Summer School of Quantitative Electroencephalography

Blended Intensive Programme in the framework of NeurotechEU

Coordinating university:
„Iuliu Haţieganu" University of Medicine and Pharmacy Cluj-Napoca

Scientific Coordinator: Dafin F. Mureşanu

Host university teaching staff /experts: Livia Popa, Ştefan Strilciuc, Hanna Dragoş

Invited teaching staff: TBA – from partners universities in NeurotechEU

Dates: 11th -15th July 2022

Virtual activity integrated throughout the duration of the BIP

Dates of physical activity: 11th -15th July 2022

Location(s) of the physical activity:
Iuliu Haţieganu" University of Medicine and Pharmacy Cluj-Napoca and partner organization **(RoNeuro Institute)**

Target audience: Students of universities part of the NeurotechEU enrolled at the level of bachelor / master / doctoral / postgraduate studies in the fields of medicine, psychology, neurosciences, engineering, mathematics etc.

Applications: managed by home universities according to their procedures

Number of ECTS granted: 3

Language of instruction requirements: ***English*** – recommended level ***minimum B2***.

Brief description: NEUSSQ is an introduction to the scientific foundations and the analysis quantitative electroencephalography in basic and applied research. This introductory course is addressed to all researchers interested in QEEG analysis (e.g., physicians, psychologists, engineers, or mathematicians), and will involve hands-on exercises and case studies using various technologies (e.g., MATLAB, BrainVision Analyzer2).

Objectives: The course aims to provide early-stage researchers with a basic yet modern understanding of where QEEG has arrived today, as well as potential avenues for its development based on most innovative technologies available. Participants will gain access to a diverse armamentarium of tools for signal processing, facilitating multidisciplinary interaction and exchange of skills.

Provisional schedule:

July 11 (Monday) —- *Intercultural Comprehension. Teamwork techniques*

1. Welcoming participants
2. *Let's break the ice! Discussion on the Romanian* language with teachers from the Department of Modern Languages
3. *Short Introduction of Romanian Culture*

Optionnal: Trip to Turda Salt Mine

July 12 (Tuesday) – *Theoretical foundations and introduction to QEEG*

1. History – from Standard EEG to Brain Mapping
2. Brain activity – Brain waves & Neural networks
3. Experimental settings for QEEG

Optionnal: Intercultural dinner: get to know Romanian cuisine

July 13 (Wednesday) – *QEEG signal processing*

4. Data preprocessing, artifact rejection and reduction (complex demodulation, IIR filters, band-rejection filters, artifact rejection, Independent Component Analysis)
5. Feature Extraction - introduction
6. Hands-on Session

Optionnal: City Guided Tour (free of charge, offered by the municipality)

July 14 (Thursday) – *Signal transformation and data analysis using linear methods*

7. Frequency and time-frequency domain analysis

8. Fast Fourier Transform (FFT), Wavelet, Phase-amplitude coupling
9. Hands-on Session

Optionnal: Botanical Garden visit

July 15 (Friday) – *Nonlinear methods and other technologies*

10. Dimensional complexity, Regularity, Predictability
11. QEEG and fMRI, fNIRS, TMS, tDCS/tACS, MEG, and eye-tracking
12. Hands-on Session
13. Virtual component (***3 hours online teamwork activity***) – to be specified
14. Participants assessment

Closing Ceremony

- ***Daily schedule will include Coffee Break (offered by the organizers)*** *and Lunch Break (cost paid by the participants, excepting July 11th)*

Accommodation: Student's dorms (Housing application form available upon request, 2 participants /room; student fare **approx. 4,5 euros/night**)