ADVANCED COURSE

Biocatalysis and Protein Engineering

8 - 12 April 2024

Ulf Hanefeld
Frank Hollmann
Caroline Paul
Adrie Straathof
Peter Leon Hagedoon

AIM OF THE COURSE

The aim of the course is to familiarize participants with the integrated, interdisciplinary approach required to utilize the catalytic potential of enzymes and whole cells for the production of useful compounds. Organic chemists, enzymologists, microbiologists and (bio)chemical engineers from the faculty staff of Delft University of Technology and other universities, together with invited international experts from industry, will offer a selection of theory and practice. In this way, the course will provide an intensive and in-depth treatment of the state of the art and the necessary link between fundamental knowledge and practical applications in industrial scale processes.

All teachers of this course are experts in their topic and have been selected for their outstanding teaching qualities. The course thus provides all participants with up to date knowledge taught by approachable lecturers. The participants are invited to ask questions during and after the lectures and will be engaged in the learning process. This very personal approach is underlined by the fact that the group is small with a maximum of 35 participants. At the end of the course the participants will be well educated on all aspects of biocatalysis, from selection of the right biocatalyst, its production and improvement to reaction engineering. Additionally the participants will have made acquaintances with all experts in the fields and among each other providing many opportunities for future contacts.

BioTechDelft
POSTGRADUATE EDUCATION

TU Delft

COURSE DESCRIPTION

This one-week course is intensive and has long days. To ensure active participation by those attending, a combination of theoretical (lectures), practical demonstrations and practical work (exercises, case study) is offered. Some online preparatory materials will be given to ensure all have the same basic knowledge.

LECTURES

Lectures are setup to be interactive but active participation of the participants is of course vital to the success of the lectures. During the lectures attention will be paid to the following questions:

- When is biocatalysis the preferred method?
- Which type of biocatalysis should be used?
- How to obtain / improve this biocatalyst?
- Which reaction types can be carried out?
- How to perform and monitor the conversion?
- How to optimize the reaction conditions?

CASE STUDY AND WORKSHOP

For a better understanding of the lectures, the theory is applied in exercises in a case study. The workshops on Enzyme visualization / bioinformatics will be offered in two different levels, so even advanced participants will definitely be challenged!
The course will be given in English.

WHO SHOULD ATTEND?

This Advanced Course is aimed at professionals (MSc, PhD or equivalent experience) in biochemical engineering, organic chemistry, fermentation technology, biochemistry or microbiology with a basic working knowledge of the other disciplines. The course is primarily aimed at those already employed in industry who wish to up-date their theoretical knowledge and practical insight in this field. In addition, this Advanced Course is an option in the two-year postgraduate programs of Delft University of Technology.

COURSE BOARD

Ulf Hanefeld
Biocatalysis
Delft University of Technology
Delft, the Netherlands

Frank Hollmann
Biocatalysis
Delft University of Technology
Delft, the Netherlands

Caroline Paul
Biocatalysis
Delft University of Technology
Delft, the Netherlands

Adrie Straathof
Bioprocess Integration
Delft University of Technology
Delft, the Netherlands

Dr. Peter Leon Hagedoorn
Delft University of Technology
Delft, the Netherlands

COURSE COORDINATION

Yvonne van Gameren
Jenifer Baptiste
BioTech Delft
Delft University of Technology
Delft, the Netherlands

LECTURERS

Dr. Alessandra Basso

Prof. Bernhard Hauer
Department of Technical Biochemistry
University Stuttgart
Stuttgart, Germany

Prof. Marco Fraaije
Molecular Enzymology
University of Groningen
Groningen, the Netherlands

Dr. René de Jong
dsm-firmenich
Delft, the Netherlands

Dr. Nick Wierckx
Forschungszentrum Jülich GmbH
Institute of Bio- and Geosciences IBG-1
Jülich, Germany

Dr. Burghard König
Koenig & Funk Biotech Ltd., CEO
Berlin, Germany

Prof. Gerard Muyzer
Faculty of Science
University of Amsterdam
Amsterdam, the Netherlands

Dr. Sandy Schmidt
Dept. of Chemical and Pharmaceutical Biology
RU Groningen
Groningen, the Netherlands

Dr. Martin Schurmann
InnoSyn B.V.
Geleen, the Netherlands

Prof. Roger Sheldon
University of the Witwatersrand,
Johannesburg, South Africa

Dr. Andreas Taglieber
dsm-firmenich
Geneva, Switzerland

Dr. Oliver Thum
Evonik Operations GmbH
Essen, Germany

Prof. John Woodley
Technical University of Denmark
Lyngby, Denmark

PROGRAM

MONDAY 8 APRIL 2024

08.45 Registration
09.00 Outlook of the course and introductions
Ulf Hanefeld
09.30 Principles and applications of enantioselection
Caroline Paul
10.45 Industrial Applications of Biocatalysis for Antibotic and Pharamceutical synthesis
Burghard König
12.00 Case study: Hydrolysis - esterification - transesterification - aminolysis - perhydrolysis introduction - organic media - introduction enantioselection
Ulf Hanefeld
12.45 Group picture & Lunch work-break
13.45 Team presentations case study
15.00 Industrial applications of immobilized enzymes
Alessandra Basso
16.15 Economics and Implementation of Biocatalytic Processes
John Woodley
17.30 Social drink and buffet

