

<p>1) Sample quality control</p>	<p>This school will link the specific requirements of academia research with the technical and regulatory aspects of industrial research and development: accurate concentration determination (prediction of extinction coefficients and UV/Vis), homogeneity (dynamic light scattering), buffer optimisation (differential scanning fluorimetry), folding state (circular dichroism spectroscopy, native mass spectrometry) and oligomeric state with optional measurement of extinction coefficients (size exclusion chromatography coupled with multi-angle light scattering and mass photometry).</p>
<p>(2) Macromolecular Interactions</p>	<p>This school will provide training at isothermal titration calorimetry, differential scanning fluorimetry, liquid-state nuclear magnetic resonance (NMR as a titration method), vibrational spectroscopy (including FTIR), surface plasmon resonance, bilayer interferometry. Data analysis with concepts of thermodynamics (equilibria), kinetics (time courses) and structural (de)stabilisation by ligand binding will be addressed. This school will also be opened to the mechanical characterization of biomaterials and implementation of lab-on-a-chip.</p>
<p>(3) Integrative structural biology</p>	<p>This school will bring together the main technologies for gaining the most out of a given sample/project. The focus is on macromolecular crystallography (MX), small angle scattering (SAXS/SANS), liquid and solid-state NMR, cryoElectron microscopy and tomography (cryoEM, cryoET), super-resolution microscopy (FLIM, STED, AFM).</p>
<p>(4) Frontiers of modelling</p>	<p>This school will be first dedicated to NMR based structure elucidation (using CYANA software) including data collected from trainings #2 and #3. Then, 3D structure of protein/protein complexes will be calculated with the use of HADDOCK and including constraints originating from NMR or SAXS data. Finally, drug discovery and protein/ligand interactions will be studied by means of the ACEMD (Acellera Inc) software including the last developed algorithm based on force field machine learning. This school can be proposed both in face-to-face and distant learning.</p>
<p>(5) Biosensors</p>	<p>This practical school will give a general overview of the different types of biosensors. Through lectures particular examples based on immuno-chromatography, electrochemical, electrical or optical detection will be addressed. The different steps of sample preparation (cell lysis, extraction or pre-concentration) in the context of biosensors will also be presented to give the DFs the keys to understand the challenges associated with the development of biosensors dedicated to diagnosis, prognosis, therapeutic follow-up or environmental monitoring.</p>
<p>(6) Management of intellectual property</p>	<p>This full immersion of 10h in the management of Intellectual Property and on the basics of its regulation will give the doctoral fellows the keys to understand the innovation cycle and which are the phases and needs for patenting. Pulsalys will coordinate this workshop together with technology transfer managers of non-academic partners and will present practical case scenario and the public vs private approaches.</p>
<p>(7) Bioinformatics</p>	<p>Through the different programmed lectures, the aim is to give a general overview of the subject of Bioinformatics. It will also include examples of practical applications of Computer Science within the area of Bioscience and Biomedicine (neurosciences and complex diseases, genetics and epigenetics, molecular diagnosis, among many others). The lectures, delivered by speakers of great international relevance, have also a professional and business orientation. The Conference will close with a round table where the present and future of this area of interest can be discussed, as well as the training needs necessary to form a relevant profile. To complement the Conference, there will be online workshops related to the content, as well as a “Datathon” competition in collaboration with the company Genyo, who annually supports UGR in this event. The content and associated topics are open to the entire community, with the possibility of recognising 1 ECTS credit.</p>
<p>(8) International School on Biological Crystallisation</p>	<p>The five-days school will provide lectures, posters and 1 full day of practical demonstrations related to the crystallisation of biological macromolecules, biominerals and biomimetic materials. The aim of ISBC is to introduce all participants into the fundamental knowledge about the behaviour of crystallising solutions and their applications for macromolecules, including large crystals for neutron diffraction, tiny crystals for XFEL and EM sample preparation/characterization. The school is included within the summer courses of UGR, recognized with 2 ECTS. (http://www.isbcgranada.org).</p>
<p>(9) BIOMAT</p>	<p>This summer school (https://www.modelingnature.org) is organized at UGR as a series of minicourses and seminars on current topics of mathematical modeling in developmental biology, biophysics, biomechanics, biomedicine and deep learning. It is aimed at researchers in training and the entire scientific community. The courses are taught intensively in one or two weeks during the month of June. BIOMAT has a long history of more than 15 years and is an international benchmark in this field. This school is recognized with 2 ECTS.</p>
<p>(10) PREDITOX</p>	<p>This summer school organised by UCBL, aims at helping ecotoxicologists, regulators, managers, NGOs and other stakeholders to improve their skills in modeling and statistical inference for, among other things, a better analysis of their bioassay experimental data. Participants will be introduced to R programming, to basic statistics in R, to fitting distributions using the MOSAIC web platform, in particular its Species Sensitivity Distribution module. Participants will also be trained step-by-step to the use of Bayesian inference, in particular the R-package 'morse' which allows the users to automatize the use of Bayesian inference when dealing with survival and reproduction ecotoxicological bioassay data.</p>