

#### Board of the Course

*Dr. Jean-Marc Daran*  
Delft University of Technology  
Industrial Microbiology  
Delft, the Netherlands

#### Faculty staff

*Dr. Pascale Daran-Lapujade*  
Delft University of Technology  
Industrial Microbiology  
Delft, the Netherlands

*Dr. Ton van Maris*  
Delft University of Technology  
Industrial Microbiology  
Delft, the Netherlands

*Prof. Jack Pronk*  
Delft University of Technology  
Industrial Microbiology  
Delft, the Netherlands

*Dr. Aljoscha Wahl*  
Delft University of Technology  
Cell Systems Engineering  
Delft, the Netherlands

#### Coordinator Computer Exercises

*Marcel van den Broek*  
Department of Biotechnology  
Industrial Microbiology  
Delft, the Netherlands

#### Guest Lecturers

*Dr. Anthony Burgard*  
Genomatica  
San Diego, CA, USA

*Dr. Derek Butler*  
BaseClear  
Leiden, the Netherlands

*Mark Chadwick, PhD*  
DSM  
Echt, the Netherlands

*Dr. Sylvie Dequin*  
INRA, Montpellier, France

*Prof. Matthias Heinemann*  
Groningen University  
Groningen, the Netherlands

*Dr. Sacha van Hijum*  
Radboud Nijmegen Medical Center and  
NIZO, the Netherlands

*Dr. Eric Johansen*  
Christian Hansen A/S  
Hørsholm, Denmark

*Dr. Bram de Jonge*  
Law & Governance group  
Wageningen University  
the Netherlands

*Dr. Stefan de Kok*  
Zymergen  
Emeryville, USA

*Dr. Hannes Link*  
MPI für terrestrische Mikrobiologie  
SYNMIKRO, Germany

*Dr. Giani Liti*

National Center for Scientific Research  
(CNRS), Nice, France

*Dr. Hanna Schebesta*  
Law & Governance group  
Wageningen University  
the Netherlands

*Prof. Hauke Smidt*  
Laboratory of Microbiology  
Wageningen University  
the Netherlands

*Prof. Ralf Takors*  
Stuttgart University  
Germany

*Prof. Bas Teusink*  
Vrije Universiteit Amsterdam  
the Netherlands

*Dr. Ronald de Vries*  
Utrecht University and CBS Fungal  
Biodiversity Centre  
Utrecht, the Netherlands

*Prof. Ken Wolfe*  
University College Dublin, Ireland

#### Course Coordination

*Jenny Boks-Zondervan*  
*Vincent Renken, MSc MSc(Ed)*  
Biotechnology Studies Delft Leiden  
Department of Biotechnology  
Delft, the Netherlands

The Institute Biotechnology Sciences Delft Leiden (BSDL-EDU) constitutes a joint initiative in biotechnological post-graduate education of Delft University of Technology and Leiden University and is coordinated from the department of Biotechnology of Delft University of Technology.

BSDL-EDU was founded in 1987 and has since then very successfully organised various types of postdoctoral education: the Advanced Course Quality Management in Pharma and Biotech, the PDEng programmes and the Advanced Courses in biotechnology. The Advanced Course Quality Management in Pharma and Biotech was developed by BSDL-EDU and is currently organised by PAO Farmacie. The PDEng programmes are special two-year postgraduate programmes that are aimed at those who wish to tailor their own specialisation to the needs of multidisciplinary biotechnological research and design, and lead to the degree of 'Professional Doctorate in Engineering'. Originally developed by BSDL-EDU, these programmes are now hosted by the 3TU School for Technological Design / Stan Ackermans Institute.

Currently BSDL-EDU offers various Advanced Courses covering the multidisciplinary spectrum of biotechnology:

- MICROBIAL PHYSIOLOGY AND FERMENTATION TECHNOLOGY
- BIOCATALYSIS AND PROTEIN ENGINEERING
- BIOPROCESS DESIGN
- DOWNSTREAM PROCESSING
- ENVIRONMENTAL BIOTECHNOLOGY
- METABOLOMICS FOR MICROBIAL SYSTEMS BIOLOGY

#### Further information

Jenny Boks-Zondervan  
Vincent Renken, MSc MSc(Ed)  
Course coordination  
P +31 15 278 1922 / 8311  
F +31 15 278 2355  
E [bsd-edu@tudelft.nl](mailto:bsd-edu@tudelft.nl)  
W [www.biotechnologycourses.nl](http://www.biotechnologycourses.nl)

