

ChE-433

Biotechnology lab (for CGC)

Pick Horst

Cursus	Sem.	Type
Biotechnology minor	E	Opt.
Ing.-chim.	MA2, MA4	Opt.

Language of teaching	English
Credits	4
Withdrawal Session	Unauthorized Summer
Semester	Spring
Exam	During the semester
Workload	120h
Weeks	14
Hours	6 weekly
Practical work	6 weekly

Number of positions

It is not allowed to withdraw from this subject after the registration deadline.

Summary

This laboratory-training course is designed to give students a comprehensive insight into laboratory research techniques in the field of biotechnology and pharmaceutical biotechnology with practices employed in the industry. Accompanying lectures provide the theoretical background.

Content

- Engineering of a synthetic gene encoding human pro-insulin using recombinant DNA techniques
- Basic animal/human cell culture training (Aseptic techniques, quantification of cell growth, cell passaging, adherent and suspension cells cultures, determination of cell viability).
- Engineering of a stable mammalian cell line using a transposon-based approach (Production of a recombinant protein for the treatment of rheumatoid arthritis).
- Bioreactor training for pharmaceutical protein production (Fed-batch culture, daily sampling for analysis: cell density, viability, glucose, lactate, glutamine).
- Pharmaceutical protein purification, SDS-page, ELISA, Mass spectrometry analysis.
- Production and purification of an anti-Rhesus D monoclonal antibody.
- Production and purification of a recombinant anti-tuberculosis vaccine.

Keywords

Cell culture technologies, therapeutic proteins, monoclonal antibodies, recombinant vaccines, bioreactor, affinity purification, ELISA, mass spectrometry, flow cytometry, recombinant DNA techniques.

Learning Prerequisites**Required courses**

Recommended courses:

Pharmaceutical Biotechnology (ChE-436)

Learning Outcomes

By the end of the course, the student must be able to:

- Demonstrate comprehensive understanding of the principles and practices of biotechnology
- Demonstrate technical skills in methods of biotechnology
- Manage working in a team to organise laboratory activities
- Choose an appropriate method for obtaining experimental data
- Demonstrate the safe use and disposal of chemicals and biological samples
- Demonstrate the development of analytical skills for the management and communication of experimental data
- Demonstrate understanding of typical conventions of lab or experimental reports
- Elaborate good scientific writing, appropriate use of scientific literature and scientific data presentation (Figures/tables)

Transversal skills

- Plan and carry out activities in a way which makes optimal use of available time and other resources.
- Set objectives and design an action plan to reach those objectives.

Teaching methods

Lectures, laboratory training

Expected student activities

Hands-on lab experiments, lab reports

Assessment methods

During the semester

- Three written tests (20 %)
- Lab participation (10 %)
- Three written lab reports (70 %)

Supervision

Office hours	Yes
Assistants	Yes
Forum	Yes

Resources

Moodle Link

- <https://go.epfl.ch/ChE-433>