

Master Module

Cell Biology & Epigenetics

The module includes lecture, seminar and practical training. The aim is:

- To gain a basic understanding of cell proliferation, differentiation and epigenetic mechanisms.
- To understand the relevance of maintaining as well as changing the epigenetic landscape in cellular differentiation, reprogramming and in disease.
- To read research publications and to critically evaluate published research data.
- To be able to design cell and molecular biological experiments and to analyze, interpret and present experimental results.

The **lecture** is based on research publications on cell biology and epigenetics. In particular the following topics are presented and discussed: nucleus structure and function; replication of the (epi)genome; reprogramming and (trans)differentiation, epigenetics and chromatin.

In the **seminar**, project ideas are planned for practical execution in the laboratory. The project drafts are presented at the beginning in the form of a road-map and the results of the experiments are presented and discussed at the end of the module in the form of a poster or oral presentation.

In the **practical course** own projects are developed in groups and pursued in the following weeks. The projects are located within the field of (stem) cell biology and epigenetics and focus, e.g., on the following methods:

- Application of biological databases
- Planning/generation of mammalian expression vectors
- Gene expression analyses and FISH
- Domain mapping of chromatin factors
- In vitro protein-protein interactions (Co-immunoprecipitation)
- In vivo protein-protein interactions (Mammalian Two-Hybrid Assay)
- Protein-DNA/RNA interactions
- Cell culture and differentiation
- Transient and stable transfection of mammalian cells and reporter cell lines
- Immunofluorescence and live cell microscopy, protein dynamics (FRAP...)
- Flow cytometric analyses

We recommend general cell biology text books, e.g.:

- Alberts, Molecular Biology of the Cell
- Lodish, Molecular Cell Biology
- Pollard and Earnshaw, Cell Biology
- Epigenetics text books, e.g.:
- Allis et al; Epigenetics
- Misteli and Spector; The Nucleus
- Cook ; Principles of Nuclear Structure and Function

Internet material:

- Databases (<http://www.ncbi.nlm.nih.gov/sites/entrez>; www.ensembl.org)
- Light Microscopy <http://www.microscopy.fsu.edu/primer/index.html>

Advanced knowledge in cell biology, molecular biology, molecular genetics and biochemistry.

All relevant information can be found on Moodle.