Course Specifications
Valid as from the academic year 2019-2020

Biocatalytic Applications (I700165)

Course
Specifications

Lecturers in academic year 2019-2020
Briers, Yves
LA25 lecturer-in-charge

Course offerings and teaching methods in academic year 2019-2020
A (semester 1)

Dutch

seminar
12.0 h

PDE tutorial
48.0 h

Offered in the following programmes in 2019-2020

Master of Science in Biochemical Engineering Technology
5 A

Teaching languages
Dutch

Keywords
Biochemistry, enzymology, biocatalysis, industrial proces

Position of the course
The acquired knowledge of enzyme technology will be used to create, design, optimize products and processes based on biocatalysis and to perform such application on a lab scale.

Contents
In the exercises, industrial processes and enzymatic analyses are simulated on a lab scale. The efficiencies and yields of the different processes steps will be calculated, compared and optimized. Finally, the optimized parameters of the different groups will be compared and the best parameters will be used in a next scale-up of the process in a bioreactor or column with immobilized enzyme.

Each group focuses on one of both projects:
1. Immobilization of β-galactosidase for the production of lactose free milk products.
2. Production of high fructose syrup.

The projects are carried out in teams with a responsible per subtopic. A preparation session of 4 hours (planning, organisation, protocol design, information collection) precedes three practical sessions of each 4 hours. A report of this preparation is submitted to the supervisors before the execution and feedback will be provided. The obtained results and conclusions are summarized in a report and presented to a jury in an oral defense.

In a second part of this course, students work out a new process/product based on biocatalysis or a novel enzymatic analysis method and present it to each other during microteaching sessions.

Initial competences
The theoretical foundations of organic chemistry and biochemistry should be known (competences 2nd and 3rd bachelor bachelor resp.).

Learning outcomes of Enzymology are acquired.

Final competences
1. To be able to identify, consult and summarize scientific literature related to the research problem in order to propose solutions for the problem.
2. To be able to design, plan and execute an appropriate research methodology.
3. Showing the appropriate attention for correct controls, calibration curves, biological
and technical repeats for a correct design and good reproducibility of the experiment.

4 To be able to process, understand and interpret research results, which leads to new suggestions for further optimizations of the process.

5 To develop a critical attitude towards the acquired research results with regard to controls, statistics and reproducibility and to be able to report the conclusions in a report based on these results using a correct scientific reporting style (language, content).

6 To be able to collaborate in a team with different personalities and talents, to divide the roles among the team members and to develop a sense for responsibility.

7 To be able to interact and discuss with non-experts about scientific results and to support this discussion with scientific arguments.

8 To be able to search for and understand novel scientific trends in the application domain.

9 To be able to study novel scientific trends in the application domain of biocatalysis, to implement them, to assess applicability, advantages and drawbacks, and to communicate about these trends with peers.

Conditions for credit contract
- Access to this course unit via a credit contract is determined after successful competences assessment.

Conditions for exam contract
- This course unit cannot be taken via an exam contract.

Teaching methods
- PDE tutorial, seminar

Extra information on the teaching methods
- The majority of this course is focused on the simulation of a selected industrial process on a lab scale. The students are expected to think with a problem-solving mindset and try to tackle an unstructured problem in an independent way through interaction with the tutor. The knowledge will not be offered to the students by the tutor, but will be sought for by the students based on the problem setting. The tutor has thus only a facilitating role, and will ask questions to steer the process. The tutor does not lead the discussion and has only a limited contribution to the content. Regularly there is a 2-hour work college to develop a strategy, protocols, to think about work distribution, to interpret results with extensive possibilities to ask questions...

Learning materials and price
- General notes and articles related to the experimental setups are provided.

References
- Course content-related articles
- Steering and supporting role of tutors during all sessions

Evaluation methods
- Continuous assessment

Examination methods in case of periodic evaluation during the first examination period

Examination methods in case of periodic evaluation during the second examination period

Examination methods in case of permanent evaluation
- Oral examination, participation, peer assessment, report

Possibilities of retake in case of permanent evaluation
- Examination during the second examination period is possible in modified form

Extra information on the examination methods
- The practical classes will be evaluated at four levels:
  - Preparatory reports based on a template (group score).
  - Participation in the realization of an optimized industrial process at lab scale evaluated by the assistants (personal score).
  - Final report about the observations (group score).
  - Oral examination about the final report (personal score).

Peer assessment will be done to evaluate each other’s role in each group regarding the preparatory reports, the participation degree in the lab, the final report and the microteaching session. The teacher holds the end responsibility to deviate from or not to take into account the peer assessments scores to determine the scores per student.

Calculation of the examination mark

(Approved)
1. Preparation reports: 20%
2. Participation: 20%
3. Final report: 35%
4. Oral examination: 25%

The student has to participate in all items (preparation, practical class, report, oral examination) to be able to succeed. Each absence should be legalized. The final score will be obtained based on the weighted average using the coefficients above.