ChE-433

# Biotechnology lab (for CGC)

Pick Horst

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

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

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|---|---|
| Office hours | Yes |
| Assistants | Yes |
| Forum | Yes |

## Resources

### Moodle Link

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