General Info

Organized by: Area Science Park, Elettra Sincrotrone Trieste and CNR
Name of the Advanced School Structural Biology
Objective and learning goals Structural biology aims to identify the three-dimensional structure of biological macromolecules, such as proteins, amino acids and nucleic acids, and to explain how this relates to their functions, thus promoting understanding of the molecular mechanisms and interactions. In virology, this means understanding mechanisms through which viruses grow, replicate and survive in host cells, thus providing crucial insights for medical research. This area of interest has obviously received increasing attention following the COVID-19 pandemic, representing a fertile ground for the prevention, detection and development of new pharmacological strategies and effective treatments (e.g., vaccines and antiviral drugs) against pathogens posing potential epidemic threats. We could say the only way to beat our enemy is actually to be able to see and know him. Starting from these premises, the following and other questions will underpin the theoretical lessons and practical sessions of the school: How do macromolecular complexes form? How do ligands interact with target proteins? What are potential binding sites and poses for drugs? How could such drugs be designed to be effective? At the end of the school, participants will acquire theoretical-practical skills relating to the topics addressed in the modules included in the scientific program.
Subject/scientific programme The following four thematic modules will be addressed during the school: 1. Protein production and characterization 2. Macromolecular Crystallography (MX) and structure-based drug design 3. Sample Preparation for Single-Particle Cryo-Electron Microscopy (Cryo-EM) 4. Cryo-EM Single Particle Analysis and Cryo-Electron Diffraction (Cryo-ED) Each module will last approximately one week; the first three modules will include approximately 36 hours of lessons while the fourth will include approximately 30 hours.
Methods of carrying out the lessons The school will include theoretical lessons (mainly in the morning) alternating with practical sessions/hands-on carried out in the laboratories (mainly in the afternoon). All lessons (both theoretical and practical) will be carried out in person and in English.
Teachers The lessons will be held mainly by staff involved in the PRP@CERIC project. Furthermore, nine selected internationally recognized invited speakers, with sector-specific skills and expertise, will hold theoretical and practical lessons in the four thematic modules provided in the school offering a perspective of the field.
Duration The school will last four weeks, divided into three sessions: the first session of two weeks and the other two of one week each.
Dates The school will include:

- a first two-week session, from Monday 9th to Friday 20th September 2024
- a second session of one week, from Monday 14th to Friday 18th October 2024
- a third session of one week, from Monday 18th to Friday 22nd November 2024

Lesson times

Each class day in the first three weeks will include approximately 8 hours of lessons, four in the morning (from 9am to 1pm) and four in the afternoon (from 2pm to 6pm), except for the first and last day of each of the two sessions in which only half a day of lessons will take place (i.e., 4 hours) - excluding Friday 18th October when a full day of lessons is planned.

In the fourth week, each class day will include approximately 6 and a half hours of lessons, except for the last day in which only half a day of lessons will take place (i.e., 3 hours).

Location

All lessons of the first two sessions will be held at the CNR-IC and Elettra laboratories involved while the lessons of the third session (i.e., the fourth week) will take place at the SOLARIS National Synchrotron Radiation Centre (Krakow, Poland).

Admission requirements

- Master's or specialist degree or old system degree diploma in STEM subjects, preferably chemical sciences, medical, veterinary and pharmaceutical biotechnology, biology, physics, materials science and engineering, industrial biotechnology, pharmacy and industrial pharmacy, biomedical engineering, chemical engineering, medicine and surgery or in similar or equivalent subjects;
- knowledge of the English language;

enjoyment of civil and political rights in the State of belonging or origin.

Recruitment of participants

The school will involve ten participants.

Two of the ten available positions are open to external applications, while eight positions are reserved for candidates belonging (as employees/ collaborators/ scholarship holders/ research fellow/ PhD students) to the PRP@CERIC project team.

Documentation to be submitted

- Expression of interest sent by email (see contact person section) with the names of the candidate and of a reference person (tutor or supervisor);
- educational and/or professional CV for the candidate evaluation.

Evaluation of participants

Applicants will be evaluated by a Scientific Committee (composed of Silvia Onesti – Elettra Sincrotrone Trieste, Paola Storici - Elettra Sincrotrone Trieste and Alberto Cassetta – CNR - Istituto di Cristallografia) on the basis of the CV or any other information submitted.

Certificate of attendance

At the end of the school, participants will receive a certificate of participation, subject to attendance of at least 80% of the theoretical/practical lessons.

An exception will be made for any students supported by the Italian Crystallographic Association who will attend a maximum of 50% of the lessons.

Contact person

For further information or any questions on participation in the Structural Biology school and to send applications, please refer to Alberto Cassetta, CNR – IC, alberto.cassetta@cnr.it; 040-3757525.