EUROPEAN FEDERATION OF BIOTECHNOLOGY

WORKING GROUP ON BIOREACTOR PERFORMANCE

in collaboration with

European Section on Biochemical Engineering Science

BIOPROCESS ENGINEERING COURSE

Doctoral /Post-doctoral level

Supetar, Island of Brac, Croatia

2 – 7. September 2010

http://www.globtour.hr/bec2012

The 2012 Brac Bioprocess Engineering Course

The next course in the long line of highly successful courses since the mid-1980s on Bioprocess Engineering will take place from **2nd to 8th September 2012**. Like the last one in 2010, it will be held on the beautiful Island of Brac, Croatia in the Adriatic Sea. It is organised under the auspices of The European Federation of Biotechnology by the Working Group on Bioreactor Performance, in collaboration with other Working Groups (Working Group on Modelling, Monitoring, Measurement & Control and Working Group on Downstream Processing and Recovery of Bioproducts) of the Section on Biochemical Engineering Science. All of the lectures will be given by internationally distinguished university teachers or by leading experts from multinational companies.

The course covers the full spectrum of bioprocess engineering, starting from genetic concepts for micro-organisms used to produce pharmaceutical and other products via microbial physiology, bioreaction kinetics to bioreactor design and scale-up. The organisms considered range from simple bacteria to highly specialised animal cell cultures. There is also a strong coverage of measurement, control and optimisation and how they interact with each other and with the specific bioreaction of interest. Finally, there is a broad-brush coverage of downstream processing. The lectures are supplemented by computer-based (MATLAB) exercises (no previous experience of MATLAB is required), discussions and a Case Study and participants are also encouraged to bring posters of their work. Selected candidates will be invited to make short oral presentations (of approximately 5 minutes duration), at a 'Speakers' Corner', to be held during the course. Finally, there is a strong social programme, specifically designed to ensure that there are many opportunities to discuss the course with the lecturers.

The course is directed specifically at Ph.D. students and experienced biotechnologists from research institutes, universities and industry. Participants are expected to have a background in chemical/biochemical engineering, biotechnology, a biological science or a related discipline. The lecturers are all acknowledged specialists in their fields, so that the course also provides a forum for highlighting recent research in relevant areas.

SCIENTIFIC COMMITTEE

LECTURERS

Prof. Dr. Joseph Lengeler, Universität Osnabrück, Germany
Prof. Dr. Sven-Olof Enfors, Royal Institute of Technology, Sweden
Prof. Dr. John Villadsen, Technical University of Denmark
Prof. Dr. Matthias Reuss, Stuttgart University, Germany
Prof. Dr. Andreas Lübbert, M.Luther-University Halle-Wittenberg, Germany
Prof. Dr. Alvin Nienow, University of Birmingham, United Kingdom
Dr. Christian Leist, Novartis Pharma Ltd. Switzerland
Dr. Henk Noorman, DSM Anti-Infectives, Delft, The Netherlands
Prof. Dr. Marin Berovic, University of Ljubljana, Slovenia
Prof. Dr. Jochen Büchs, Aachen University, Germany
Prof. Dr. Chris Hewitt, Loughborough University, United Kingdom
Prof. Dr. Sten Bay Jörgensen, Technical University of Denmark
Prof. Dr. Bernhard Sonnleitner, Technicum, Winthertur, Switzerland
Prof. Dr. David Mitchell, Universidade Federal do Parana, Brasil
Prof. Dr. Luuk A.M van der Wielen, TU Delft, The Netherlands
Prof Dr John Woodley, Technical University of Denmark

ORGANISING COMMITEE

Prof. Dr. Marin Berovic, University of Ljubljana, Slovenia (Chairman)
Prof. Dr. Chris Hewitt, Loughborough University, UK.
Prof.Dr. N.Kuzmanic, University of Split, Croatia
Prof. Dr.Igor Jerkovic, University of Split, Croatia

POSTER PRESENTATION

Poster dimensions should not exceed 1.0 m x 1.0 m. Every poster should include a title and author name(s). The posters will be on display in front of the lecture hall throughout the course for informal discussions. On the basis of the posters a group of selected candidates will be invited to make short (5 minutes) oral presentations at a ´Speakers´corner´.

SOCIAL PROGRAMME

The social programme for all participants and tutors will include several special events: a ‘get together’ party, to which, it is suggested, each participant might bring a bottle of a typical drink from his/her native country; an introduction to the art of professional wine tasting followed by a sampling of selected Croatian wines; an Island sight-seeing trip

including a visit to the peak of the famous Vidova Gora mountain; a picnic on the famous beach of the Golden Horn and a farewell party. Additional programmes for accompanying persons are available.

