

CRISPR/Cas: Gene Editing and Beyond, 3.0 credits

CRISPR/Cas: Genredigering och andra tillämpningar, 3.0 hp

Third-cycle education course

8FO0142

Department of Biomedical and Clinical Sciences

Valid from: Second half-year 2024

Approved by
The Research and PhD studies
Committee

Approved
2023-02-27

Registration number
LiU-2023-00969

Entry requirements

Entry requirement for studies on third-cycle education courses

- second-cycle degree,
- 240 credits in required courses, including at least 60 second-cycle credits,
or
- acquisition of equivalent knowledge in some other manner

Specific entry requirements for this course are approved courses in genetics and/or molecular genetics (at least 6 credits) or equivalent.

Learning outcomes

After completing the course, the student is expected to be able to:

Knowledge and understanding

- Recognize the challenges of gene targeting.
- Explain the different DNA/RNA delivery systems available.
- Summarize the main techniques for gene targeting based on the CRISPR/Cas system.

Competence and skills

- Critically review scientific method articles within the subject area.
- Design a strategy for genetic management by objectives within the framework of their own research by applying a CRISPR/Cas-based method.
- Write a research plan in the field.

Judgement and approach

- Critically evaluate the advantages and disadvantages of different methods of genome editing.
- Analyze and provide constructive critiques on proposed applications of CRISPR/Cas-based methods in research.
- Reflect on the need for further knowledge and research to continuously develop competence.
- Reflect on the sustainability of current and future research in basic and clinical science involving gene editing.

Contents

The course deals with historical and theoretical aspects of gene targeting/editing and DNA/RNA delivery. In addition, important techniques based on CRISPR/Cas principles will be addressed, including gene knockout, knock-in of specific mutations, genetic screenings, transcription regulation, epigenetic modifications, and DNA/RNA visualization. Finally, applications in basic research as well as ongoing clinical applications and their sustainability will be discussed.

Educational methods

The pedagogical approach applied at the Faculty of Medical and Health Sciences is student centered, problem based learning (PBL). The student takes responsibility for his/her own learning, and seeks and evaluates information and knowledge based on own queries and formulated problems. The role of the teacher is to guide and support the students.

Educational methods applied in this course are* *lectures, seminars and individual assignments.

Examination

The examination consists of an individually designed written research plan and a critical assessment of another student's research plan in connection with an oral presentation. Students whose research plan is not approved are given two weeks to present a revised version.

Attendance and participation on all course days are mandatory. A maximum of one day's absence can be replaced by a written supplement, but this does not apply to the examination day.

Students who fail are offered one re-examination in a coming course, or after agreement with the course coordinator. The re-examination should be equally comprehensive as the ordinary examination.

Change of examiner

Students who have failed the course or part of the course twice are entitled to request another examiner for the following examination occasion, unless prevented for special reasons.

Grading

Two-grade scale

Course literature

A list of recommended literature will be provided by the course management before the start of the course.

General information

The course is planned and carried out according to what is stated in this syllabus. Course evaluation, analysis and suggestions for improvement should be fed back to the Research and PhD studies Committee (FUN) by the course coordinator.

If the course is withdrawn or is subject to major changes, examination according to this syllabus is normally offered at three occasions within/in close connection to the two following semesters.