

#### **SC4: Advanced Molecular cloning techniques**

Training Program: This course will teach the handling of expression cDNA libraries, the isolation of phage clones with antibody probes and the analysis of phage clones by subcloning, restriction and sequence analysis. Furthermore, students will learn the basic tools for DNA and protein sequence analysis by accessing data bases and computer-aided sequence analysis tools. Finally an overview of various methods for expressing and purifying recombinant proteins will be communicated.

#### **SC5: Mouse genetics**

Training program: In this course students will learn the basics about the generation of transgenic and (conditional) knock-out/knock-in mice. Topics covered in this program are: mouse development and ES cells, genetic modification of ES cells, Cre/loxP-mediated recombination, pronuclear injection, blastocysts injection and morula aggregation as well as standard experimental manipulations and procedures in mice (e.g. isolation of organs, intraperitoneal and intravenous injections etc).

#### **SC6: Cellular allergology**

Training Program: This course will present a comprehensive overview on the immune cells (innate and specific immunity) involved in allergic diseases. In a practical part students will learn the principles of cell isolation, characterization and cultivation of human immune cells. A state of the art program for characterization of allergen-specific T cells will be offered including various methods such as phenotyping, receptor analysis, antigen-specificity and epitope mapping. Furthermore, the course will include a part on human effector cells relevant in allergic diseases.

#### **SC7: Hematopoietic stem cells and leukemia**

Training Program: In this course students will get familiar with assays for the clinical and experimental detection of human hematopoietic stem cells (HSC), ex vivo methods to generate dendritic cells for clinical application, clinical strategies for mobilization of CD34<sup>+</sup> hematopoietic stem cells as well as concepts in cord blood banking and bone marrow transplantation. Additionally, they will learn about HSC disorders including acute leukemias, their pathogenesis and clinical diagnosis (FACS-based identification of aberrant stem cell phenotypes), as well as chronic leukemias and novel molecular targeted treatment concepts. Finally they will get familiar with gene therapy methods for targeting HSC, including the design of retroviral/lentiviral packaging cell lines and vector systems, and with protocols to effectively deliver genes into isolated human CD34<sup>+</sup> cells.

### **SC8: Immunoproteomics**

Training Program: The students will be introduced to our functional immunoproteomics approach. The starting point in this reverse protein expression cloning approach is a predefined functional phenotype of immune cells which ends with the molecular characterization of key effector protein(s). This goal is achieved by generating mAbs against immune cell proteins with specific function linked expression profile ("rough selection") and testing of mAb-defined proteins in appropriate and informative functional assays ("fine selection"). The molecular analysis of mAb-defined targets is accomplished by cloning with our retroviral cDNA-based proteome expression libraries and/or proteomics, i.e. 2D-gel electrophoresis and mass-spectrometry. This strategy is not designed for rather randomized "large-scale proteom" analysis but is perfectly suited to chase and identify at least parts of the "functionally relevant proteom".

### **SC9: Immunodiagnosics**

Training Program: The course will focus on laboratory diagnostic approaches for autoimmune diseases and immunodeficiencies in patient material. It will cover both theoretical background and practical aspects of immunodiagnosis including optimization strategies, mulltiparameter detection of markers (Luminex), standardization of immunologic test procedures and also patient data management.

### **SC10: Virus diagnostics**

Training program: This course will provide the theoretical background of the technologies used for the rapid diagnosis of virus infections and on-site insights into their practical applications in a virus-diagnostic laboratory. Topics covered will include different variations of antibody assays, direct virus detection in clinical materials by antigen-assays and PCR, methods of virus isolation, and the genotypic determination of resistance to antivirals. Students will also be involved in the interpretation of test results in specific clinical cases.