

DEEP TECH BRAIN: NEUROIMAGING

STUDY PLAN

Course type: Microcredential

Teaching modality: Distance learning

Language of instruction: English

Number of credits: 3

General features of the teaching methodology:

- 10 Sessions teòriques de 2h amb modalitat asíncrona.
- 10 hores de sessions pràctiques amb exercicis relacionats amb el contingut teòric.

TEACHING PLAN

Contents:

Thematic blocks:

1. Block 1. Introduction to Neuroimaging
 - 1.1. Fundamentals
2. Block 2. Magnetic Resonance Imaging (MRI)
 - 2.1. Basics of Magnetic Resonance Imaging
 - 2.2. Preprocessing and Analysis of Structural MRI
 - 2.3. Preprocessing and Analysis of Functional MRI (task-based, resting-state)
 - 2.4. Applications of MRI in the Study of Health and Disease
3. Block 3. Positron Emission Tomography (PET)
 - 3.1. Preprocessing and Analysis of PET Imaging
 - 3.2. Applications of PET in the Study of Health and Disease

Practices:

Audiovisual material, asynchronous

There will be 4 practical tests: two corresponding to Block 2 and two more corresponding to Block 3.

Objectives:

- Understand the **physical and neurophysiological principles** underlying Magnetic Resonance Imaging (MRI) and Positron Emission Tomography (PET) for brain imaging.
- Learn about the **main approaches for processing and analyzing MRI and PET data**, and how to **select the appropriate ones** when designing a study.
- Explore **clinical and research applications** of MRI and PET neuroimaging.

- Interpret neuroimaging study results at both **anatomical and functional levels**.
- Analyze and critically evaluate scientific findings when reading a published study.
- Begin practicing the **processing and analysis of morphological and functional images**.

EVALUATION

Continuous assessment:

- Practical exam Block 1: **20%**
- Practical exam Block 2: **20%**
- Final exam (theoretical): **60%** — assesses theoretical knowledge acquired

Exam format:

- Multiple choice (4 options per question)
- Wrong answers deduct 0.25 points
- Grading scale: 0–4.9: Fail, 5–6.9: Pass, 7–8.9: Good, 9–10: Excellent

To pass the course:

- A **minimum of 5 out of 10 points** is required to pass the course.
- All **three exams must be completed** to receive a final grade.
- The **theoretical part of the course must be passed** in order to average the scores from all three exams and obtain the final mark.

RECOMMENDED BIBLIOGRAPHY

Jenkinson, M., & Chappell, M. (2018). Introduction to neuroimaging analysis. Oxford University Press.

Bijsterbosch J, Smith S, Beckman C. Resting state fMRI functional connectivity. Oxford University Press; 2017

Huettel S, Song A.W, and McCarthy G. Functional Magnetic Resonance Imaging. 3rd ed. Sunderland, Mass. : Sinauer Associates, 2014