



LTH

FACULTY OF
ENGINEERING

Course syllabus

Molekylär bioteknik Molecular Biotechnology

KBTN20, 7,5 credits, A (Second Cycle)

Valid for: 2023/24

Faculty: Faculty of Engineering, LTH

Decided by: PLED B/K

Date of Decision: 2023-04-18

General Information

Main field: Biotechnology.

Compulsory for: MBIO1

Elective for: MLAK2

Language of instruction: The course will be given in English

Aim

The aim of the course is to provide the students with a thorough understanding of the field of genetic engineering and its applications in modern biotechnology including contemporary genetic tools used for modification and containment of organisms designed for various purposes. The course will also discuss safety, ethical and regulatory aspects of associated with the use of genetically modified organisms, and will provide a brief introduction to computational tools for handling of large amount of information and datasets.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- show knowledge and understanding of the principles of gene cloning and expression
- show knowledge of the underlying molecular differences between different organisms and the approaches used for their genetic engineering
- be able to understand gene technologies used for different biotechnological applications

Competences and skills

For a passing grade the student must

- be able to practically perform gene amplification, cloning and expression in a bacterial host and assess the results
- be able to evaluate information related to genetic engineering in the scientific literature
- be able to discuss both in oral and written form the principles of genetic engineering and/or its application in biotechnology

Judgement and approach

For a passing grade the student must

- be able to discuss and critically examine literature and laboratory data
- be able to identify and assess the safety risks, as well as the ethical and regulatory aspects associated with the use of genetically modified microorganisms in order to appropriately address the issues that may arise as a result of their assessment.

Contents

- Genetic engineering principles and elementary techniques: Nucleic acids synthesis and amplification, Cloning and Sequencing (from single cell to communities).
- Production hosts (bacteria, yeast, mammalian cells, fungi, plants, microbial communities and their differences).
- Genetic basis and genetic tools for the heterologous expression of genes and production of useful compounds
- Genome annotation and search for genes and pathways for the production of compounds of biotechnological interest.
- Comparison of GMO and non-GMO production organisms. Mutagenesis (chemical, physical), recombinant DNA technology versus Genome engineering: CRISPR-Cas, RNAi, adaptive evolution, transient expression.
- Challenges in contemporary protein design.
- Computational analysis methods for biotechnology applications.
- Regulation and society including biocontainment of modified organisms.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)

Assessment: Written exam, passed assignment and laboratory work. Final grading is based upon the written exam. Assignment and laboratory work is graded G/U.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a

form of examination equivalent to that of a student without a disability.

Parts

Code: 0123. **Name:** Molecular Biotechnology.

Credits: 5. **Grading scale:** TH. **Assessment:** Written exam

Code: 0223. **Name:** Written Lab and Computation Exercise Report .

Credits: 2,5. **Grading scale:** UG. **Assessment:** Written lab-report and computation exercise report

Admission

Admission requirements:

- Microbiology or biochemistry, mathematics/calculus

The number of participants is limited to: No

Reading list

- Rosanna Mann: Genetic Engineering and Biotechnology. Callisto Reference, 2018, ISBN: 1632399202, 9781632399205.
- The course will be based on the latest research and review article in the fields of biotechnology, synthetic and systems biology, metabolic engineering.
- T.A. Brown: Gene Cloning and DNA Analysis, An Introduction. Wiley-Blackwell, 2020, ISBN: 9781119640783.

Contact and other information

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