#### Address

Institute Biotechnology Studies Delft Leiden  
Department of Biotechnology, Delft University of Technology  
Van der Maasweg 9, 2629 HZ Delft, the Netherlands

## Advanced Course

# GENOMICS IN INDUSTRIAL BIOTECHNOLOGY

31 October -  
4 November 2016



Institute Biotechnology Studies Delft Leiden (BSDL)  
Delft University of Technology, Department of Biotechnology  
Van der Maasweg 9  
2629 HZ Delft  
The Netherlands

  
Delft University of Technology



Universiteit Leiden



# Program, 31 October - 4 November 2016

## Aim

The Advanced Course on Genomics in Industrial Biotechnology aims at familiarizing industrial and academic research professionals (i.e. MSc, PhD, or equivalent experience) with modern concepts in genomics, their use in microbial research and development and their utility in contemporary biotechnological industry.

This course focuses on the singular and combined utilization of the modern molecular research tools genome sequencing, transcriptomics, proteomics, and metabolomics to elucidate cellular regulatory mechanisms of sensing and signalling, metabolic flux and physiology. Mathematical tools and computer algorithms are indispensable to analyze, interpret and model this experimental data. In combined approaches, these tools offer unprecedented possibilities for industrial biotechnology research.

Experts will present lectures on genome analysis and -interpretation, genome-wide mRNA expression analysis (transcriptomics), whole-organism protein expression and activity analysis (proteomics), and metabolic pathway analysis (metabolomics). Data handling and bioinformatics are key to the successful application of genomics and hence, will be an integral part of the course. The necessary links between theory and practice will be provided in interactive case studies and demo-workshops. Implementation of these technologies in industrial R&D will be illustrated with real-life examples.

## Course description

This intensive, high-diversity, one-week course provides a full overview of the possibilities and challenges of genomics in the field of industrial biotechnology. A combination of expert lectures and hands-on activities ensures active participation. The participants will receive the course book, including the presentations of the lecturers, on the first day. The course will be taught in English.

### Lectures

Expert lectures are taught by renowned scientists from both Delft University of Technology as well as other universities and companies from all over the world. They will focus on a variety of themes:

- Genome sequencing and analysis
- Transcriptomics (incl. RNA sequencing)
- Proteomics
- Metabolomics
- Bioinformatics
- Systems Biology
- Genomics in strain improvement (incl. metabolic and evolutionary engineering)
- Regulation, legislation and patents
- Biodiversity
- Novel molecular tools and automated strain construction
- Examples from biotechnology industry

### Hands-on

Two afternoons are reserved for hands-on activities in bioinformatics. These will focus on analysis of next-generation sequence data, massive data handling, statistics, interpretation and visualisation of genomics data.

## Who should attend ?

This Advanced Course is aimed both at participants from industry, who want to update and extend their theoretical knowledge and practical insight in this field and at participants from universities and research institutions with a wish to evaluate practical implications of their research.

It is intended for postgraduates (MSc, PhD level, or equivalent experience), with a sound background in microbiology, microbial physiology, molecular cell biology, biochemistry or biochemical engineering, and a basic working knowledge in some of the other disciplines. Having some basic insight into one or more of the genomics technologies or in bioinformatics is not compulsory, but certainly is an advantage.

## Duration & Location

This Advanced Course will be given on **Monday, October 31 - Friday 4 November 2016**  
The course will be held at **Delft University of Technology**  
**Department of Biotechnology**  
**Van der Maasweg 9**  
**2629 HZ Delft**  
**the Netherlands**  
P +31 15 278 1922  
E [bsdl-edu@tudelft.nl](mailto:bsdl-edu@tudelft.nl)  
W [www.biotechnologycourses.nl](http://www.biotechnologycourses.nl)

## Accommodation

The course fee includes meals (5 lunches and 4 dinners). Hotel accommodation is not included. Hotel accommodation can be arranged at your request, addressed to [bsdl-edu@tudelft.nl](mailto:bsdl-edu@tudelft.nl)

