COURSE TITLE: EEG Data Analysis for Psychology Research (Michele Scaltritti, 10 hours - 2 cfu)

PERIOD: May-June 2024

COURSE CONTENTS, OBJECTIVES AND LEARNING OUTCOMES

Description of activity and topics:
EEG data potentially provide a lot of different information. The multidimensional nature of EEG data requires a series of data-processing procedures in order to extract informative measures from the raw data. These meetings have the goal to provide a first practical experience with respect to EEG analyses, using EEGLAB (a Matlab toolbox). The 3 meetings will focus on the following issues:
1 – From raw data to event-related potentials: pre-processing and physiological/environmental artifacts.
2 – From raw data to event-related potentials: Artifact detection using algorithms, averaging and measurements on event-related potentials.
3 – Statistical analyses: traditional parametric approaches and non-parametric cluster-based permutation tests.

Specific learning objectives (i.e. specific knowledge and skills that the participants in the activity will acquire):
The goal is to have a first experience of EEG data analysis using EEGLAB. More generally, the goal is to introduce a critical and thoughtful approach to some of the main issues of EEG data analysis, via a hands-on experience with one potential analysis tool

DUBLIN DESCRIPTORS (Indicate the learning objective(s) that the activity aims to achieve, exercise and/or consolidate)

☒ systematic understanding of a field of study and mastery of the skills and methods of research associated with that field;

☒ ability to conceive, design, implement and adapt a substantial process of research with scholarly integrity;

☐ ability to make a contribution through original research that extends the frontier of knowledge by developing a substantial body of work, some of which merits national or international refereed publication;

☒ ability to critically analyse, evaluate and synthesise new and complex ideas;

☐ ability to communicate with their peers, the larger scholarly community and with society in general about their areas of expertise;

☐ ability to promote, within academic and professional contexts, technological, social or cultural advancement in a knowledge based society;

ENTRANCE REQUIREMENTS (Indicate any specific knowledge and/or skills that the student must have in order to participate in the activity)
A general and even purely theoretical knowledge of the EEG signal and about ERPs might be beneficial. For Psychology students, what you have covered during bachelor and master is enough. For students coming from different fields, I will suggest some preliminary readings (purely optional). During the first meeting, we will review together some basic concepts before moving to the proper hands-on phase of the course.

TEACHING AND LEARNING METHODS AND ACTIVITIES

All the meetings would be based on the applications of procedures of EEG analyses on data provided during the course. Students will be asked to run the procedures, as well as to explore alternative solutions and solve small exercises.

ASSESSMENT OF THE ACHIEVEMENT OF LEARNING OBJECTIVES (Possibily an activity carried out independently by the student functional to his/her research activity)
Students will be asked to process (in part) a new dataset, and to identify critical issues and potential solutions.

BIBLIOGRAPHY /STUDY MATERIALS (video-lessons, etc.) (Specificare se il materiale va letto, visionato, etc. prima degli incontri)
During the course, some suggested readings will be discussed. There is no need to read them in advance, or even during the course. The readings are just suggested references. For students with no previous knowledge concerning EEG and ERPs, it might be beneficial to skim through the following:
Luck, S. (2005). An introduction to the event related potential technique, Cambrige: MIT Press (chapters 1 and 2).