



# Multidisciplinary Lab project 2



ECTS  
6 crédits



Composante  
Faculté des  
Sciences

## Présentation

### Description

The multidisciplinary lab project, also called “Gene to Protein project”, will be a “learning by doing” project. The students will be in charge of the bioproduction of a protein using *E. coli* as a host. If they follow both parts of the project (1 & 2, like students from Biohealth master), they will start with strain construction and continue with pilot scale production and purification of the protein. Bioprocess engineering is a highly interdisciplinary field of study. The students (and future workers in the field), will benefit from project-based learning with an important practical part, where they can actively experience the interconnection between biology, engineering and physical sciences.

The part 2 of the project will be dedicated to the “production process design and pilot scale production” of the recombinant protein using a high-cell density fed-batch culture. It will be a multidisciplinary, hands-on training of Bioprocess Engineering and will be organized over three different periods:

-Week 1 : In Learning lab, students will participate in workshops to design and plan a production process in accordance with equipment and data available (scientific papers, reports, websites, previous results from UE “Multidisciplinary Lab Project 1”). Based on the bottlenecks identified for production of recombinant proteins in *E. coli*, the students will choose the culture process to be used, define the production objectives, simulate the culture (planning

objective), design a sampling plan, design the culture medium...

-Week 2 : In practical training rooms on pilot-scale equipment (20L working volume bioreactor), students will prepare the bioreactor and all they need to perform the pilot-scale culture. They will be in charge of the monitoring of the culture and of real time data treatment in order to detect and correct deviations from the anticipated progress of the culture.

-Week 3 : In learning labs, students will treat and analyze the data. They will be in charge of the interpretation and discussion of the results and of the writing of a professional report.

### Objectifs

This project is for students a unique opportunity to be challenged with a real-life bioprocess-engineering application from gene to protein, with the objective to be immediately effective for their future employment in biotechnology companies. This project will provide students additional training in biological concepts, but will also prepare them to communicate and interact with co-workers trained in different disciplines, as many companies operate with multidisciplinary teams working in a basic functional unit. Students will work in multidisciplinary teams since they have been trained in different disciplines (biology, biochemical engineering, pharmaceutical sciences...) but also have acquired different skills through their internships.

The part 2 of the project will include 6 learning objectives (LO):

-LO1: Students will be able to define bioproduction process goals and to set up an appropriate culture strategy



which implies that -students understand the principles of operating modes and particularly the fed-batch mode- students understand the fundamentals of E. colimetabolism and growth, and particularly the overflow mechanism leading to acetate production

-LO2: Students will be able to plan and simulate abioproduction (be able to develop experimental schemes, ...)

-LO3: Students will understand the functions of a bioreactor and apply this knowledge during the practical course. Students will be able to prepare the device...

-LO4: Students will be able to analyze and interpret key elements of the culture data (mainly online data) to operate the bioreactor

-LO5: Students will be able to document and analyze the data in a correct and scientific way

-LO6: Students will be able to work efficiently in team, and to manage their project

Know-how and skills in short:

-Bioprocess engineering (Fed-Batch culture design, planification, performance, analysis...)

-Project management, communication, and team working in a transversal and interdisciplinary field

-Reporting (deliverables production like summary notes, calculation sheets, oral presentations, reports)

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English (reading and talking)

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## Contrôle des connaissances

The knowledge assessment is done in full continuous assessment (contrôle continu intégral CCI). Each learning objective are rated through different kinds of assessments: deliverables like summary notes, calculation sheets, oral presentations, reports ; interviews by peers or teachers; anonymous peer assessment of team performance...

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## Infos pratiques

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### Contacts

Responsable pédagogique

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## Pré-requis nécessaires

Bioprocess engineering (M1 UE HAV811V "Ingénierie des bioprocédés -BATCH" or eq. and M2 UE HAV930V "Ingénierie des bioprocédés -Fed-Batch et continus" or eq.)

Pré-requis recommandés:

Project management