

Course summary for Experiment Design for High-Throughput Genomics Experiments

Number of credits: 3

Course leader: Carsten Daub, carsten.daub@ki.se, Karolinska Institutet

Content highlights: Learn about critical aspects of experiment design for your genomics projects

Teaching activities: analyze experiment designs, lectures on experiment design, make your own experiment design

Date: Work on course assignment from home in Week 1: November 16-20, 2026; on site

Campus Solna in Week 2: November 23-27, 2026

Venue for Week 2: Air/Fire, SciLifeLab, Campus Solna

In this course the students will learn how to design experiments and the corresponding bioinformatics analysis of high throughput experiments. After completing the course, the participants will understand the principles of experiment design and the relevance to high throughput experiments. The participants can design experiments and critically evaluate the influence of various design parameters. Examination elements are: pre-course individual assignment, and individual final presentation. For the first week, the PhD students will get pre-assignment tasks. The students can work on these pre-assignments at their home institutions. For the second week, all students will come to Campus Solna Stockholm to participate at the course on-site for the whole week.

This course is given simultaneously with the MedBioinfo Graduate School. More information at https://www.medbioinfo.se/?page_id=31

1. Title of the course

Experiment design for high throughput technologies

2. Suggested number of credits

3 hp

3. Name of course leader

Carsten Daub

4. Affiliation of course leader

Department of Medicine Huddinge, Karolinska Institutet

5. Course content

In this course, students will learn how to design experiments and develop corresponding bioinformatics analysis workflows for high-throughput experiments, including modern omics technologies. Building on their prior experience with relevant methods, each student will design a workflow that can be extended to support more advanced analyses. Assessment will be based on two components: an individual pre-course assignment and a final individual presentation.

6. Intended learning outcomes (ILOs)

After completing the course, participants will be able to:

- Understand the principles of experimental design and their importance in high throughput experiments
- Design robust and effective experiments
- Critically evaluate how different experimental design parameters affect the outcomes and interpretation of results

7. Course activities

Week 1 - Pre-Assignments (Remote Work):

In the first week, participants will complete pre-assigned tasks while remaining at their home institutions. Each student will conduct a detailed analysis of the experimental design and bioinformatics methods used in a selected published paper. Based on this analysis, students will propose improvements to both the experimental setup and the data analysis approach. Each assignment will then be peer-reviewed by another course participant.

Week 2 - On-Site Course in Stockholm:

In the second week, all students will attend the course in person in Stockholm. Each participant will give a brief presentation summarizing the paper they analyzed in Week 1 along with their proposed improvements. The week will include lectures delivered by the course instructors. Additionally, each student will develop an individual project proposal in the format of a research grant application. This proposal will be presented on the final day of the course and will serve as the basis for the course examination.

8. Eligibility requirements

The course is best suited for doctoral students in their second year or beyond, as it assumes prior experience with research projects and a foundational understanding of experimental work.