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Summer School ZQT433 - Eukaryotic Cell Biology

PROF. WANDA LATTANZI

Overview

Area: Experimental biology, basic science, applied sciences.

Dates: June 23 – July 10 (3 weeks)

Campus: Rome

Course Number: ZQT433

Term: Summer 2026

Credits: 6 ECTS

Course description

The human body is made of trillion cells, which vary in shape, size, organelle distribution, and functional activities. As in many aspects of human biology, the structure explains the specific function of each cellular compartment. As a direct consequence, subtle anomalies affecting specific organelles and cellular compartments may result in human diseases, and cells may represent suitable tools for improving organ functions, and targets in the design of novel drugs and treatments. The course will provide the basic knowledge on the biology of eukaryotic cells and introduce the key aspects of experimental biology applied in the medical field, including cellular and molecular mechanisms in disease pathogenesis and exploitation of cells as therapeutics.

Main topics

- The concept of biological order applied to living organisms; the cell theory: an introduction to the cell as the basic unit of life, with a view on evolution and ontology.
- Cellular biomolecules and metabolisms: the molecular basis of life.
- General structure of the eukaryotic cell
- Structure and function of subcellular organelles and structures.
- Focus on the eukaryotic nucleus: the flow of the genetic info.
- The cell cycle and its regulation. Meiosis and mitosis.
- Cellular biology in medicine: stem cells and their applications; cell's mechanisms in disease pathophysiology

Learning objectives

- Understand the main structural organization of the eukaryotic cell and how structure relates to function.
- Derive the complex cellular functions from the combined activities of subcellular organelles
- Understand how cells interact with the extracellular environment and with the surrounding cells.
- Acquire basic knowledge on stem cell biology and applications
- Discuss cellular involvement in disease pathogenesis.

Course requirements



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Students are expected to:

- attend lectures and participate in class discussions,
- develop project works,
- attend the laboratory experiential sessions.

Grading

Class participation	25% of final grade
Home and class assignments	25% of final grade
Research project	25% of final grade
Final written exam	25% of final grade

Course readings and materials

- Karp G, "Cell and Molecular Biology – Concepts and Experiments" 8 edition, Wiley, 2016 (latest available edition)
- Alberts B, et al. Essential Cell Biology, 4th Edition, Garland Science Taylor & Francis Group, 2013.
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3203695/>
- Updated literature provided by the instructors

Teaching methods

The teaching methods implement active learning activities, such as problem-based learning, self-learning, case studies and experimental activities both in real laboratory environments and using online platforms for virtual laboratory scenarios (Labster).

Site visits

Visit to clinical laboratories and research facilities.

Rules of conduct

Attendance: Attendance of at least 70% of the entire course is mandatory and this applies also to site visits'. An excused absence will only be granted if you are seriously ill and can support your claim with a local doctor's certificate dated the day you missed class (therefore you must go to the doctor that same day) that has to be delivered to the Professor or to Cattolica International Office. Fail to comply with this rule will result in impeding your admission to the final exam.

Exam Date: The exam date cannot be re-scheduled. Should the dates of the final exams be moved for force major reasons, Cattolica International Office and the Professor will promptly inform you in class and/or via e-mail on the new date agreed. Unexcused absences to the exams will result in a failing grade in the course.

In cases of unforeseeable circumstances such as illness or injury on the day of the exams, you must submit a medical certificate and communicate your absence to the Professor and Cattolica International Office via email prior to the exam. If the student does not justify his/her absence through sufficient documentation and with adequate notice before the final test, you will receive an automatic Failed.

Absences for other unforeseeable circumstances will not be accepted and will result in a failing grade.

Bio of the instructors

Wanda Lattanzi is Associate Professor of Experimental Biology at the Università Cattolica S. Cuore, where she teaches cellular biology in several bachelor and master degree courses, and is in charge of tutoring PhD students. She holds a documented scientific expertise in cellular and molecular biology, mostly focused on stem cells, development of tissue engineering strategies for tissue regeneration and translational research on developmental diseases. She obtained funds for her research activity through the national and international agencies and coordinates a group of



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PostDocs and PhD students.

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Elvira Ragozzino is a post-doc researcher at Università Cattolica del Sacro Cuore. She graduated in Medical Biotechnologies in 2014 at Università degli Studi di Napoli “Federico II” and obtained her PhD in Neurosciences in 2022 at Università Cattolica del Sacro Cuore. Over the past 8 years, Dr. Ragozzino has been involved in many research projects in the field of neuromuscular disorders and rare diseases. Her areas of expertise include skeletal muscle regeneration, molecular and cellular biology and her main interest is in the identification of tissue and circulating biomarkers for muscular dystrophies focusing on inflammation and extracellular vesicles.

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Federica Tiberio is an assistant professor of cellular and experimental biology at the Università Cattolica del Sacro Cuore in Rome (Italy), where she teaches in several bachelor’s and master’s degree courses, and oversees tutoring students and PhD students. She obtained her Medical Biotechnology Master’s degree in 2017 from the Università “La Sapienza” in Rome and in 2022 she completed her Doctorate in Experimental and Translational Medicine at Department of Life Sciences and Public Health at Università Cattolica del Sacro Cuore, in Rome. During her scientific career, Dr. Tiberio acquired a wide expertise in cellular and molecular biology mainly applied to skeletal disorders. In this context, she focused her experimental activities on the characterization of the pathogenic mechanisms involved in bone-related rare conditions and on the development of innovative therapeutic strategies for the treatment of these conditions.

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Domiziano Dario Tosi obtained his PhD in Experimental and Translational Medicine in 2025 at the Department of Life Sciences and Public Health at the Università Cattolica del Sacro Cuore in Rome, after completing Master’s degree in Functional Genomics in 2021 at the University degli Studi of Trieste.

His research focused on understanding the impact of microgravity on primary cilium-mediated mechanotransduction in bone-derived mesenchymal stromal cells, with particular attention to skeletal development, bone homeostasis, and craniofacial disorders. During his training, he gained extensive experience in cell and molecular biology, mechanobiology, and 3D computational modeling. He has also been involved in projects investigating pediatric skeletal diseases and craniofacial defects, contributing to the characterization of mesenchymal stromal cells and the study of signaling pathways associated with the phenotype. In addition, he participated in interdisciplinary research activities involving therapeutic molecule delivery strategies, and translational applications in regenerative medicine and craniofacial tissue engineering.

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Alessia Vita obtained her Master’s degree in Biotechnology for Personalized Medicine in 2021 and completed her PhD in Experimental and Translational Medicine in 2025 at the Università Cattolica del Sacro Cuore in Rome. Her research focused on skeletal disorders and craniofacial defects, investigating pathogenic mechanisms and developing innovative therapeutic strategies. She contributed to the characterization of mesenchymal stromal cells and explored non-invasive therapies using human amniotic membrane-derived factors. Additionally, she has participated in several research projects, including the promotion of sustainable laboratory practices through the evaluation of eco-friendly biomaterials.

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Martina Salvati obtained her PhD in Experimental and Translational Medicine in 2025 at the



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Department of Life Sciences and Public Health at the Università Cattolica del Sacro Cuore in Rome, after completing her Master's degree in Biotechnology for Personalized Medicine in 2021 at the same institution. During her professional training, she gained extensive experience in cell and molecular biology applied to the study of disease mechanisms in the field of pediatric skeletal diseases and craniofacial defects. She has also been involved in several research projects, including the design and validation of siRNAs, the development of highly biocompatible nanodelivery systems for the intracellular delivery of therapeutic molecules, and the 3D printing of nano-functionalized inks for therapeutic applications in craniofacial malformations.

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