# Psychophysiology and Cognitive Neuroscience

## Prof. Michela Balconi

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

The course aims to: a) illustrate the brain mechanisms underlying the principal perceptual, cognitive and emotional functions; b) present the main disorders resulting from brain injury with relative analyses of supporting clinical cases; c) illustrate the main and most recent investigation methods used in neuroscience and in neuropsychology (neuropsychological, psychophysiological and neuromodulatory measures) and their possible applications in the various sectors of psychophysiology and cognitive neuroscience. In particular, the course will provide a neurofunctional understanding of the main perceptual, cognitive and social processes. At the end of the course, students will be able to examine and describe the main approaches of cognitive neuroscience and psychophysiology, as well as formalise research and intervention plans in the clinical and applicative areas of neuroscience. They will also be able to extrapolate this knowledge to the main areas of intervention and rehabilitation of mental functions. The ability to communicate the knowledge learned in oral and written form and a knowledge of new analysis methods will be another intended outcome, supplemented by critical competence in assessing the theoretical models learned and the main methods of analysis.

***COURSE CONTENT***

The course aims to explore the neuroanatomical systems and the functions, cognitive processes and neurofunctional deficits related to them. The following topics will be covered:

- A brief history of neuropsychology and the cognitive neurosciences;

- Research methods in neuroscience (functional, psychophysiological and psychometric methods)

- Anatomical structures of the CNS and main functions;

- Neural bases of perception and perceptual disorders (agnosias);

- Neural mechanisms of movement and motor disorders (apraxias);

- Mechanisms of attention (spatial and selective) and attention disorders;

- Memory systems and mnemonic deficits;

- Language and communication processes;

- Neuropsychology of emotions and motivation;

- Neural bases of executive functions and disorders of control functions;

- Sleep and biological rhythms (overview);

- Neural bases of conscious experience;

- Brain lateralisation and functional specialisation;

- Social neurosciences;

- Cognitive neurorehabilitation.

***READING LIST***

 *Neuropsicologia cognitiva,* (2019). Pearson, Milano.

Balconi M., *Neuroscienze delle emozioni* (2020). Franco Angeli, Milano.

The reading list for the text-based path will be provided at the beginning of lectures.

***TEACHING METHOD***

The course includes frontal lectures and discussions on clinical cases, starting with research protocols and making use of audio-visual methods.

Methodological aspects will be further explored in a dedicated cycle of practical classes involving the application of neuroscientific, neuropsychological and psychometric tools (neuropsychological tests), with a focus on clinical and rehabilitative neuropsychology. There will also be seminars with experts in the field of experimental and clinical neuroscience.

***ASSESSMENT METHOD AND CRITERIA***

Achievement of the learning objectives will be assessed on two levels, which together each contribute 50% to the overall assessment:

- a written exam on the topics covered in class and the reference texts. This exam will verify students' knowledge of the course's basic concepts and the main analysis methods, with a detailed examination of the contents and reference models of cognitive neuroscience and psychophysiology; these will be evaluated through a detailed examination of the contents and reference models of cognitive neurosciences and psychophysiology.

- an oral exam centred on the single-subject content of lectures and aimed at verifying students' acquisition of specific skills as well as their development of a critical approach to the areas of psychophysiology and cognitive neuroscience with respect to the main areas of application.

Attendance at lectures and practical classes is recommended.

***NOTES AND PREREQUISITES***

There are no specific requirements 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.