

CH-319

Experimental biochemistry and biophysics

Hovius Ruud

Cursus	Sem.	Type
Chemistry	BA6	Obl.

Language of teaching	English
Credits	4
Withdrawal Session	Unauthorized 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

During a semester long experiment students plan and perform the construction from DNA bricks of a fluorescent sensor protein that will be expressed and purified for characterization by biochemical and spectroscopic methods. A report in the style of a scientific paper will be delivered.

Content

- Molecular biology: DNA fragment isolation by PCR, DNA restriction and ligation, plasmid purification and sequence analysis, agarose gel electrophoresis.
- Biochemistry: Bacterial protein expression, protein purification by affinity chromatography, analysis by SDS-PAGE and spectroscopy, fluorescent labelling
- Biophysics: Fluorescence spectroscopy, enzyme kinetics or molecular interactions.

Learning Prerequisites**Required courses**

Biochimie I (CH-111);
chemistry practicals

Recommended courses

Molecular and cellular biophysics I (CH-311)

Important concepts to start the course

genetic engineering & DNA manipulation; protein synthesis; DNA & protein analysis; absorbance and fluorescence spectrometry; enzymology / receptor-ligand interactions

Learning Outcomes

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

- Design cloning strategy
- Produce a scientific report and high-quality lab journal

- Integrate Good laboratory behavior and wet lab practice
- Assess / Evaluate your data critically
- Produce a purified expressed protein
- Analyze proteins and DNA
- Characterize sensor function
- Use common sense and logical deduction

Transversal skills

- Plan and carry out activities in a way which makes optimal use of available time and other resources.
- Collect data.
- Continue to work through difficulties or initial failure to find optimal solutions.
- Write a scientific or technical report.

Teaching methods

Students prepare and discuss experimental approach

Laboratory experimentation

Discussion of experimental progress and results

Reporting on scientific level

Expected student activities

Good theoretical preparation & planning of lab work before doing experiments; skillful execution of experiments, being organized & keeping a lab book; thorough analysis of results, writing a scientific-grade report; respecting security rules and fellow students.

Assessment methods

Evaluation of preparation and planning

Evaluation of experimental execution, including good laboratory behaviour

Evaluation of comprehension through discussion & written questions

Evaluation of report: including structure, data treatment and presentation, critical attitude, comparison to scientific literature

Supervision

Assistants

Yes

Others

Discussions are possible at office hours, depending on the availability of assistants and lecturer, Experimentation might be possible at office hours, depending on the availability of assistants and lecturer, and only upon the allowance of lecturer.

Resources

Bibliography

TP manual

Biochemistry & Biophysics text books

ApE; a plasmid editor free software

Methods, Structures, and other useful info via my.epfl.ch

Websites

- <http://my.epfl.ch>

Prerequisite for

A big plus for Msc courses and for semester or diploma projects in chemical biology or biophysics