TUESDAY 9 APRIL 2024

09.00 Themes of the day
09.15 From natural environment to biocatalyst
Gerard Muyzer
10.30 Reaction engineering: optimizing the medium for enzymatic conversions
Caroline Paul
11.45 Novel enzymes and expanding the reaction space
Frank Hollmann
12.45 Lunch
13.45 Enzyme-catalysed synthesis of C-C bonds: aldolases
Ulf Hanefeld
15.30 Immobilization of biocatalysts
Roger Sheldon
17.00 End of day

WEDNESDAY 10 APRIL 2024

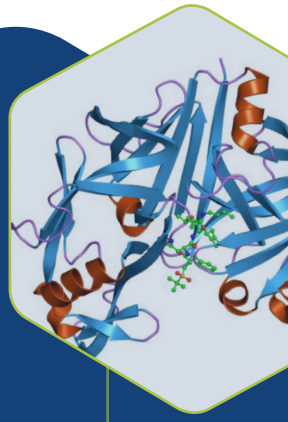
9.00 Themes of the day
9.15 Discovery and engineering of cofactor-dependent enzymes
Marco Fraaije
11.30 Rational design and directed evolution of enzymes
Sandy Schmidt
13:00 Lunch
14.00 Biocatalysis - A tool for sustainable production of ester-based surfactants
Oliver Thum
15.15 Computer practical: PyMOL
Peter Leon Hagedoorn
18.00 End of day

THURSDAY 11 APRIL 2024

09.00 Themes of the day
09.15 From biotransformation towards industrial process - part 1
Adrie Straathof
10.25 Biocatalytic processes to oxyfunctionalised products
Martin Schürmann
11.30 Protein engineering to bring progress to life™
René de Jong
12.45 Lunch
13.45 From biotransformations towards industrial processes - part 2
Adrie Straathof
15.00 Plastic upcycling through enzymatic and microbial catalysis
Nick Wierckx
16.00 Non-aqueous biocatalysis
Ulf Hanefeld
16.45 Plenary discussion
18.30 Course dinner

FRIDAY 12 APRIL 2024

09.00 Themes of the day
09.15 Fundamentals and application of BioRedox Catalysis
Frank Hollmann
10.15 Biocatalytic reduction reactions
Frank Hollmann
11.15 Biocatalytic oxidation and oxyfunctionalization reactions
Frank Hollmann
12.15 Lunch
13.00 Biocatalysts for the synthesis of chiral amines
Bernhard Hauer
14.15 An industrial perspective from the world of flavors and fragrances
Andreas Taglieber
15.15 Evaluation of the course
Frank Hollmann
15:30 Farewell drink



LOCATION

The course will be held at the
Delft University of Technology
Department of Biotechnology
Van der Maasweg 9
2629 HZ Delft, The Netherlands
http://bt.tudelft.nl

COURSE REGISTRATION

Please register via the website to attend the course. Deadline for application is 18 March 2024. Applicants will be handled in order of the date of receipt.

COURSE FEE

€ 2.500 in case booking is made before 29 January 2024 or € 2.750 in case booking is made after this date. In the event of cancellation before 12 February 2024, a full refund will be granted, after this date, a 25% fee charge can be made.
To facilitate enrolment of young PhD-students from universities, a limited number of fellowships is available. The course fee with fellowship is € 1.250. To apply, please include a copy of your registration as a PhD-student from your university.

The fee includes course materials, lunches, the buffet on Monday and the course dinner on Thursday. The fee does not cover other meals and lodging.

When the number of participants is too low to have a fruitful course, BioTech Delft will cancel the event no later than six weeks before the start of the course. The course fee will be reimbursed within three weeks after cancellation.
In case a speaker will not be able to present his/her lecture due to unforeseen circumstances, BioTech Delft will arrange an equivalent replacement.

Preparatory texts will be send a month before the start of the course. The complete digital course book will be supplied at the start of the course.

BioTech Delft organises biotechnology education at postgraduate level. BioTech Delft closely cooperates with the department of Biotechnology of Delft University of Technology. Since its foundation, in 1987, BioTech Delft has very successfully organised various types of postdoctoral education.

Currently BioTech Delft offers Advanced Courses given each year, covering the multidisciplinary spectrum of biotechnology. The courses have a long track-record dating back to 1988.

- *Microbial Physiology and Fermentation Technology (1988)*
- *Downstream Processing (1989)*
- *Biocatalysis and Protein Engineering (1999)*
- *Environmental Biotechnology (1993)*
- *Bioprocess Design (2014)*
- *Modelling and Computation for Micro-organisms in Bioprocesses (2018)*
- *Integrated Multi-Omics approaches for Improvement of Industrial Microbes (2020)*

FURTHER INFORMATION

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Advanced Courses in Biotechnology

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