Course unit English denomination	Nanopharmaceutical and biopharmaceutical: physicochemical/pharmacokinetic correlations
Teacher in charge (if defined)	SALMASO Stefano, Paolo Caliceti
Teaching Hours	24
Number of ECTS credits allocated	3
Course period	06-07/2025
Course delivery method	☐ In presence ☐ Remotely ☒ Blended
Language of instruction	English
Mandatory attendance	☒ Yes (75% minimum of presence) ☐ No
Course unit contents	Introduction into pharmacokinetics and pharmacodynamics, PK and PD of small MW drugs. Pharmacokinetics (PK) and pharmacodynamics (PD) terminology, Physiological basis for drug (small MW compound) distribution and elimination, Major PK parameters: clearance, volume of distribution, elimination half-life, Major properties of compartmental and physiologically-based PK (PBPK) models, PK-PD correlations (sigmoid E max model). PK and PD of nano-drug delivery systems (DDSs). Targeted drug delivery for enhancement of drug effectiveness and safety, Major pathways of nano-DDS disposition following systemic administration. Effect of the nano-DDS formulation properties (size, charge, composition, targeting residues) on their systemic disposition and accumulation in solid tumors. Analytical issues: quantification of nano-DDS-encapsulated vs. free drug in the systemic circulation and at the site of action (solid tumor). Problems with limited drug/DDS permeability into the 'deep' parts of the solid tumor (i.e., cells that are distant from the capillaries). Modeling analysis of rate-limiting steps of nano-DDSs systemic and intratumoral disposition. Strategies to modulate the nano-DDSs disposition for enhancing their therapeutic effectiveness (PK) and pharmacodynamic (PD) properties of biopharmaceuticals. Immunogenicity and PK/PD of biopharmaceuticals. Target-Mediated Disposition of biopharmaceuticals. PK and PK-PD modeling of biopharmaceuticals and its use in pre-clinical and clinical drug development.
Learning goals	Knowledge: general concepts on PK/PD correlation for diverse biotechnological drugs and colloidal carriers of drugs Skills: Ability to foresee the PK and biodistribution and thus PD of drugs and drug carriers based on rational physico-chemical and physiological concepts. Competencies: Integration of the skills with the capacity of proposing projects related to drug delivery and advanced formulation of drugs with critical features
Teaching methods	Frontal teaching

Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No
Available for PhD students from other courses	☒ Yes ☐ No Students external to the PhD Course admitted upon evaluation of the CV by the teachers
Prerequisites (not mandatory)	No specific prerequisites.
Examination methods	Students will be group tasked to propose and design some rational formulation and delivery approaches for difficult to administer drugs based on the knowledge and contents provided during the course. The exam will be oral with in depth discussion.
Study material	Slides/articles provided by the teacher
Additional information (not mandatory)	max 3750 caratteri