



LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Kurs i syntetisk biologi **Course in Synthetic Biology**

KBKF10, 15 credits, G2 (First 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.

Elective for: B3, K3, MBI01, N3

Language of instruction: The course will be given in English on demand

Aim

The course aims to provide in-depth knowledge and skills in synthetic biology by designing, building, and testing a genetically engineered biological system intended to solve real-world challenges. The project also includes public outreach and communication with experts, stakeholders, and the public. It is essential the work is done in a team of students with competences from various disciplines including engineering, natural sciences, medicine, and social sciences. Knowledge in economics, marketing, and project management is also essential in the project.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

be able to define and evaluate a number of solutions to a real-world problem using synthetic biology

be able to apply synthetic biology concept into the development of a biological system

be able to select methods and tools for the construction and testing of a biological system

be able to describe the biological system's activity by means of data analysis and/or modeling

Competences and skills

For a passing grade the student must

be able to critically search, read, retrieve, and draw conclusions from scientific literature

be able to independently plan and work hands-on when developing a biological system

be able to present a biological system and its purpose both to a scientific and a non-scientific audience

Judgement and approach

For a passing grade the student must

be able to work and cooperate with all relevant competences represented in the team

be able to work in a multidisciplinary team, assuming tasks and responsibilities that will contribute to the final outcome of the project

have the understanding and judgement to respect all the various competences necessary for the constructive design of a project

understand what responsible innovation is by taking into account ethics, biosafety, biosecurity, and public outreach.

Contents

Synthetic biology is a discipline that combines engineering, molecular biology, chemistry, computer science, and mathematics. In this course, participants propose and then work on a project idea aimed to solve real-world challenges using synthetic biology tools. The project has two parts. Part I includes extensive information search, brainstorming, design, model prediction, and evaluation of the idea (5 credits). Part II, tools and parts are selected and the biological system is assembled, tested, and evaluated. Also public outreach activities are carried out (10 credits). The project may also include *in silico* modelling, hardware and/or software construction. All activities are supervised independent activities and students assume the role of project managers. The course activities are planned by the students and may be scheduled outside regular office hours. The course concludes with the written and oral presentation of the biological system.

Students who complete both parts of the course and want and have the opportunity can volunteer to join the IGEM Lund team in an international synthetic biology competition against other universities.

Examination details

Grading scale: UG - (U,G) - (Fail, Pass)

Assessment: For passing the course the student should have significantly contributed to the completion of a synthetic biology project. Assessment Part I: Presentation of the project plan in groups. Assessment Part II: Students should independently give an oral presentation using material (report, presentation) previously submitted to the course coordinators. The discussion should include a selected area of the project, motivate its relevance, challenges, limitations, capabilities, and its impact on the rest of the project.

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: 0119. **Name:** Part I.

Credits: 5. **Grading scale:** UG. **Assessment:** Presentation of the project plan in groups. **Contents:** Part I includes extensive information search, brainstorming, design, model prediction, and evaluation of the idea (5 credits).

Code: 0219. **Name:** Part II.

Credits: 10. **Grading scale:** UG. **Assessment:** The student should independently give an oral presentation using material (report, presentation) previously submitted to the course coordinators. The discussion should include a selected area of the project, motivate its relevance, challenges, limitations, capabilities, and its impact on the rest of the project. **Contents:** During Part II, tools and parts are selected and the biological system is assembled, tested, and evaluated. Also, public outreach activities are carried out.

Admission

Admission requirements:

- Completed a minimum of 90 credits within relevant programme.

The number of participants is limited to: 25

Selection: Completed university credits within the program. Admission groups: - LTH Engineering Program : 48% - LTH Masterprogram Biotechnology: 20% - Other programs: 32%

The course might be cancelled: If the number of applicants is less than 3.

Contact and other information

Course coordinator: Johan Svensson Bonde, johan.svensson_bonde@tbiokem.lth.se