DATE AND VENUE

The EFB Bioreactor Engineering Course will be held between Sunday, **September 2nd** and **Saturday, September 7th 2012** on the Island of Brac, Croatia. The lectures will commence at 15:00 h on **September 2nd**. The course will conclude in the evening on **September 7th**. Departure is scheduled on **Saturday morning September 8th**.

The venue for the course is the small, picturesque Dalmatian town of Supetar, placed on the mountainous Island of Brac, the pearl of the Adriatic Sea famous for some of the most beautiful beaches in the Mediterranean especially the Golden Horn. The Island of Brac is situated just a few kilometres from Split, an old Dalmatian harbour on the mainland with the famous summer palace of the Roman Emperer Diokletian. Split has an international airport that is well connected with all major airports in Europe.
During the Course, the accommodation and meals will be provided at the Hotel Resort Velaris located within 15 minutes walking distance of the small town of Supetar. Transfer from Split harbour to Supetar is via frequently-running ferry-boats. Mini-bus transportation will be available between Supetar harbour and the Hotel Resort Velaris. Brac also has its own small airport, directly accessible from a few airports in the region.

Although Croatia has no visa requirements for many countries the participants are advised to check whether or not they require a visa for entering Croatia.

European Bologna Studies System recognizes 5 Credits
to the Certificates of EFB BEC

COURSE FEE

*The full cost for participants is **1600** EU. It includes a course fee **900 EU** **(lecturing, exercises, computer workshop and course literature**) and **full accommodation 700 EU** (from the morning of **September 2nd** to the morning **September 8th** including meals and all social events). The reduced fee for students is **1200** EU for the same package (except that accommodation will be provided in rooms with twin beds). To obtain the reduced rate, doctoral/post doctoral students must submit written University Confirmation of their status with or immediately after registration.*

*The Fee for **Accompanying Person is 550 EU** and it includes full accommodation and all social events of the Course.*

PROGRAMME

Lecture Schedule 2012

Day 0: Sunday, September 2nd

12.00 Arrival, registration

Introductory Talks (optional attendance): Chairman A. W. Nienow

16.45-17.45 a) Basic Biological Concepts: **S.-O. Enfors**

17.45-18.30 b) Basic Engineering Balances: **H. J. Noorman**

18.30-18.45 Welcoming Address: **A. Lubbert, A. W. Nienow and M. Berovic**

Chairman A Lubbert

18.45-19.30 Lecture 0. Introduction to Bioprocess Engineering: **J. Villadsen**

20.30**Welcome Party with Dinner**

Day 1: Monday, September 3rd

Chairman J Villadsen

09.00-09.45 Lecture 1. Metabolic Networks I: **J. Lengeler**

09.45-10.30 Lecture 2. Metabolic Networks II: **J. Lengeler**

10.30-11.00 **Coffee**

Chairman M Reuss

11.00-11.45 Lecture 3. Stoichiometry: **J. Villadsen**

11.45-12.30 Lecture 4. Kinetics: **J. Villadsen**

12.30-14.00 **Lunch**

Chairman J. Lengeler

14.00-14.45 Lecture 5. Dynamic Modelling of Metabolism: **M. Reuss**

14.45-15.30 Lecture 6. Measurement of Intracellular Metabolites: **M. Reuss**

15.30-16.00 **Coffee**

16.00-18.45 **Exercise 1.** Stoichiometry/Microbial Physiology/Case Study 1: (**Villadsen/Lengeler/Noorman**)

19.00-20.30 **Dinner**

20.45 **Get Together Party with Tasting of Participants 'National Delights'**

Day 2: Tuesday, September 4th

Chairman A. Lubbert

09.00-09.45 Lecture 7. Rheology, Mass and Heat Transfer **H. J. Noorman**

09.45-10.30 Lecture 8. Stirred Bioreactors **A. W. Nienow**

10.30-11.00 **Coffee**

Chairman A. W. Nienow

11.00-11.45 Lecture 9. Airlift Bioreactors **A. Lubbert**

11.45-12.30 Lecture 10. Fed Batch and Continuous Culture **S.-O. Enfors**

12.30-14.00 **Lunch**

Chairman H Noorman

14.00-14.45 Lecture 11. Scale-up and Scale-down **A. W. Nienow**

14.45-15.30 Lecture 12. Bioprocess Engineering Studies at the Microwell and Shake Flask Scale **J. Buechs**

15.30-16.00 **Coffee**

16.00-18.45 **Exercise 2.** Cultivation Techniques/Case Study 2 (**Enfors/Noorman/Nienow**)

