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 labeling
• Biophysics: Fluorescence spectroscopy, enzyme kinetics or molecular interactions.

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 / receptor-ligand 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

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 Moodle

Websites
• http://my.epfl.ch

Prerequisite for

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