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 2027

All sessions take place from 13-16h.

Session 1: February 25, 2027

- Intro to EEG, physics and neurophysiology (M De Lucia)
- Recordings and preprocessing (M De Lucia)
- Pipeline demo (M De Lucia)

Session 2: February 26, 2027

- Power spectra and cluster permutation statistics (M De Lucia)
- Time-frequency analysis (F Bernasconi)
- Pipeline demo (M De Lucia, F Bernasconi)

Session 3: March 3, 2027

- Inverse solution (I Rigoni)

Session 4: March 4, 2027

- Multivariate decoding (M De Lucia)
- Neurofeedback (T Ros)
- Pipeline demo (M De Lucia, T Ros)

Session 5: March 18, 2027

- EEG and Sleep (G Legendre)

Session 6: March 19, 2027

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 2027*"
Location	Geneva, Campus Biotech, room TBA
Evaluation	Students are expected to be present in at least 5 (out of the 6) course sessions. In the end of the course, a multiple-choice test will have to be passed, based on questions related to the session content. Students must reach at least 60% correct responses to obtain the ECTS for the course.
Registration	The course is limited to 30 participants. Register before February 5, 2027 by writing a mail to lndscourses@gmail.com (with your supervisor in copy) and stating the course title as subject.