CH-319

# Experimental biochemistry and biophysics

Hovius Ruud

| Cursus | Sem. | Type |
|---|---|---|
| Chemistry | BA6 | Obl. |

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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** |
| Practical work | 6 weekly |
| **Number of positions** | |

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

## Summary

A semester long experiment where you plan and construct a fluorescent sensor protein starting from DNA bricks. The protein will be expressed in and purified from bacteria, and characterized by biochemical and spectroscopic methods. Your report will be in the style of a scientific paper.

## Content

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

## Keywords

Molecular biology - cloning
Protein expression & purification
Bio-chemical and bio-physical chracterisation
Sensor proteins
Reporting

## Learning Prerequisites

### Required courses

Biochimie I (CH-210);
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, molecular interactions

## Learning Outcomes

- 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
- Interpret protein structure data

## 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
Topiocal presentations

## 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, writting 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

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|---|---|
| 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 Moodle

### Websites

- http://Moodle

## Prerequisite for

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