ethical responsibility and sensitivity to gender issues.
- Exercise criticism and self-criticism.
- Promotion of free, creative, and inductive thinking.

(3) SYLLABUS

Students will be trained in systems neuroscience techniques such as behavioral assays, programing, synthesis & control of visual stimuli, imaging, signal processing, population analysis, & computational modeling. More specifically, they will be exposed to the following techniques in the context of research focusing on object recognition:

a) High throughput behavioral training of rodents in multisensory object recognition tasks.
b) Recording the activity of neural populations with imaging techniques from multiple cortical areas.
c) Optogenetic techniques for manipulation of neural activity.
d) d) Analysis of neural population activity data from 1 and 2 photon imaging during passive viewing and active behavior.

(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 public code repositories
Use of databases
Use of web-based interactive computing platforms</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>Literature</td><td>50-150</td></tr>
<tr><td>Elaboration of a study (project)</td><td>100-300</td></tr>
<tr><td>Writing a report</td><td>25-75</td></tr>
<tr><td>Independent Study</td><td>50-150</td></tr>
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<tr><td>Course total (25 workload hours per credit unit)</td><td>225-675</td></tr>
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</td></tr>
<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>Language: Greek or English.
The student's dedication to the preparation of the study, his autonomy and independence, the critical study and analysis of the literature, his progress over time, the perfection of the report are evaluated.
The evaluation criteria are explicitly mentioned in the Study Guide and are communicated to the students at the beginning of the Exercise.</td></tr>
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(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

Scientific articles published in authoritative scientific journals related to the field of research interests of the Systems Neuroscience Lab of the School of Medicine of the University of Crete.