19.00-20.30 **Dinner**

20.45 **Speakers Corner C. J. Hewitt**

Day 3: Wednesday, September 5th

Chairman C. J Hewitt

9.00-9.45 Lecture 13. Engineering Parameters for Industrial Animal Cell Culture Bioprocess Development **C. Leist**

9.45-10.30 Lecture 14. Lecture 14. Process Analytical Technologies (PAT) for Control of Large Scale Cell Culture Bioprocesses **C. Leist**

10.30-11.00 **Coffee**

Chairman J Buechs

11.00-11.45 Lecture 15. Bioreactor Engineering for Large Scale Animal Cell Culture **A. W. Nienow**

12.00 Excursion to Vidova Gora Mountain and Picnic on Golden Horn Beach

Day 4: Thursday, September 6th

Chairman C. Leist

9.00-9.45 Lecture 16. Single Cell Analysis for Informed Recombinant Protein Production **C.J. Hewitt**

9.45-10.30 Lecture 17. Integrated Approach to Development of Recombinant Protein Processes with *Pichia pastoris* **S.- O. Enfors**

10.30-11.00 **Coffee**

Chairman S.-O. Enfors

11.00-11.45 Lecture 18. Solid State Fermentation **M. Berovic**

11.45-12.30 Lecture 19. Enzymes in Bioprocess Engineering **J. Woodley**

12.30-14.00 **Lunch**

Chairman M Berovic

14.00-14.45 Lecture 20. Downstream Processing I **L. van der Wielen**

14.45-15.30 Lecture 21. Downstream Processing II **L. van der Wielen**

15.30-16.00 **Coffee**

16.00-16.45 Lecture 22. Downstream Processing III **L. van der Wielen**

16.45-18.45 **Exercise 3.** Case Study 3 - Downstream Processing **L. van der Wielen**

19.00-20.30 **Dinner**

20.45 **Wine Culture and Art of Wine Tasting in Europe: M. Berovic**

Day 5: Friday, September 7th

Chairman S. B. Jorgensen

9.00-9.45 Lecture 23. Monitoring of Bioprocesses I **B. Sonnleitner**

9.45-10.30 Lecture 24. Monitoring of bioprocesses II **B. Sonnleitner**

10.30-11.00 **Coffee**

Chairman B. Sonnleitner

11.00-11.45 Lecture 25. Control I **S. B. Jorgensen**

11.45-12.30 Lecture 26. Control II **S. B. Jorgensen**

12.30-14.00 **Lunch**

Chairman L van der Wielan

14.00-14.45 Lecture 27. Process optimisation **A. Lubbert**

15.00-15.30 **Coffee**

15.30-18.45 **Exercise 4.** Case Study 4 - Optimisation and Control (**Jorgensen)**

19.00-20.30 **Dinner**

20.45 **Farewell Party and Presentation of Case Study Prize**

PAYMENT

The payment must be made **at the latest by July 31st. After that date a 'late-bird fee'** of 100 Euro will be charged. The payment in Euros should be made by bank transfer to:

GLOBTOUR EVENT, Preradovićeva 14, Winkler House,
10000 Zagreb, Croatia
www.globtour.hr/BEC2012

Bank account is:

Raiffeisen Bank, Petrinjska 59, 10000 Zagreb, Croatia
Bank Account No.: 2484008-1500160396
Swift address: RZBHHR2X
IBAN: HR62 2484 0081 5001 6039 6

with payment designation 'for EFB BEC2012'.

ATTENTION!: Please note that the transfer charges must be paid by the sender

Contact persons : **Mrs. Edita Pijaca & Ms. Andrea Zec,**

GLOBTOUR EVENT d.o.o
Phone number: +385 1 488 1106; 4881117;
FAX: +385 1 488 1119

E - mail: edita.pijaca@globtour.hr; andrea.zec@globtour.hr

Since the total number of participants is limited, the participant list will be formed according to the date of payment. Early registration and early payment (not later than July 31st) are the best way to assure attendance on this very popular course.

Registration details and payment, including the information specified below, should be sent by e-mail, before July 31, to the address:

E - mail: edita.pijaca@globtour.hr; andrea.zec@globtour.hr

www.globtour.hr/BEC2012

REGISTRATION FORM

I hereby register for the Bioprocess Engineering Course on the Island of Brac, Croatia ***2 rd – 8 th September 2012***

Name: _____

Family Name:
_____

Gender (male or female)

_____

Name of the
University/Company/Institution: _____

Address: _____

Postal code City: _____

Country: _____

E- mail: _____

Phone: _____

Fax: _____

Means of your transportation to Split (airplane, train, bus, ferry, private car etc.)

_____

Expected date and time of arrival to Split _____

Departure from Split Airport _____

Date of application: _____

CHAIRMAN OF ORGANIZING COMMITTEE

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