

# ***Multivariate pattern analyses of Electroencephalography data: Theory and Practice.***

- Website: <https://wpd.ugr.es/~multiveeg/>
- **Dates:** 23-27th of November 2020
- **Number of students:** 30 (maximum).
- **Contact:** María Ruz (--LOGIN--e85821c394b6a1a3e2ce7d3da0750fd6ugr[dot]es ), Centro de Investigación Mente, Cerebro y Comportamiento (CIMCYC).
- **Organizing Committee:** María Ruz (UGR), Teresa Bajo (UGR), Andrés Catena (UGR), Juan M. Górriz (UGR), Lluís Fuentemilla (UB), Juan Linde (Max Planck Inst.), Ben Griffiths (LMU), Radoslaw M. Cichy (FU-Berlin).
- **Inscription:** Via web (to be announced by September 2020)
- **Fee:** Free

The course will be offered for free to the accepted students, which will have the opportunity to participate in practical sessions with real data and interact with the course instructors. The contents, however, will be available on the website for anyone aiming to learn multivariate methods applied to EEG data.

## • **Lecturers**

- María Ruz: <http://www.ugr.es/~mrucz/>
- David López García: [https://www.researchgate.net/profile/David\\_Lopez-Garcia](https://www.researchgate.net/profile/David_Lopez-Garcia)
- Lluís Fuentemilla: [http://brainvitge.org/member/fuentemilla\\_ll/](http://brainvitge.org/member/fuentemilla_ll/)
- Alexis Pérez Bellido: <http://brainvitge.org/member/alexis-perez-bellido/>
- Marta Silva: <http://brainvitge.org/member/marta-silva/>
- Xiongbo Wu: <http://brainvitge.org/member/xiongbo-wu/>
- Ben Griffiths: [http://www.psy.lmu.de/knp/people/ben\\_griffiths/index.html](http://www.psy.lmu.de/knp/people/ben_griffiths/index.html)
- Juan Linde Domingo: <https://www.mpib-berlin.mpg.de/staff/juan-linde-domingo>
- Radoslaw M. Cichy: <http://userpage.fu-berlin.de/rmcichy/>
- Kshitij Dwivedi: [https://www.ewi-psy.fu-berlin.de/en/einrichtungen/arbeitsbereiche/neural\\_dyn\\_of\\_vis\\_cog/team\\_v2/visitors/kshitij/index.html](https://www.ewi-psy.fu-berlin.de/en/einrichtungen/arbeitsbereiche/neural_dyn_of_vis_cog/team_v2/visitors/kshitij/index.html)

The course will combine pre-recorded theoretical contents, which will be available in advance, with synchronous practice live sessions in smaller groups. Main contents:

- Day 1: Introduction to the electroencephalography (EEG) signal. Biological basis and properties. EEG oscillations. Signal preprocessing for multivariate analyses. Considerations for experimental designs. Pros and cons of Univariate vs. Multivariate approaches.
- Day 2: Introduction to classifiers: Families and properties. Time-resolved decoding. EEG features for classifier training. Practice with EEG preprocessing and classification (LDA). K-fold cross-validation.
- Day 3: Generalized classification. Searchlight analysis. Practice with time generalization. Evaluation of the performance of classifiers. Controlling methodological and analytical confounds. Practice with classifier interpretation and addressing confounds.
- Day 4: Introduction to Representational Similarity Analysis (RSA). Practice with RSA in a simple dataset. State segmentation methods. Forward encoding models. Practice with building a simple forward encoding model.
- Day 5: Introduction to Deep Neural Networks (DNN). Practice with simple DNN (extracting features, RSA and forward encoding).