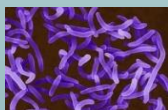


PhD course

June 10-14, 2013

Biorefineries

for the production of fuels, chemicals and feed (4 ECTS)



The **PhD course** will give a detailed overview of different biorefinery concepts and present how different types of biomass resources can serve as feedstock for the production of biofuels, chemicals, raw materials and animal feed.

The course will deal with the following topics:

- Biomass characteristics and availability
- Energy crops, marine biomass
- Biorefinery concepts
- Pretreatment technologies
- Biological production
- Enzymatic conversion
- Fermentation processes
- Separation processes
- Post-treatment

In line with the nationally and internationally acknowledged "Aalborg University model", which is an interdisciplinary, problem-oriented approach to research and education, the course will consist of a combination of lectures and group work in groups consisting of 4-5 students.

It is required that you prepare yourself for the group work before the start of the course by carrying out a literature study on a topic that you have chosen among the different course topics – Biomass characterization, pretreatment, enzymatic conversion, ethanol fermentation, anaerobic digestion, chemicals and feed from biomass. You will then design a biorefinery system for a certain biomass building upon the different expertise of the group members. When working in the groups it is important that you separate the work within the group and work individually. The teachers of the course act as consultants for the groups, so that each group can use the expertise of the teachers when needed.

In parallel in the lectures there will be given an overview of the necessary individual steps of biomass conversion and their combination in biorefinery systems.

The course will take place at:

Section for Sustainable Biotechnology

Department of Biotechnology, Chemistry, and Environmental Engineering

Aalborg University Copenhagen, A.C. Meyers Vaenge 15, 2450 Copenhagen SV, Denmark

For further information: Please visit our website www.sustainablebiotechnology.aau.dk or contact Section Secretary Margit BORN, Phone: +45 99403559, Email: mborn@bio.aau.dk

Course registration: To register please complete the registration form at <https://phd.moodle.aau.dk/>

Biorefinery PhD course

June 10-14, 2013

Course schedule (4 ECTS)

Lectures will be given by the course teachers and external guest lecturers. The group work will end with a presentation of each group work on Friday, June 15 and will be evaluated based on a written report to be delivered one week after the course period, not later than July 1 (Monday). The delivery of the written report is compulsory in order to pass the course. **If possible, bring a laptop!**

	June 10 Monday	June 11 Tuesday	June 12 Wednesday	June 13 Thursday	June 14 Friday
09:00	Welcome and Intro; Distri-bution into groups (ML)	Biorefinery concepts, processes and products (IVS)	Hydrolytic enzymes for biomass conversion (ML)	Post-processing (HU)	Biorefineries seen from an industrial biotech company (TG, NZ)
10:00	General introduction to biorefining (IVS)	Pretreatment technologies (thermochemical, biological) (HU)	Discovery of novel proteins for biomass conversion (LLa)	Separation processes (MLC)	Group work
11:00	Biomass characteristics and availability (CF)	Fermentation processes and metabolism (HNG)	Group work		
12:30	Lunch	Lunch	Lunch	Lunch	Lunch
13:00	Biorefineries in a sustainable perspective (PW)	Group work	Cell factories for bioproduction (PSL)	Group work	Group presentations
14:00	Group work		Synthetic biology for next gen. biocatalysts (PSL)		
Until			Group work		Course evaluation
17:00					
	Lectures in room H1.01 Group room H 2.02	Lectures in room H1.01 Group room H 2.02	Lectures in room H1.01 Group room H 2.02	Lectures in room H1.01 Group room H 2.02	Lectures in room H1.01 Group room H 2.02

The above schedule is subject to change

Course Teachers and their expertise

Lene LANGE (lla@adm.aau.dk): International Expert on Enzyme Discovery: Enzyme discovery methodologies, Protein characterization, expression and engineering, Bioethics, Biotechnology, Fungal biodiversity, Microbial interactions

Peter WESTERMANN (pw@bio.aau.dk): International Expert in Anaerobic microbiology, Anaerobic bacteria, Archaea, Biodiversity, Microbial physiology, Biological hydrogen production, Greenhouse gases

Ioannis V. SKIADAS (ivs@bio.aau.dk): Biomass characterization, Design of high-rate fermentation reactors, Anaerobic biotechnology for biofuels and chemicals production from biomass, Mathematical simulation of bioprocesses

Hariklia GAVALA (hng@bio.aau.dk): Reactor fermentations, Biofuels production from biomass and wastes, Mathematical simulation of bioprocesses, Pretreatment methods for biomass exploitation, Biodegradation of xenobiotic compounds

Mette LÜBECK (mel@bio.aau.dk): Fungal gene technology, Enzyme discovery for biomass conversion, Cloning, characterization and evaluation of hydrolytic enzymes, Discovery of new biocatalysts, Genetic diversity of fungi

Peter LÜBECK (psl@bio.aau.dk): Fungal and bacterial gene technology, Development of Expression and Production hosts, Gene modification, Metabolic Engineering, Synthetic Biology, Biorefineries

Hinrich UELLENDahl (hu@bio.aau.dk): Anaerobic digestion, Process optimization, High rate reactor systems for anaerobic wastewater treatment, Integration of fermentation and physico-chemical processes, Biomass pretreatment

Morten Nedergaard GRELL (mng@bio.aau.dk): Molecular biology, Analysis of secreted proteins and peptides (secretome analysis) of fungi, Enzyme discovery, enzyme expression/analysis

Morten Lykkegaard CHRISTENSEN (mlc@bio.aau.dk): Physical chemistry, Separation processes (membranes, filters etc.)

Claus FELBY (cf@life.ku.dk): International Expert on Lignocellulosic Biomass for ethanol production.

Thomas Grotkjaer (togr@novozymes.com): Expert in biorefineries and technoeconomic and market considerations