



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Research Methods in Cognitive Neuroscience

2425-1-F5105P020

Learning area

RESEARCH METHODS IN EXPERIMENTAL PSYCHOLOGICAL SCIENCES

Learning objectives

Knowledge and understanding

- Knowing the functional and technical properties of the most important non-invasive research methods in Cognitive Neuroscience
- Understanding the genesis and dynamics of brain signals and how they do reflect mental functions

Applying knowledge and understanding

- Acquisition of the methodological knowledge required to (i) critically analyze studies applying state-of-the-art techniques in cognitive neuroscience, and (ii) design empirical studies in the field.

Contents

This laboratory course provides essential knowledge on the methodological bases required to apply state-of-the-art techniques in cognitive neuroscience (non-invasive brain stimulation, fMRI, EEG) to explore the several domains of Cognitive Neuroscience.

Detailed program

- Brief review: how the brain can be studied with cognitive neuroscience techniques.
- Brief review: how to design a cognitive neuroscience experiment from a methodological point of view.
- In-depth discussion of functional magnetic resonance imaging (fMRI): basic principles of functioning, critical discussion of some examples on how it can be applied in cognitive neuroscience studies (the case of Motor Cognition will be taken as an example), and hand-on exercises on data analysis.
- In-depth discussion of non-invasive brain stimulation (NIBS): basic principles of functioning, critical discussion of some examples on how it can be applied in cognitive neuroscience studies (the case of Motor Cognition will be taken as an example).
- In-depth discussion of electroencephalogram (EEG): basic principles of functioning, critical discussion of some examples on how it can be applied in cognitive neuroscience studies (the case of Motor Cognition will be taken as an example).
- Practical activity: critical discussion of a research study applying a cognitive neuroscience technique to address a specific theoretical issue.
- Practical activity: development of a research project to address a specific theoretical issue by applying a cognitive neuroscience technique.

Prerequisites

This course requires a basic knowledge of Cognitive Neuroscience of the nervous system and its cognitive functions, and the language skills required to understand scientific articles in English.

Teaching methods

The laboratory consists in lecture-based lessons (12 hours) and interactive classwork (20 hours) to be attended in physical presence. The interactive class-work will include: (i) group discussion on how published studies apply different cognitive neuroscience techniques, (ii) hand-on exercises on data analysis, and (iii) small-group work aimed at preparing a presentation and writing a research project that applies a cognitive neuroscience technique to address a specific theoretical issue in cognitive neuroscience.

Assessment methods

Attendance is required. Students learning will be assessed during data discussion, case study analysis or hands-on experience, and during the presentation of the research project, with questions pertaining issues addressed in class. Numerical grades will not be used but just a passing check, based on attendance and active interaction of students.

Textbooks and Reading Materials

Learning material will be provided during the course.

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING
