

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-239	SEMESTER	3rd
COURSE TITLE	Introduction To Experimental Methods In Neurosciences		
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	
Presentations, Tests	On average 3 hours weekly (x10 weeks)	6	
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Special background		
PREREQUISITE COURSES:	No		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	English		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (Reading Courses/Exams in English)		
COURSE WEBSITE (URL)	https://elearn.uoc.gr/course/view.php?id=4421		

(2) LEARNING OUTCOMES

<p>Learning outcomes</p> <p><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></p> <p><i>Consult Appendix A</i></p> <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>How do we understand neuronal communication in the brain, how neurons control behavior, or how circuits malfunction during disease? Measuring how cells fire in the brain is challenging because of their vast numbers and intricate spatiotemporal interactions within a voluminous tissue. Research is continuously pushing the boundaries with techniques that have faster time scales down to the millisecond, and across different spatial scales: from micron-scale, to whole brain imaging. However, no one technique can give us an understanding of the circuits over all these scales, but instead, we have to use information from many techniques in tandem. Accordingly, manipulation of cell firing, needed for identifying the key mechanisms of neural function, is a challenging task that necessitates temporal, spatial and cell-type specificity. The goal of this course is to cover the most important techniques in neuroscience: their principles, their advantages and disadvantages as well how can be combined to address specific hypotheses.</p>

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	Project planning and management
Adapting to new situations	Respect for difference and multiculturalism
Decision-making	Respect for the natural environment
Working independently	Showing social, professional and ethical responsibility and sensitivity to gender issues
Team work	Criticism and self-criticism
Working in an international environment	Production of free, creative and inductive thinking
Working in an interdisciplinary environment
Production of new research ideas	Others...

The course takes more aim at the following specific competences:

- Working independently
- Team work
- Criticism
- Production of free, creative and inductive thinking
- Production of new research ideas

(3) SYLLABUS

After attending the course, the student should be acquainted with the techniques that are used to sample as well as control neural activity such as:

Methods for Sampling neural activity

1. Electrophysiology – Patch clamp
2. Electrophysiology – Multi-electrodes
3. Imaging – Widefield imaging
4. Imaging – Two-photon imaging
5. Imaging – FMRI

Methods for Controlling neural activity.

6. Electrical stimulation
7. Optogenetics
8. Chemical
9. Neurofeedback

(4) TEACHING and LEARNING METHODS - EVALUATION

<p style="text-align: center;">DELIVERY <i>Face-to-face, Distance learning, etc.</i></p>	Face-to-face	
<p style="text-align: center;">USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i></p>	Learning process support through the e-learn platform	
<p style="text-align: center;">TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <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>	Activity	Semester workload
	Lectures	30
	Independent study for exam preparation	150 (5 hours of study required for each hour of lecture)
	Special tests	3
	Final examinations	2
Course total	185	
<p style="text-align: center;">STUDENT PERFORMANCE EVALUATION <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>The evaluation is conducted in English</p> <p>I. Written final examination (100%) including:</p> <ul style="list-style-type: none"> - Multiple choice questions - Short-answer judgment questions - Short presentation <p>or a combination thereof</p> <p>Criteria and assessment method are announced during the course and posted on e-learn</p>	

(5) ATTACHED BIBLIOGRAPHY

<p><i>- Suggested bibliography:</i></p> <p>Guide to Research Techniques in Neuroscience, Matt Carter Jennifer C. Shieh, Associated Press, ISBN: 978-0-12-374849-2 (2010)</p> <p>Imaging: A Laboratory Manual, Edited by Rafael Yuste, Cold Spring Harbor Laboratory Press, ISBN 978-0-879699-35-2 (2011)</p>
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