

## Syllabus:

### Genome Medicine and Molecular Networks

Lecture room: [GPS Google maps link, 1.OG](#)  
/and/or/ Zoom.

#### **COURSE STAFF**

Prof. Korsching

#### **OBJECTIVE**

This lecture series will give insight into the complex machinery of the human cell and how to exploit this knowledge for new medical applications.

#### **PREREQUISITES**

None - introductory level to advanced level

#### **ABSTRACT**

Personalized medicine and targeted therapies are two buzz words which mark the direction of the next decades of medical development. The foundations of this type of medicine are strategies which try to approach the molecular machinery in the cells directly to cure disease phenotypes or even the disease itself. To overcome the multitude of problems on that way, a precise understanding of the cellular function is essential but not sufficient. Additional research areas play a role, like cell cell interactions, cell differentiation, the functionality of the complete organ and last but not least the transport of effectors to the target cells. These and many more fields of research need to play together at the end to achieve this ambitious goal of genome medicine. This course should help to become orientated, help to find subdisciplines of interest, and to create a stable basis for further activities. The presented topics span from wet lab methods to computational biology.

Extra curricular course  
[Medicine]

Course ID  
cb-gmmn

Class Start  
Second week of lecture period

Timeline  
Weekly

Estimated Effort  
2 hours per week

Class Size  
4 to 10 people

#### **The RESEARCH COMMUNITY**

This means we try to join learning and research as far as possible. We also encourage successful participants of the courses to consider projects in our field of research.

## **Concept of the course**

The lecture is conceptually a combination between a lecture and a journal club to join present topics in life sciences with exercising basic knowledge.

### **A) Introduction and Concepts**

- 1) Definitions
- 2) Resources
- 3) Conceptual anchor points for genome medicine
- 4) Why theory counts
- 5) Insight into the structure of typical theoretical methods
- 6) What need to be known on the conceptual side
- 7) Working with knowledge
- 8) What is weak and what is strong looking on 'established' knowledge?
- 9) Train to critically review given knowledge

### **B) Spread out into different fields**

- 1) Genomic technologies - from tools to therapies
- 2) Detecting protein variants by mass spectrometry: a comprehensive study in cancer cell-lines
- 3) Interrogating the “unsequenceable” genomic trinucleotide repeat disorders by long-read sequencing
- 4) ISOWN: accurate somatic mutation identification in the absence of normal tissue controls
- 5) Unified Least Squares Methods for the Evaluation of Diagnostic Tests With the Gold Standard
- 6) Advances in the delivery of RNA therapeutics: from concept to clinical reality
- 7) Computing patient data in the cloud: practical and legal considerations for genetics and genomics research in Europe and internationally
- 8) Linked read sequencing resolves complex genomic rearrangements in gastric cancer metastases
- 9) Dissecting the human microbiome with single-cell genomics
- 10) brain-coX: investigating and visualising gene co-expression in seven human brain transcriptomic datasets
- 11) Seed-effect modeling improves the consistency of genome-wide loss-of-function screens and identifies synthetic lethal vulnerabilities in cancer cells
- 12) Social network architecture of human immune cells unveiled by quantitative proteomics