COURSE OUTLINE

(1) GENERAL

SCHOOL			
ACADEMIC UNIT	**Interdisciplinary Graduate Programme in the BRAIN and MIND sciences**		
LEVEL OF STUDIES	7		
COURSE CODE	**B&M-102**	SEMESTER	**Fall**
COURSE TITLE	Introduction to Systems Neuroscience I: Perception		

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
lectures	6	6
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*	General Background
PREREQUISITE COURSES:	N/A
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES
COURSE WEBSITE (URL)	

(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*

In this module students make the transition from studying the properties of individual nerve cells and the way they communicate at the synapses, to appreciating how interconnected networks of neurons give rise to behavior. The aim of the Systems Neuroscience modules is to introduce students to the study of complex neuronal circuits that give rise to mental activity: perception, programmed action and thinking. Understanding how these networks produce cognitive brain functions is one of the ultimate challenges of science.
In the first module of Systems Neuroscience, students gain knowledge about how sensory information is perceived, and how perception shapes internal representations of the body and the environment.

Specifically, upon successful completion of the course, students will have acquired specialized knowledge about:

- how the nervous system processes sensory information from the level of sensory receptors up to the cerebral cortex, focusing on the main sensory pathways that transmit information to the cortex, their anatomical and functional characteristics and their contribution to

perception
- how the properties of physical stimuli are encoded and perceived
- how specific neurons of the sensory systems, both peripheral receptors and neurons in the sensory cortices encode certain critical characteristics of the stimuli, such as their location and intensity
- how different sensory features are encoded by the pattern of activity in a population of sensory neurons.
- how the specificity of sensory receptors is and the different patterns of neuronal activity contribute to fine sensory discrimination
- the computational principles that govern sensory encoding at different levels of information processing
- how information from different pathways is combined to generate unified conscious perception

Upon successful completion of the course, students
- demonstrate a comprehensive understanding of the course material
- understand the basic theories, concepts and principles underlying perceptual processes
- are able to reproduce the knowledge acquired and communicate it in a clear and unambiguous manner to both specialized and non-specialized audiences.

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
- Working independently
- Team work
- Working in an interdisciplinary environment
- Production of new research ideas
- Criticism and self-criticism
- Production of free, creative and inductive thinking

(3) SYLLABUS

- Vision I. Refractive means of the eye
- Vision II. Visual Processing in the Retina
- Vision III. Psychophysics
- Vision IV. Primary visual cortex
- Vision V. Colour - depth - motion perception
- Vision VI. Higher visual information processing
- Visual attention
- Somatosensation I. Peripheral receptors
- Somatosensation II Anatomical pathways and cortical processing
- Audition and balance

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Integration of ICT in teaching Utilizing the elearn platform for uploading teaching materials Communication via "e-learn" and e-mail
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*	
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.*	Evaluation Language: English Assessment Methods: Multiple-choice questionnaires, short-answer questions Written exam (oral examination available in special cases) Evaluation criteria are outlined in the study guide and communicated to students at the beginning of the course.

Activity	*Semester workload*
Lectures	30
non-directed study	120
Course total	***150***

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Principles of Neural Science, 4th Edition, Edited by Kandel ER, Schwartz JH, Jessell TM, McGraw Hill, 2000.
- Principles of Neural Science, 5th Edition, Edited by Kandel ER, Schwartz JH, Jessell TM, Siegelbaum SA, Hudspeth AJ, McGraw Hill, 2012.
- Principles of Neural Science, 6th Edition, Edited by Kandel ER, Koester JD, Mack SH., Siegelbaum SA, McGraw Hill, 2021.
- Neuroscience, 6th Edition, Purves D, Augustine G, Fitzpatrick D, Hall W, LaMantia A, White L, Mooney R, and Platt M, Oxford University Press, 2018.
- Fundamental Neurosciece, 4th Edition, Edited by Squire L, Berg D, Bloom FE, du Lac S, Ghosh A, Spitz NC, Academic Press, 2012.