

# DEEP TECH BRAIN: SUMMER SCHOOL

## STUDY PLAN

Course type: Microcredential

Teaching modality: Fully in-person

Language of instruction: English

Number of credits: 3

### General features of the teaching methodology:

The summer school takes place over five consecutive days in a fully in-person format, comprising:

- **Lectures** (8 hours)

Theoretical sessions aim to provide key knowledge on the role of neurotechnologies (including neuroimaging, neuromodulation, virtual reality, and artificial intelligence) in both basic and clinical neuroscience. These sessions are structured into four thematic blocks and serve as the theoretical foundation for the practical sessions and seminars, ensuring that students acquire the necessary understanding to participate actively and effectively.

- **Practical classes** (14 hours)

The hands-on sessions aim to equip students with the skills required to independently and efficiently use and combine various neurotechnologies in human neuroscience research and clinical applications. Students will engage directly with tools and methodologies involving neuroimaging, neuromodulation, VR, and AI. Classes are delivered in small groups to enhance experiential learning and maximize the effectiveness of practical instruction.

- **Integration seminars** (8 hours)

These seminars promote active discussion and critical thinking on specific topics addressed throughout the course, incorporating case study analyses and scientific article discussions. Students are expected to engage meaningfully and demonstrate comprehension. Preparatory materials will be provided in advance to ensure productive and informed contributions.

### TEACHING PLAN

#### Thematic blocks:

#### Block 1: Basic Neuroscience (University of Barcelona, Cognitive Neuroscience Unit)

- **Topic 1:** Core concepts in the use and integration of non-invasive brain stimulation, neuroimaging, neurophysiology, VR, and AI.
- **Topic 2:** Application of these techniques to explore brain function and plasticity.

#### Block 2: Clinical Neuroscience (Institut Guttmann, Barcelona)

- **Topic 3:** Application of Block 1 techniques in neurology and neurosurgery.

- **Topic 4:** Application of Block 1 techniques in psychiatry.

## **EVALUATION**

**Continuous assessment (attendance + individual project):** 40%

**Final exam (multiple choice test):** 60%

## **REQUIRED READINGS**

Edwards, D. J., Fried, P. J., Davila-Pérez, P., Horvath, J. C., Rotenberg, A., & Pascual-Leone, A. (2024). *A Practical Manual for Transcranial Magnetic Stimulation*. Springer Nature.

Cohen Kadosh, R. (2014). *The Stimulated Brain: Cognitive Enhancement Using Non-Invasive Brain Stimulation*. Elsevier.

Jenkinson, M., & Chappell, M. (Eds.). (2018). *Introduction to Neuroimaging Analysis*. Oxford University Press.