UNIVERSITÀ
DEGLI STUDI
DI PADOVA

Course unit English denomination	**Neurodegeneration**
SS	MEDS-02/B
Teacher in charge (if defined)	Emanuela Zuccaro, Elisa Greggio, Elena Ziviani
Teaching Hours	13
Number of ECTS credits allocated	2
Course period	To be determined
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☒ Yes (80% minimum of presence) ☐ No

Course unit contents	The course provides a comprehensive exploration of both the molecular and clinical aspects of neurodegenerative diseases, offering in-depth insights into the clinical features and pathogenesis of a broad range of neurodegenerative diseases, including Alzheimer's disease, Parkinson's disease, repeat expansion disorders, and prion diseases.
	
	Key topics will include:
	
	• The accumulation of misfolded and aberrant proteins, the inflammatory response, and the cellular and molecular mechanisms underlying neurodegeneration, as well as disease propagation.
	
	• The initiation, genetic contributions, and pathomechanisms of neurodegenerative diseases.
	
	• Diagnostic methods and potential strategies for therapeutic intervention.
	
	• Animal and cell culture models pivotal to research on neurodegenerative diseases.
	
	• Practical experience: The practical part of the course consists of **3 hours**, structured as follows:
	
	  - Theoretical session (1 hr) covering microscopy techniques used in the subsequent rotations (TEM, confocal, and high-content imaging).
	  - TEM visualization (40 mins), focusing on mitophagy defects and other proteostasis impairments in Parkinson's disease models.

- Confocal microscopy (40 mins), using mouse brain sections with Alzheimer's and Parkinson's pathology.
- High-content imaging (Operetta) (40 mins), demonstrating high-throughput screening approaches to identify/evaluate potential druggable molecules based on cellular readouts (e.g., protein aggregation, increased target phosphorylation, etc.).

Learning goals	By the conclusion of the course, students should be able to: 1. Describe the pathophysiology of the most prevalent neurodegenerative disorders, including the clinical symptoms, the affected cells and regions, as well as the potential mechanisms underlying disease progression. 2. Describe and analyze potential mechanisms of disease spread. 3. Explain and interpret the role of genetics in the development of neurodegenerative diseases. 4. Demonstrate a thorough understanding of investigative methods and diagnostic approaches. 5. Describe and evaluate in vivo and in vitro disease models available. 6. Engage in a critical discussion of the potential future disease-modifying treatment options. 7. Evaluate the scientific literature on both the clinical and research aspects of neurodegenerative diseases.
Teaching methods	The course will be divided into 10 hours of lectures supported by slides and 3 hours of practical experience. The course involves active student participation through both questions and the use of interactive teaching tools. The supporting slides will be made available to students via upload on the Moodle platform.
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes Classes are open to doctoral students only in the following courses: Biosciences ☐ No
Prerequisites (not mandatory)	Basic knowledge of Neurobiology, Cellular and Molecular Biology. Basic knowledge of Microscopy.
Examination methods (if applicable)	Multiple-choice Quiz
Suggested readings	Slides, scientific articles, and supplementary materials will be made available to students on the Moodle platform.
Additional information	