



LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Biologiska läkemedel Biopharmaceuticals

KIMN10, 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: Pharmaceutical Technology.

Compulsory for: MLAK1

Elective for: B4-1, K4

Language of instruction: The course will be given in English

Aim

The aim of this course is to convey basic knowledge and a broad understanding of the types of biological pharmaceuticals, biopharmaceuticals, also named “biologics”, that exist today, how targets for biologics are identified, how they are developed and produced, and molecular and cell biological principles that are relevant for the process of developing and producing biopharmaceuticals.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- be able to describe what biopharmaceuticals are, which types exist, according to which principles they are developed, and what steps are needed from discovery to production,
- be able to describe ways/methods for the discovery of druggable targets for therapy and what molecular interactions are involved in common drug-target interactions,
- be able to explain the connection between basic molecular and cell biological mechanisms and the function of biopharmaceuticals, and demonstrate a deeper understanding of such aspects for a selection of commonly used biopharmaceuticals.

Competences and skills

For a passing grade the student must

- be able to analyse different types of literature and to extract relevant information within the field and neighbouring disciplines,
- be able to describe, exemplify, and discuss/problematize the discovery of druggable targets and suggest appropriate candidates for biopharmaceuticals,
- be able to present laboratory and literature results in a formally correct way in a report.

Contents

The course will include lectures covering:

- historical aspects of biopharmaceutical development including their different types; discovery, validation and production of pharmaceuticals (including production in cultured cells), and the formulation of biopharmaceuticals.
- cellular and molecular interactions in disease and homeostasis.
- high-throughput methods for discovery of potential targets for biopharmaceuticals and screening methods to assess functionality
- classes and delivery of protein pharmaceuticals, i.e. administration routes, medical devices.
- strategies to prolong half-life of biopharmaceuticals in circulation.
- an overview of several major therapeutic areas, such as cancer, transplantation, inflammatory disease that exploit biopharmaceuticals, including immunotherapy.
- pharmacological/pharmacokinetic aspects, and toxicity aspects of biopharmaceuticals.

The course will also include

- study visits and guest lectures from biopharmaceutical companies and relevant infrastructures,
- a hands-on project "from discovery to validation and production",
- a case about combination therapy, incorporating knowledge activation from the Medicinal chemistry and the Biopharmaceuticals courses.
- Laboratory practicals highlighting relevant methods for development of biopharmaceuticals

Examination details

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

Assessment: Attendance in compulsory lectures and active participation in compulsory exercises. Laboratory work and reporting thereof. Ordinary examination is written. Re-examination is written or individual oral examination (as defined by the examiner). The final grade is based on the written or oral examination.

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: 0120. **Name:** Practical.

Credits: 3. **Grading scale:** UG. **Assessment:** Laboratory work and reporting thereof. Active participation in PBL sessions, including reporting. **Contents:** Laboratory work and reporting thereof. The laboratory work will involve some methods used in discovery and development of biopharmaceuticals Project work in PBL format. The projects will involve analysis of literature and data of relevance for development of biopharmaceuticals.

Code: 0220. **Name:** Theory.

Credits: 4,5. **Grading scale:** TH. **Assessment:** Attendance in mandatory lectures and study visits. Written or oral examination. **Contents:** Lectures and study visits about biopharmaceuticals

Admission

Admission requirements:

- EXTA70 Biology of the Cell or KBK011 Biochemistry or KBKA05 Technical Biology or KBKA10 Biochemistry or KBKF05 Cell biology or KBKF15 Biochemistry or TEK295 Biology of the Cell

The number of participants is limited to: 48

Selection: Maximum 3 places in the course are reserved for exchange students. Selection criteria for the remaining places: completed university credits within the programme. Priority is given to students enrolled on programmes with the course listed as mandatory, and subsequently to students from programmes that include the course in their curriculum.

Reading list

- Wei Wang, Manmohan Singh : Biological Drug Products, Development and Strategies, 1st Edition. Wiley, 2013, ISBN: 978-1118148891.
- Scientific and review articles.

Contact and other information

Course coordinator: Christina Sakellariou, Christina.Sakellariou@immun.lth.se

Course homepage: <https://www.immun.lth.se/study-at/>