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From molecules to cells: a translational path towards novel therapeutics

PROF. WANDA LATTANZI – ALESSANDRO ARCOVITO

Area of study	Experimental biology, biochemistry, applied sciences
Area Code	BL / CH 300
Credit	6 ECTS
Dates	8 – 19 June (2 weeks)
Campus	Rome

Course description/overview

This course will delve into innovative strategies for drug design, smart delivery, and biological testing exploited in modern medicine for the treatment of different conditions. Rooting on cellular and molecular mechanisms implicated in human diseases, a detailed emphasis will be devoted to explaining state-of-the-art biotechnologies, including, AI-based computational tools, biochemical assembly of nanocarriers, stem cells and advanced cellular models.

Goals/learning objectives

At the end of this school the students will have gained knowledge on:

- general disease mechanisms affecting cellular organelles and compartments
- molecular cascades and signal transduction pathways enabling the identification of key molecular players
- workflow for in silico protein modeling and drug design
- drug delivery systems
- stem cells and cell-based disease modeling
- main functional assays exploited for in vitro drug testing.

Students will have the opportunity to delve into practical activities during simulated laboratory sessions, on paradigm disease models, aimed at acquiring technical competences for conducting an experimental path.

Course's pre-requisites

Students attending this school should have already gained basic knowledge in chemistry, biochemistry, general biology, including ground knowledge in human genetics.



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Course requirements

Students are expected to:

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

Grading

Class participation	25% of final grade (pass/fail)
Home and class assignments	25% of final grade
Final written exam	50% of final grade

Course readings and materials

Updated literature, tutorials, protocols and web-links will be 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 simulated laboratory environments using online platforms for virtual laboratory scenarios (Labster, JoVE).

Site visits

Visit to research facilities and laboratories.

Rules of conduct

Attendance: Attendance 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 impede 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.

Bios of the instructors

Wanda Lattanzi is Associate Professor of Experimental Biology at the Università Cattolica S. Cuore, where



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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 PostDocs and PhD students.

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Alessandro Arcovito is an Associate Professor of Biochemistry at the Università Cattolica del Sacro Cuore (UCSC) in Rome, where he teaches related disciplines in several master and bachelor degree courses, and leads a research group dedicated to the characterization of Drug Design and Delivery for smart drugs (smart3D). He has been involved in research activities for over 20 years in the field of protein biochemistry and structural biology. In particular, he has a well-documented expertise in the study of molecular recognition mechanisms between proteins and ligands, serving as a starting point for the development of next-generation drugs. This involves the use of leading spectroscopic techniques combined with time-resolved protocols, as well as advanced computational methods such as docking and molecular dynamics.

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