Electrical Neuroimaging for the investigation of human brain functions

Organizer(s) Marzia De Lucia, CHUV-UNIL

1.5 ECTS

Summary This course provides a fundamental understanding of EEG neuroimaging, covering data preprocessing, advanced analyses, and statistical methods with examples of analysis pipelines. Students will explore EEG applications in functional connectivity, neurofeedback, and integration with fMRI for a comprehensive approach to brain imaging.

Course level The course is adapted for intermediate and advanced level PhD students.

Pre-requirements The student should ideally cover basic algebra knowledge and bei able to perform calculations with vectors and matrices; some programming knowledge is an advantage. Before each lecture, students will be required to read papers and relevant materials suggested by the teachers.

Content of course sessions and dates in 2026

Session 1, 5th of March, 13h-16h:
Intro to EEG, physics and neurophysiology (M De Lucia)
Recordings and preprocessing (M De Lucia)
Pipeline demo (M De Lucia)

Session 2: 6th of March, 13h-16h
Power spectra and cluster permutation statistic (M De Lucia)
Time-frequency analysis (F Bernasconi)
Pipeline demo (M De Lucia, F Bernasconi)

Session 3: 12th of March, 13h-16h
Inverse solution (I Rigoni)
Functional connectivity (N Roehri)
Pipeline demo (I Rigoni, N Roehri)

Session 4: 13th of March, 13h-16h
Multivariate decoding (M De Lucia)
Neurofeedback (T Ros)
Pipeline demo (M De Lucia, T Ros)

Session 5: 19th of March, 13h-16h
EEG and fMRI combination (1 hours theory + 1 hour pipeline demo + possible visit to an EEG laboratory)

Course materials	- go to "https://moodle2.unil.ch" - log in with your institutional address (unil, chuv, epfl) - click on "Faculté de Biologie et de Médecine" > "Ecole doctorale / doctoral school" > "Lemanic Neuroscience Doctoral School" - course materials and papers will be stored under "*Electrical Neuroimaging for the investigation of human brain functions 2026*"
Location	Geneva, Campus Biotech
Evaluation	Students will be asked to write a project proposal (1-2 pages) integrating material learned during the course with explicit reference to in class-resources such as experimental data that has been reviewed together or specific discussion. Ideally the project proposal should be relevant for the students' PhD project.
Registration	The course is limited to 30 participants. Register before February 10, 2026 by writing a mail to lndscourses@gmail.com (with your supervisor in copy) and stating the course title as subject.