UNIVERSITÀ DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Cognitive Neuroscience

2425-1-F5105P002

Learning area

Applied Experimental Psychological Sciences

Learning objectives

Knowledge and understanding
This course provides a strong background in systems-level neuroscience and allows students to develop integrative research interests that cross domains. The laboratory will allow students to learn how to program basic experiments in cognitive neuroscience.

Applying knowledge and understanding
Students will gain a thorough understanding of the intellectual issues that drive this rapidly growing field, as well as expertise in the major methods for research on higher brain function. Students will also learn to apply the acquired knowledge in designing and carrying out empirical studies in the field of cognitive neuroscience. In particular, they will learn how to design experiments in PsychoPy (www.psychopy.org), a program designed to facilitate the conception of any experiment that uses a computer as an interface between the subject and the experimenter.

Contents

The course provides a thorough update and review of fundamental issues in cognitive neuroscience, also considering most recent methodological approaches within the field. It will cover recent developments in research on the neural bases of memory and attention.

Detailed program

• Basics and history of mind-brain investigations

• Research methods in cognitive neuroscience
o Neurostimulation and neuromodulation (transcranial electrical stimulation and single pulse and repetitive transcranial magnetic stimulation)
o Functional Magnetic resonance imaging

• Cognition and the brain
o Neural bases of memory processes
o Neural bases of attention
o Neural bases of consciousness

• Laboratory: programming in PsychoPy
o Creating experiments with "no-coding" in PsychoPy's Builder interface
o Running experiments online with PsychoPy's Pavlovia platform
o Coding in Psychopy

Prerequisites

This course requires a basic knowledge of anatomy and physiology of the nervous system and its cognitive functions. No prior programming skills are required.

Teaching methods

The course will be held in presence. Teaching will consist of 42 hours of lecture-based lessons, and also interactive classwork, discussion on scientific papers, and assignments. There will also be 16 hours of practical course with PsychoPy that will take place in the laboratory, with practical computer exercises, using the Unimib's LIBaaS VMware environment. All course material (e.g., slides, readings) will be made available on the e-learning website of the course, so that also non-attending students can use it.

Assessment methods

1. The exam will consist of 30 multiple choice questions and 1 open question covering all the topics of the course.
   a. Multiple choice questions will be graded 1 if correct and 0 if incorrect.
   b. The open question will be evaluated 0-30 and will be averaged with the multiple choice results for the final grade.

2. For those students who request it, or if the teacher considers it necessary, an oral interview can be arranged: the mark obtained in the oral test will be averaged with that obtained in the written test. The evaluation criteria are: the correctness of the answers, the ability to argue, synthesize, create links, and critically discuss the course topics.

3. Knowldege of programming PsychoPy as imparted by the course will be assessed at the end of the

laboratory practicum, by means of assigned problems such as implementing a new experiment. For those students who could not attend the PsychoPy Lab, an equivalent test will be integrated in the final course exam.

4. Dissertation on a desired topic could be produced, and will integrate the final grade (0-3 points).

A pre-assessment will be held at the end of the course and will consist of a written examination (as in 1).

Textbooks and Reading Materials

The reference textbook is:

Principles of Cognitive Neuroscience.
Dale Purves; Kevin S. LaBar; Michael L. Platt; Marty Woldorff; Roberto Cabeza; Scott A. Huettel
Publisher: Sinauer Associates
Print ISBN: 9780878935734, 0878935738
eText ISBN: 9781605354316, 1605354317

Further learning materials for the classes and laboratory will be indicated during the course and will be uploaded on the course web-site.

Sustainable Development Goals