### Monday, October 31, 2016

Theme: Genome Sequencing & Analysis

08.45 **Registration**

09.00 **Introduction**

*Jean-Marc Daran*

09.30 **Technology Review I: Microbial genome sequencing**

*Derek Butler*

10.45 **From raw data to assembled genome**

12.00 **Genome annotation**

*Ken Wolfe*

14.00 **Interactive case**

**Analysis of next-generation sequencing data**

*Marcel van den Broek*

16.30 **Continuation of the case**

18.00 **Dinner**

19.30 **Model-based design of metabolic networks**

*Anthony Burgard*

### Tuesday, November 1, 2016

Theme: Analytical Tools

09.00 **Technology Review II: Transcriptomics**

*Jean-Marc Daran*

10.15 **Technology Review III: Proteomics**

11.30 **Technology Review IV : Metabolomics**

*Aljoscha Wahl*

13.30 **Introductory Lecture**

**Bioinformatics, data handling & visualization**

14.45 **Computer demo's**

**Bioinformatics: massive data handling, statistics,**

**interpretation and visualization**

*Marcel van den Broek*

16.00 **Continuation of the computer demo's**

18.00 **Dinner**

19.30 **Filamentous genomics of plant biomass utilization**

**by fungi**

*Ronald de Vries*

### Wednesday, November 2, 2016

Theme: Systems Biology

09.00 **Introduction to genome-scale metabolic models**

*Bas Teusink*

10.15 **Metabolic Flux Analysis**

*Aljoscha Wahl*

11.30 **Metagenomics of the intestinal microbiome**

*Hauke Smidt*

13.30 **Linking the -omes**

*Pascale Daran-Lapujade*

14.45 **Allosteric regulation of metabolism**

Hannes Link

16.00 **Application of systems biology in the biotech industry**

*Ralf Takors*

18.00 **Dinner**

19.30 **Genomics of wine yeasts**

*Sylvie Dequin*

### Thursday, November 3, 2016

Theme: Genomics & Strain Improvement

09.00 **Introduction to Metabolic Engineering**

*Ton van Maris*

10.15 **Exploring biodiversity: QTL analysis**

*Gianni Liti*

11.30 **Application of genomics in evolutionary engineering**

*Jack Pronk*

13.30 **Strain improvement and regulatory constraints:**

**experiences from the food industry**

*Eric Johansen*

15.15 **(Intellectual) Property Rights**

*Hanna Schebesta/Bram de Jonge*

16.30 **Patenting genes and genomes**

*Mark Chadwick*

19.00 **Course dinner**

### Friday, November 4, 2016

Theme: Outlook

09.00 **Novel molecular tools in strain construction**

*Jean-Marc Daran*

10.15 **High-throughput microbe construction & phenotype testing?**

*Stefan de Kok*

11.30 **Metagenomics of mixed-culture processes**

*Sacha van Hijum*

13.30 **Heterogeneity in pure cultures**

*Matthias Heinemann*

14.45 **Evaluation**

*Jean-Marc Daran*

15.00 **Drinks**

## Fees & Registration

This course does not have a selection procedure. Please visit our website, or complete and return the attached form if you are interested to attend the course or would like to receive information on following or other courses. Registration is on a "first come, first serve" basis. The course fee is:

Early bird fee: € 2500.- in case of payment before **19 September 2016**.  
Regular fee: € 2750.- in case of payment after **19 September 2016**.  
In the event of cancellation before 19 September 2016 a full refund will be granted. After this date, a 25% fee charge will be made.

To facilitate enrolment of PhD students, a limited number of fellowships is available, covering half of the course fee (i.e. the reduced fee is € 1250.-). To apply for this fellowship, please include proof of your university registration as a PhD student. The fee includes course materials, meals (5 lunches and 4 dinners). The fee does not cover other meals and lodging.

When the number of participants is too low to have a fruitful course, the institute BSDL will cancel the event not 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, BSDL will arrange an equivalent replacement.

Hotel accommodation can be arranged at your request.

Preparatory texts will be sent after receipt of the course fee. The course material will be supplied at the start of the course.

## Advanced Course Genomics in Industrial Biotechnology

- I wish to attend the course of 31 October - 4 November 2016
- I would like to receive information of the other courses of the Institute BSDL
- Please send me announcements of the future **Advanced Course Genomics in Industrial Biotechnology**

Family name, title, Mr / Ms \_\_\_\_\_ First name \_\_\_\_\_

Organisation / Company \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

Phone \_\_\_\_\_

E-mail address \_\_\_\_\_

Educational background \_\_\_\_\_

Diet wishes \_\_\_\_\_

Date / Signature \_\_\_\_\_

