Course Specifications
Valid as from the academic year 2019-2020

Enzyme Technology (I700232)

Course

Course size (nominal values; actual values may depend on programme)
Credits 5.0
Study time 150 h
Contact hrs 48.0 h

Course offerings and teaching methods in academic year 2019-2020
A (semester 1) Dutch seminar: coached exercises 3.0 h practicum 19.0 h lecture 24.0 h seminar: practical PC room classes 2.0 h

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

Offered in the following programmes in 2019-2020
Bachelor of Science in Bioscience Engineering Technology
5 A
Linking Course Master of Science in Biochemical Engineering Technology
5 A

Teaching languages
Dutch

Keywords
Classification and nomenclature, enzyme structure, thermodynamic and molecular base of enzyme catalysis, enzyme kinetics, enzyme inhibition and activation, activity measurements, industrial production immobilisation, industrial and biomedical applications and processes

Position of the course
Enzymes are used in numerous industrial processes and analytical assays. This course provides basic knowledge in the properties of enzymes (structure, activity, kinetics, stability, inhibition) and numerous industrial applications.

Contents
The usefulness of biocatalysts will be compared to chemical catalysts in the perspective of our evolution to a more sustainable bio-economy. Subsequently, a discussion of enzyme classification, nomenclature and structure will introduce the course. The thermodynamic and molecular base of enzyme catalysis will be discussed in detail and illustrated with examples. The enzyme kinetics will be studied starting from the Michaelis-Menten model followed by study of the impact of different kinds of inhibitors on enzyme kinetics. The correct execution of activity measurements will be taught in a very practical and problem-solving manner and typical pitfalls will be discussed. Industrial production of enzymes and the different methods for enzyme immobilisation used in industry and the laboratory will be clarified. To conclude the course, the multitude of enzyme applications in industry and biomedicine will be summarized.

During the practical classes, the theoretical principles of enzyme kinetics, activity measurements and inhibition will be evaluated with a model enzyme. During the laboratory exercises the relevant calculations will be practiced intensively under supervision. During the introduction session of the practical classes, an in-depth bioinformatical analysis of the model enzyme will be done using protein databases and bio-informatic tools.

Initial competences

(Assigned) 1
The theoretical basis of organic chemistry, biochemistry and spectroscopy
Laboratory skills in biochemistry

Final competences

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
Lecture, practicum, seminar: coached exercises, seminar: practical PC room classes

Extra information on the teaching methods
Theory lessons with powerpoint slides.
Laboratory exercises to acquire and practise lab skills. Students explore protein databases and use bio-informatic tools to look up information about the model enzyme. Relevant calculations will be practiced during an exercise session.

Learning materials and price
Syllabus and powerpoint slides
Lab manual with protocols, (bio-informatic) exercises and software manuals

References
Buchholz, K., V. Kasche, et al. (2005). Biocatalysts and enzyme technology, Wiley-VCH Verlag GmbH & Co. KGaA.

Course content-related study coaching
Students can ask questions before, during or after the lessons
Lab exercises are intensively guided

Evaluation methods
end-of-term evaluation and continuous assessment

Examination methods in case of periodic evaluation during the first examination period
Written examination with open questions, written examination

Examination methods in case of periodic evaluation during the second examination period
Written examination with open questions, written examination

Examination methods in case of permanent evaluation
Participation, peer assessment, report

Possibilities of retake in case of permanent evaluation
not applicable

Extra information on the examination methods
Report about experimental set-up, observations, interpretation and discussion of the practical classes
Participation: professional attitude during practical classes, teamwork collaboration and preparation
Exam: Written preparation and oral examination

Calculation of the examination mark
Theoretical exam: Weighted average of the scores on the individual questions
Practicum: participation (25%) and report/peer assessment (75%)
Total: theory (70%) and practicum (30%)
When the student does not participate in the evaluation of one of the course modules, or gets a score below 9/20 (not rounded) for one or more course modules, he/she cannot succeed for the course. In case the final score is 10 or more on 20, the final score will be reduced to 9/20.

(Approved)