



## MODULE 3: NERVOUS SYSTEM DISEASES

Code: 43645

Type: Elective

Credits: 6 ECTS

Language: English/Spanish

**Module's Coordinator:** Sunny Malhotra, PhD

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**Schedule for mentoring:** Wednesday from 10:00 to 12:00h

*Although having this timetable proposal, the **students have to arrange an appointment with the teacher by e-mail.***

## OBJECTIVES

The goal of the module is to provide the students the knowledge of the physiological and pathological mechanisms responsible in the development of psychiatric and neurological diseases.

In addition, the module aims to generate in the students a critical vision of problems and challenges that appear in this field and the approaches to overcome those issues.

## SKILLS

E01. Identify and use the tools, techniques and methodologies of translational clinical research to solve problems in human health.

E01.14 Learn morphological, imaging, biochemical, genetic, molecular and cellular techniques used in neurological and psychiatric research.

E01.15 Learn the bases and methodologies that enable the identification and design of new therapeutic targets against neurological and psychiatric diseases.

E02. Use of modification techniques in living organisms (or part of them) to improve pharmaceutical and biotech processes or to develop new products.

E02.3 Apply cell and molecular biology techniques to produce diagnostic and therapeutic products for neurological and psychiatric diseases.

E03. Analyze the pathophysiology at the molecular level using the scientific method and identify its relationship with the clinical process of different diseases.

E03.3 Understand the basis that underlay the main neurological and psychiatric diseases from the point of view of epidemiology, physiopathology, clinics and diagnosis.

## CONTENTS

### Lesson 1. Introduction

- 1.1 Introduction: Brain and peripheral nervous system
- 1.2 Brain neuroanatomy
- 1.3 Brain imaging techniques

### Lesson 2. Paroxysmal diseases

- 2.1 Headache and neuropathic pain
- 2.2 Mouse models of migraine

### Lesson 3. Pheripheral nervous system

- 3.1 Regeneration and plasticity of the nervous system

**Lesson 4. Neurovascular diseases**

- 4.1 Stroke physiopathology, diagnosis and treatment
- 4.2 Experimental models of ischemic stroke
- 4.3 Intracranial hemorrhage
- 4.4 Neurorehabilitation after stroke

**Lesson 5. Psychiatric diseases**

- 5.1 Understanding ADHD across lifespan
- 5.2 Autism
- 5.3 An overview of approaches to study the genetics and epigenetics of psychiatric

**Lesson 6. Epilepsy**

- 6.1 Clinical aspects of Epilepsy
- 6.2 Treatment

**Lesson 7. Neurodegenerative diseases***Parkinson's disease*

- 7.1 Clinical aspects of Parkinson's disease
- 7.2 Biomarkers in Parkinson's disease
- 7.3 Parkinson's disease: molecular mechanism of neurodegeneration
- 7.4 Role of the lysosomal pathway in Parkinson's disease

*Alzheimer's disease*

- 7.5 Molecular mechanisms of Alzheimer disease and other dementias
- 7.6 Clinical aspects of primary neurodegenerative dementias
- 7.7 Diagnostic and treatment of Alzheimer's disease
- 7.8 In vivo and in vitro models of Alzheimer's disease

**Lesson 8. Mitochondrial diseases**

- 8.1 Mitochondrial diseases 1
- 8.2 Leigh syndrome due to mitochondrial disorders in children
- 8.3 Mitochondrial diseases: Experimental models

**Lesson 9. Clinical Neuroimmunology**

- 9.1 Role of environmental factors, Epstein-barr virus and vitamin D in multiple sclerosis
- 9.2 Genetics and pathology of multiple sclerosis

9.3 Clinical and diagnostic aspects of multiple sclerosis

9.4 Overview of drugs currently registered for multiple sclerosis

## Lesson 10. Neuromuscular diseases

10.1 Myasthenia gravis and related disorders

10.2 Duchenne muscular dystrophy and spinal muscular atrophy: Novel therapeutic options

10.3 McArdle disease and other glycogen storage diseases

## Practicum

Working with mice

Neuropathology

## METHODOLOGY

Theoretical classes

Laboratory practice

Making reports/works

Autonomous study

Reading articles/reports of scientific interest

Presentation/ oral defense of works

Tutorials

## EVALUATION

Theoretical exam	50%
Assistance y participation	10%
Practical work report	10%
Oral presentation	30%

### Note that:

- This module does not include a single evaluation system.
- **Attending a minimum of 80% of the classes is required for taking the exam and passing the course. Unexcused absence of 20% or more mean failing the subject.**

### Second-chance examination:

- Students who fail the course (grade lower than 5), will be entitled to a second evaluation, provided

that they have participated in all the evaluation activities and have a final average grade equal to or higher than 3.5.

- Second-chance evaluation will consist in preparing a report that should be submitted within a maximum timeframe of 15 days, or a theoretical exam depending of each situation.
- The maximum grade of the second-chance evaluation will be a pass mark (5).

## TEACHING STAFF

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## ACADEMIC SCHEDULE

**Dates:** from 21<sup>th</sup> October to 7<sup>th</sup> November 2024.

**Exam date:** 18<sup>th</sup>, 19<sup>th</sup>, and 29<sup>th</sup> November, from 9 to 11 am.

[See the Master's Degree Schedule for academic year 2024-2025](#)

### Classroom:

Please, check the information board at the Academic Office of the Teaching Pavilion in order to confirm the classroom before the class starts.