

COURSE DETAIL

CELLULAR AND MOLECULAR NEUROBIOLOGY

Country

Italy

Host Institution

University of Bologna

Program(s)

University of Bologna

UCEAP Course Level

Upper Division

UCEAP Subject Area(s)

Biological Sciences

UCEAP Course Number

181

UCEAP Course Suffix**UCEAP Official Title**

CELLULAR AND MOLECULAR NEUROBIOLOGY

UCEAP Transcript Title

CELL&MOLCR NEUROBIO

UCEAP Quarter Units

6.00

UCEAP Semester Units

4.00

Course Description

This course is part of the Laurea Magistrale degree program and is intended for advanced level students. Enrollment is by permission of the instructor.

This course provides students with an advanced knowledge of cellular neurobiology and molecular mechanisms of brain functions, as well as to make students able to apply this knowledge to specific aspects of nervous system physiopathology. This course is an overview of advanced topics in neurobiology and is designed to introduce and discuss the biological models, the techniques and the research strategies employed in this research field, as well as the molecular mechanisms underlying the structure and function of the nervous system. The course is divided into three general topic areas: cell biology of the nervous system, molecular mechanisms in the brain functions, and their alterations in neuropathologies. At the end of the course, the student is able to: understand and discuss properly main aspects of nervous system physiopathology; read and comprehend scientific articles; use this neurobiology background for advances experimental purposes. The course content is divided as follows:

1. Advanced Methodological Approaches in Neurobiology: From optogenetics to neuroimaging, brain atlas.
2. In Vitro and In Vivo Models in Neurobiology: From primary cultures to brain organoids, with an introduction to related ethical issues.
3. Cellular Neurobiology: Cells of the nervous system, their interactions, and communication systems. Biology and physiology of neurons. Oligodendrocytes and the myelin sheath. Astrocytes and microglia.
4. Molecular Neurobiology: Biochemical, molecular, and epigenetic mechanisms underlying cognitive brain processes, such as synaptic plasticity, learning, and memory (from invertebrates to mammals).
5. Developmental Neurobiology: Molecular mechanisms underlying the origin of various CNS cell types, cell migration, axonal formation, synapse stabilization, activity-dependent CNS development, critical periods, and neural plasticity. Neural stem cells and adult neurogenesis.
6. Cellular and Molecular Mechanisms of Brain-Environment Interaction: Gut-brain axis and circadian rhythm regulation.

7. Alterations in Cellular and Molecular Neurobiology in Neuropathologies:
Neurodegenerative diseases, prion disorders, neurodevelopmental
disorders, and neuropsychiatric diseases.

Language(s) of Instruction

English

Host Institution Course Number

B5850

Host Institution Course Title

CELLULAR AND MOLECULAR NEUROBIOLOGY

Host Institution Course Details

<https://www.unibo.it/it/studiare/insegnamenti-competenze-trasversali-moocs/inse...>

Host Institution Campus

BOLOGNA

Host Institution Faculty**Host Institution Degree**

LM in MOLECULAR AND CELL BIOLOGY

Host Institution Department

PHARMACY AND BIOTECHNOLOGY

Course Last Reviewed

2025-2026

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