Educational course: Neuroimaging – 28.11.2022 – 30.11.2022,

Location: CEITEC MU, Brno, Czech Republic,

Masaryk University Campus, Building E35, Seminar room 145

Detailed program

Monday 28th November

Time	Description
8:30-9:00	Registration of participants
9:00 – 9:40	**Introduction to the course** *(Michal Mikl)* **Anatomical and physiological backgrounds to brain mapping** *(Robert Roman)*
9:40 – 10:45	**Electrophysiological methods in brain mapping** • **EEG signal processing and analysis** *(Martin Lamoš)* • **SignalPlant - software for EEG data handling and deep learning** *(Filip Plešinger)*
10:45 – 11:00	Coffee break
11:00 – 12:30	**Overview of MRI principles for non-physicists** *(Zenon Starčuk)*
12:30 – 13:30	Lunch
13:30 – 15:00	**fMRI basics** • **Principles of fMRI** *(Michal Mikl)* • **fMRI data preprocessing** *(Anežka Kovářová)* • **Statistical analysis of fMRI data** *(Martin Gajdoš)* • **Overview of connectivity, resting-state fMRI studies, independent component analysis** *(Marie Nováková)*
15:00 – 15:15	Coffee break
15:15 – 16:45	**fMRI advanced** • **Seed analysis and Psycho-physiological interactions** *(Marek Bartoň)* • **Granger causality and Dynamic causal modelling** *(Martin Gajdoš)* • **Introduction to dynamic connectivity** *(Martin Gajdoš)* • **Real-time fMRI neurofeedback and its application to psychiatric disorders** *(Pavla Linhartová)*

Tuesday 29th November

Time	Description
9:00 – 10:00	**Principles of DWI and fiber tracking** *(Michaela Bartoňová)*
10:00 – 10:25	**Morphometry – part I** • **Principles and methods of brain morphometry** *(Pavel Říha)*
10:25 – 10:40	Coffee break
10:40 – 11:00	**Morphometry – part II** • **Group analysis in morphometry and another advanced topics** *(Radek Mareček)*
11:00 – 12:15	**Electrophysiology and fMRI** • **Simultaneous EEG-fMRI** *(Radek Mareček)* • **EEG microstates** *(Tomáš Jordánek)*
12:15 – 13:15	Lunch
13:15 – 15:00	**Practical session in MRI labs** • Placed at MAFIL labs (2nd underground floor) • Two parallel groups: A) simultaneous EEG-fMRI recording, B) advanced fMRI approaches and fMRI accessories
15:00 – 15:15	Coffee break
15:15 – 16:30	**Advanced neuroimaging topics** • **Brain graphs: persistent dojmology and other stories** *(Jaroslav Hlinka)* • **How to prepare acquisition of fMRI data** *(Michal Mikl)* • **Data quality and related issues, examples of wrong interpretation** *(Marie Nováková)*

Wednesday 30th November

Time	Description
9:00 – 10:30	**Noninvasive brain stimulation techniques** • **Transcranial magnetic stimulation- basic principles and applications** *(Luboš Brabenec)* • **Transcranial electric stimulation- basic principles and novel methods of NIBS** *(Patrik Šimko)* • **Combination of NIBS with other neuroimaging techniques** *(Ľubomíra Nováková)*
10:30 – 10:45	Coffee break
10:45 – 11:30	**Differences between animal and human studies. technical aspects of animal studies. Quantitative imaging, physiological models, and Perfusion** (Radovan Jiřík)
11:30 – 12:15	**Neuroimaging studies and data – practical aspects** • **How to prepare and conduct neuroimaging study – practical hints** *(Michal Mikl)* • **Data workflow and data formats in neuroimaging. FAIR data, preparation of publicly available datasets** *(Tomáš Slavíček)*
12:15 – 13:15	Lunch
13:15 – 15:30	**fMRI data processing - practical session** Introduction to SPM12 and preparation to data processing (Michal Mikl) Processing of fMRI data in SPM12 with example dataset (Martin Gajdoš)