

WORKSHOP IN NEUROIMAGING AND SENSORIO-MOTOR CONTROL

(2.5 ECTS) Research in Behavior and Cognition
www.brainvitge.org

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OBJECTIVES

The main objective of the course is to acquire basic knowledge about some of the most important neuroimaging techniques and sensori-motor experimental settings used in cognition and cognitive neuroscience. The course will give a brief overview of three neuroimaging techniques (electroencephalography, magnetic resonance imaging and transcranial Magnetic Stimulation), highlighting their main characteristics, their use and limitations, focusing in the different designs used in cognitive neuroscience experiments. In addition, the course will provide one session on the bases of sensori-motor movement experimental setups.

METHODOLOGY

The methodology of the course is mainly practical. There will be three sessions where students will attend to different experimental setups (electroencephalography, transcranial magnetic stimulation and sensori-motor control). In these sessions, students will learn the basic experimental aspects, will participant in real experimental sessions and will learn how to interpret the obtained data.

There will be also two sessions dedicated to the analysis of the data using two techniques: electroencephalography and magnetic resonance imaging. In these sessions, students will learn different aspects of the analysis, from the most basic (preprocessing, single-subject and group analysis using standard models) to more complex ones (time-frequency analysis, connectivity measures and independent component analysis). Students will be encouraged to bring laptops in order to perform the analysis by themselves as the sessions will be based in the analysis of real data, more than in theoretical aspects of the analysis.

PROGRAM

1. Introduction to functional Magnetic Resonance Analysis (Josep Marco Pallarés, **Campus Mundet**)
2. Electroencephalography / Event-Related Potentials methods (David Cucurell, **Bellvitge Hospital**)
3. Introduction to Electroencephalography analysis (Josep Marco Pallarés, **Campus Mundet**)
4. Sensorio-Motor control methods (López Moliner, **Campus Mundet**)
5. Transcranial Magnetic Stimulation (Julià Amengual, **Bellvitge Hospital**)

EVALUATION

- Research proposal about the topic of interest of the student including two of the studied techniques (25 %)
- Final exam: (75%)

BASIC TEXT AND MATERIALS

Bandetini, P. (2012) 20 Years of fMRI. Neuroimage, special issue. 61(2), 575-1324

Càmara, E., Marco-Pallarés, J., Muenté, T.F., Rodríguez-Fornells, A. (2005) Neuroimaging Data Analysis II: Functional Magnetic Resonance, in The SAGE Handbook of Quantitative Methods in Psychology.

Huettel, S.A., Song, A.W., McCarthy, G. 2009. Functional Magnetic Resonance Imaging. Sinauer Associates Inc., U.S.; Edición: 2nd Revised edition

Luck, S.J. (2005). An Introduction to the Event-Related Potential Technique. MIT Press

Maestu, F., Rios, M., Cabestrero, S. (2008). Neuroimage: técnicas y procesos cognitivos. Elsevier-Masson

Marco-Pallarés, J., Càmarà, E., Muenté, T.F., Rodríguez-Fornells, A. (2005) Neuroimaging Data Analysis I: Electroencephalography, in The SAGE Handbook of Quantitative Methods in Psychology. in press

Toga, A.W., Mazziotta J. C. (2002). Brain Mapping: the methods. Academic Press; 2 edition.

Toga, A.W., Frackowiak, R., Mazziotta J. C . (2012). Neuroimaging: then, now and the future. Neuroimage, special issue. 61(2), A1-A12, 323-516