## COURSES ORGANIZED BY OTHER NATIONAL AND INTERNATIONAL PHD PROGRAMS, AND INSTITUTES, RESEARCH CENTRES AND COMPANIES

*February 15-28, 2023*
***Dr. Jenny Desantis, University of Perugia***

**T Introduction to proteolysis targeted chimeras (PROTACs): design principles, synthetic approaches, and applications** (3 CFU,18 h)

*Proteolysis targeting chimeras (PROTACs) represent an innovative class of compounds that are emerging in drug discovery and are opening the way to a next generation idea of therapeutic agents aimed at the removal of disease-related target proteins. Structurally, PROTACs are hetero-bifunctional molecules composed of two ligands, one binding the protein of interest (POI) and the other one recruiting an E3 ubiquitin ligase, concatenated through a linker. The chemically-induced formation of ternary complexes (POI-PROTAC-E3) leads to ubiquitination and proteasomal degradation of the target protein. In this course, after an introduction to the principles used for PROTACs design and optimization, an overview of the different synthetic approaches exploited so far for the preparation of such tricky molecules will be presented. Furthermore, different examples of applications of PROTAC technology will be discussed.*

*March 21, 2023*
***Professor Robert S. Marks, University of the Negev, Israel***

**Biosensors and diagnostics in a nutshell** (1 CFU, 6 h)

Aula 6 via del Giochetto EDIFICIO A

*March-May, 2023*
***Dr. Gianandrea La Porta, University of Perugia***

**Data Scientist with R** (3 CFU, 18 h)

*Data science is the practice of transforming data into knowledge, and R is one of the most popular programming language used by scientists. The course aims to provide students with: i) the skills necessary to use the R programming language, ii) the principles of statistics to analyze and transform data, and iii) the functions to create and interpret descriptive and multivariate statistics, graphic representations, and statistical models.*

*March 20-June 15, 2023*
***Dr. Pier Luigi Gentili, University of Perugia***

**The theory of complex systems to address the XXI century challenges** (3 CFU,18 h)
*Despite significant achievements in science and technology, humankind still needs to win compelling challenges. Whenever we face the XXI century challenges, we deal with Complex Systems. Complex Systems are natural systems that science is unable to describe exhaustively. This course presents the features of Complex Systems by using the theories of Out-of-Equilibrium Thermodynamics, Non-linear Dynamics, and Natural Computing. The contents are interdisciplinary. Subjects regarding chemistry, biology, physics, economy, and philosophy are presented. This course intends to give the Ph.D. students new tools and ideas to face their specific research.*

*July 3–14, 2023*
***Prof. Luigi Vaccaro, University of Perugia***

**Continuous flow technologies for the preparation of pharmaceutically relevant molecules** (3 CFU, 18 h)*

*Modern chemical production relies on the development of innovative technologies that could allow the preparation of the desired chemicals at the highest chemical and economic efficiency. Flow technologies have proved to be powerful synthetic tools for accessing complex molecular entities in a faster and user friendly manner. The use of flow reactors has also proven to be very effective for the definition of protocols featuring easier purification of the pure products leading to a minimal waste production and consequently a lower cost of the synthetic process. In this course, the student will be introduced to the fundamental aspects of flow chemistry and some examples of application of this technology to relevant target will be also presented.*