



ADVANCED COURSE

# Biocatalysis and Protein Engineering

9 - 13 April 2018

Isabel Arends  
Ulf Hanefeld  
Frank Hollmann  
Adrie Straathof

## 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.

## 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 on Tuesday 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

**Isabel Arends**  
Biocatalysis  
Delft University of Technology  
Delft, the Netherlands

**Ulf Hanefeld**  
Biocatalysis  
Delft University of Technology  
Delft, the Netherlands

**Frank Hollmann**  
Biocatalysis  
Delft University of Technology  
Delft, the Netherlands

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

## COURSE COORDINATION

**Vincent Renken**  
**Claudia Westhoff**  
BioTech Delft  
Delft University of Technology  
Delft, the Netherlands

## LECTURERS

**Dr. Alessandra Basso**  
Purilite  
Cardiff, United Kingdom

**Prof. Uwe Bornscheuer**  
Institute of Biochemistry  
Greifswald University  
Greifswald, Germany

**Prof. Bernhard Hauer**  
Dept. of Biological Engineering  
University Stuttgart  
Stuttgart, Germany

**Prof. Dick Janssen**  
Dept. of Biochemistry  
University of Groningen  
Groningen, the Netherlands

**Dr. René de Jong**  
DSM Biotechnology Center  
Delft, the Netherlands

**Dr. Mirjam Knavel**  
Wageningen University & Research  
Wageningen, the Netherlands

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

**Dr. Stephan Lütz**  
Technical University Dortmund,  
Dortmund, Germany

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

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

**Dr. Andreas Tagliabue**  
Firmenich SA  
Geneva, Switzerland

**Dr. Oliver Thum**  
Evonik Industries AG  
Essen, Germany

**Prof. John Woodley**  
Technical University Denmark  
Lyngby, Denmark

## COORDINATORS WORKSHOP

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



# PROGRAM

## MONDAY 9 APRIL 2018

- 08.45 Registration  
09.00 Outlook of the course  
*Isabel Arends*  
09.15 Keynote lecture: The future of Biocatalysis  
*Isabel Arends*  
10.30 Industrial Applications of Biocatalysis for Antibiotic and Pharmaceutical synthesis  
*Burghard König*  
11.45 Immobilization of biocatalysts  
*Roger Sheldon*  
12.30 Lunch  
13.30 Continuation: Immobilization of biocatalysts  
*Roger Sheldon*  
14.45 From natural environment to biocatalyst  
*Gerard Muyzer*  
16.00 Engineering nature's enzyme repertoire for food, pharma and biofuels  
*René de Jong*  
17.00 Social drink and buffet

## TUESDAY 10 APRIL 2018

- 09.00 Themes of the day  
09.15 Biocatalysis and sustainability  
*John Woodley*  
10.45 Reactions of serine hydrolases  
Case study  
*Ulf Hanefeld*  
12.30 Lunch  
13.30 Team presentation of the case study  
14.45 Principles of enantioselection: mathematics and applications  
*Adrie Straathof*  
15.45 Rational design and directed evolution of enzymes  
*Uwe Bomscheuer*  
17.00 Reaction engineering: optimizing the medium for enzymatic conversions  
*Adrie Straathof*  
18.00 End of day

## WEDNESDAY 11 APRIL 2018

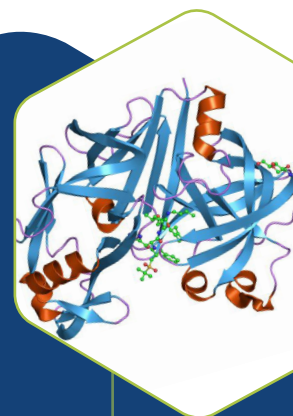
- 9.00 Themes of the day  
9.15 Protein engineering: enzyme stability/specificity  
*Dick Janssen*  
10.30 Genomic databases, bioinformatics and biocatalysis  
*Dick Janssen*  
11.30 Enzyme-catalysed synthesis of C-C bonds: Hydroxynitrile lyase/Oxynitrilase  
*Ulf Hanefeld*  
13.00 Lunch  
14.15 Biocatalysis – a tool for sustainable production of ester-based surfactants  
*Oliver Thum*  
15.30 Computer practical: Pymol  
*Peter Leon Hagedoom*  
18.00 End of day

## THURSDAY 12 APRIL 2018

- 09.00 Themes of the day  
09.15 From biotransformation towards industrial process  
*Adrie Straathof*  
11.30 Non-aqueous biocatalysis  
*Ulf Hanefeld*  
12.30 Lunch  
13.45 Industrial biocatalysis in food and pharma  
*Alessandra Basso*  
15.15 Enzymes for lignocellulose degradation  
*Mirjam Knavel*  
18.00 Course dinner

## FRIDAY 13 APRIL 2018

- 09.00 Themes of the day  
09.15 Fundamentals and application of BioRedoxCatalysis  
*Stephan Lütz*  
11.15 Biocatalytic oxidation and oxyfunctionalization reactions  
*Frank Hollmann*  
12.15 Lunch  
14.00 Selection and development of biocatalysts for the preparation of fine chemicals  
*Bernhard Hauer*  
15.00 An industrial perspective from flavor and fragrances  
*Andreas Taglieber*  
16.00 Evaluation of the course  
*Ulf Hanefeld*  
16:30 Farewell drinks



### 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>

### ACCOMMODATION

Hotel accommodation can be arranged at your request addressed to [biotechdelft@tudelft.nl](mailto:biotechdelft@tudelft.nl).

## COURSE REGISTRATION

Please register via the website to attend the course. Deadline for application is **26 March 2018**. Applicants will be handled in order of the date of receipt.

## COURSE FEE

€ 2.500 in case booking is made before **12 February 2018** or € 2.750 in case booking is made after this date. In the event of cancellation before **26 February 2018**, 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.

Hotel accommodation can be arranged at your request.

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



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**BioTech Delft** organises courses in biotechnology 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 various 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)*
- *Genomics in Industrial Biotechnology (2005)*
- *Metabolomics for Microbial Systems Biology\* (2010)*
- *Bioprocess Design\*\* (2014)*

\* in partnership with Forschungszentrum Jülich

\*\* in partnership with Wageningen University & Research

## FURTHER INFORMATION

Claudia Westhoff

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Course coordination

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