UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Methods in Cognitive Neurosciences

2122-2-F5104P037

Learning area

PSYCHOLOGICAL FUNCTIONING: MODELS AND METHODS FOR ASSESSMENT

Learning objectives

Knowledge and understanding

· How to collect and analyze morphological and functional neuroimaging data

· Meta-analyses of neuroimaging data

Applying knowledge and understanding

· Ability of designing experiments using neuroimaging techniques

· Ability to analyse morphological and functional neuroimaging data

· Neuroimaging data interpretation

Interpretation of meta-analyses based on neuroimaging data.

Contents

Students will learn the experimental design principles, data collection and data-analyses of morphometric and functional MRI data with the goal of making inferences on the mind-brain relationship.

During the lab there will be an introduction to the principal software used in neuroimaging analysis, included those used for meta-analyses analisi (MRIcron, SPM, GingerAle, CluB).

Detailed program

LECTURES

- Data collection of CT, MRI and fMRI data
- The digital structure of imaging data;
- Meta-analyses of coordinate based data.
- **Main softwares for neuroimaging:**
- Statistical Parametric Mapping for voxel-based morphometry and fMRI
- MRICron and VSLM in the analysis of acquired lesions.
- Main softwares for meta-analyses: GingerALE and hierarchical clustering.

LAB

- Guided introduction to the aforementioned software
- Analysis of lesion data
- Analysis of morphometric data
- Analysis of fMRI data
- Meta-analysis of fMRI data

Prerequisites

Good knowledge of the foundations of cognitive neuroscience. Previous attendance of the course alle Neurofunctional methods in neuropsychology and clinical psychology is strongly recommended.

Teaching methods

Lectures, and practical exercises on the computer. The practical exercises with imaging data will be introduced with a lecture describing the theoretical foundations for the data analytical procedures

Lessons will be held in presence, unless further COVID-19 related restrictions are imposed.

Assessment methods

Computer based exercise on neuroimaging data. For example, the student may be asked to perform and interpret the results of a first-level analysis of fMRI data of a single subject starting from the raw data.

Although this course is held in Italian, for Erasmus students, course material can also be available in English, and students can take the exam in English if they wish to do so

Textbooks and Reading Materials

The teacher will provide slides and technical articles.

Software needed (the student should install this software on her/his portable computer from the University software repository for students):

SPM12 (software for (f)MRI and PET/VBM data analysis): https://www.fil.ion.ucl.ac.uk/spm/software

MATLAB (software on which SPM12 operates**):** https://it.mathworks.com/academia/tah-portal/universita-degli-studi-di-milano-bicocca-30566431.html

MRIcron (neuroimaging data visualization software): https://www.nitrc.org/projects/mricron

GingerAle (software for meta-analysis): www.brainmap.org