







MedChem and structural biology: tools and strategies for

hit and lead optimization in the One Health perspective

Wednesday 27 September – Friday 29 September 2023

University of Siena, Siena, Italy

Training School of the COST Action CA21111 One Health drugs against parasitic vector borne diseases in Europe and beyond OneHealthdrugs

<u>Description.</u> Drug discovery is a complex process aiming to develop compounds with appropriate safety and efficacy profiles allowing to proceed to their clinical evaluation. On this purpose structural biology, medicinal chemistry and computational chemistry provide key information to guide the rational design of effective drugs. The first focus of this Training School will be to explore how drugs are designed and synthesized, with a particular focus on the green aspects that should be considered both in the design, synthetic approaches, and in the prediction of their environmental fate. The second focus of the Training School will be the structural characterization of macromolecular targets and of their interactions with substrates and compounds for drug development purposes. The main topics that will be part of the Training School scientific program are in silico methods for the toxicity prediction applications related to environmental issues, green medchem/synthetic approaches, integrative structural biology approaches for investigating macromolecular targets, structural characterization of enzyme-inhibitor and enzyme-substrate complexes through X-ray crystallography. At the end of the training school, the participants will work together to create a report that summarizes the main topics and subjects covered during the training.

Programme

Day 1 (Wednesday 27 September 2023)	
8:00-9:00	Registration
9:00-9:30	Introductions (Sandra Gemma and Cecilia Pozzi)
9:30-10:30	Lecture: Computational methods and tools in support of chemical safety and
	sustainability assessment (Alessandra Roncaglioni)
10:30-11:30	Break & Flash-presentations from Selected Training School attendees
11:30-12:15	Lecture: In silico tools for prediction of natural compounds toxicity (Simone Brogi)
12:15-13:00	Lecture: Drug-likeness and optimization approaches: case studies in infectious diseases (Valeria Tudino and Sandra Gemma)
13:00-14:30	Lunch
14:30-18:30	Practical Work, Demonstrations & Group Activities on methods and tools in support
	of chemical safety and sustainability assessment (Alessandra Roncaglioni)
	Flash-presentations from Selected Training School attendees
Day 2 (Thursday 28 September 2023)	
9:00-9:45	Lecture: Case studies in drug design and synthesis (Luca Pozzetti)
9:45-10:15	Lecture: Green and sustainable strategies to combatting infectious diseases (Valeria Tudino)
10:15-11:00	Lecture: From natural compounds to simplified analogues: tools and strategies (Sandra Gemma)
11:00-11:30	Break
11:30-12:30	Lecture: An introduction to biocatalysis: a sustainable tool for medicinal chemists
	(Daniele Castagnolo)
12:30-13:00	Flash-presentations from Selected Training School attendees
13:00-14:30	Lunch
14:30-18:30	Practical Work, Demonstrations & Group Activities on Biocatalysis (Daniele Castagnolo)
Day 3 (Friday 29 September 2023)	
9:00-9:45	Lecture: Integrative structural biology approaches for investigating macromolecular targets (Marco Mazzorana)
9:45-10:15	Lecture: Practical aspects of performing X-ray crystallographic experiments on biological macromolecules (Cecilia Pozzi)
10:15-10:45	Lecture: Investigating enzyme-inhibitor complexes through X-ray crystallography (Cecilia Pozzi & Marco Mazzorana)
10:45-11:45	Break & Flash-presentations from Selected Training School attendees
11:45-13:00	Practical work: Analysis of structural model for drug discovery purposes (Giusy
	Tassone. Cecilia Pozzi & Marco Mazzorana)
13:00-14:30	Lunch
14:30-17:30	Practical Work, Demonstrations & Group Activities on protein crystallization and
	investigation of enzyme-inhibitor complexes (Giusy Tassone, Cecilia Pozzi, Marco
	Mazzorana & Sandra Gemma)
17:30-18:00	Integrative structural biology studies at Diamond Light Source (Marco Mazzorana)
18:00	Closing remarks