# Fundamentals of Neuroscience

## Prof. Cinzia Di Dio

***COURSE AIMS AND INTENDED LEARNING OUTCOMES***

*Aims*

The objective of the course is to expand the basic knowledge related to the structure, development, and function of the central nervous system considered as an anatomical and physiological substrate of the higher functions.

*Intended learning outcomes*

*Knowledge and understanding*

At the end of the course, students will be able to:

– communicate and collaborate with healthcare professionals involved in the diagnosis and therapy of disability;

– understand and process the interconnections between neuroscientific knowledge and pedagogical, historical, philosophical, psychological and sociological knowledge;

– know the neurobiological bases of the main neurological and psychiatric diseases;

– address the lessons that require a basic knowledge in the neuroscientific field;

– develop critical skills that allow them to carry out design and research activities within interdisciplinary work groups.

*Ability to apply knowledge and understanding*

Students will be able to apply their knowledge especially within multidisciplinary research and operational contexts in order to be able to sustain a mature and critical dialogue with professional figures in relation to basic neurofunctional aspects.

***COURSE CONTENT***

– *Basic concepts of neuroscience*

Nerve tissue: neuron and glia. Genesis and transmission of the nerve impulse. Ionic channels. The synapse and the main neurotransmitter systems. Synaptic plasticity.

*– The central nervous system*

Division of the central nervous system. Spinal cord and spinal nerves; brainstem; hypothalamus; thalamus; cerebral cortex.

*– The main sensory systems*

 The somatosensory and optic pathways.

*– The neural control of movement*

The pyramidal bundle and other descending systems.

*– Higher functions*

Structure, connections, and circuits of the cerebral cortex. High-order processing of signals and their integration; associative areas.

*– Mirror system: understanding the motor and affective behavior of others:* anatomical brain systems involved and functions

*– Hot and cold empathy:* what differences? Anatomical brain systems involved and functions

*– Transdisciplinarity and scientific research:*

the study of human behavior through neuroscience in experimental settings

***READING LIST***

B. Cozzi-A. Granato-A. Merighi, *Neuroanatomia dell’uomo,* A. Delfino Editore, Roma, 2018.

G. Rizzolatti, *Lezioni di fisiologia del sistema nervoso*, Esculapio,1998

***TEACHING METHOD***

The course is mainly based on classroom lectures, supplemented by online lectures. The course will include mainly face-to-face lectures according to the official schedule. An audiocommented lecture summary and videos presenting the main contents of the lecture will be available in the "Materials" section of the course, on Blackboard. Links to content or insights related to the lecture will also be available.

The lessons will include the projection of slides and videos that allow the student to take ownership of the content in a visual, syntactic, and authentic way.

***ASSESSMENT METHOD AND CRITERIA***

The final evaluation is based on an oral exam on the contents of the course. In particular, students will be assessed on their ability to link basic neurobiological phenomena with clinical and pedagogical contexts related to disability and marginality.

***NOTES AND PREREQUISITES***

As it is introductory in nature, there are no prerequisites for attending the course.

Further information can be found on the lecturer's webpage at http://docenti.unicatt.it/web/searchByName.do?language=ENG or on the Faculty notice board.