BB2480 Energi och miljö 7,5 hp

Energy and Environment

Fastställande

Kursplan för BB2480 gäller från och med VT12

Betygsskala

A, B, C, D, E, FX, F

Utbildningsnivå

Avancerad nivå

Huvudområden

Bioteknik

Särskild behörighet

At least 150 credits from grades 1, 2 and 3 of which at least 100 credits from years 1 and 2, and bachelor's work must be completed. The 150 credits should include a minimum of 20 credits within the fields of Mathematics, Numerical Analysis and Computer Sciences, 5 of these must be within the fields of Numerical Analysis and Computer Sciences, 30 credits of Chemistry, possibly including courses in Chemical Measuring Techniques and 20 credits of Biotechnology or Molecular Biology.

Undervisningsspråk

Undervisningsspråk anges i kurstillfällesinformationen i kurs- och programkatalogen.

Lärandemål

After completion of the course the student should:

Knowledge and understanding

- understand and describe how microorganisms can utilise biomass-based waste products as substrates for growth and production where the biomass primarily is lignocellulose
- be able to describe and understand how living cells can be selected, designed and operated in a way that leads to accumulation of high amounts of small organic molecules and in which way they are used in the treatment of waste
- understand how microbial cells generate energy and regenerate cofactors both aerobically and anaerobically and how this information can be used in the design of microorganisms where byproduct formation is minimised
- be able to describe the degradation pathways and thus understand the undesired effects of microbial activity in relation to commercially produced products such as food and beverages but also naturally occurring processes
- be able to describe the large scale bioprocesses used to produce small molecule products and the processes for treatment of waste
- know the basic concerns of establishment of a biorefinery, the means of how it operates and be able to give concrete examples
- have a deeper knowledge in one subject of the course

Skills and abilities

- be able to set up and calculate intracellular metabolic fluxes, on the basis of knowledge of metabolism gained from the literature, and by programming in Matlab
- be able to design experiments and perform carbon and redox balances to evaluate product and byproduct formation of microorganisms under specific environmental conditions
- be able to communicate the contents of a set of peer reviewed scientific papers to an audience which does not have any prior knowledge of the subject
- be able to calculate appropriate sterilization times based on knowledge of microbial activity
- be able to describe the basic principles of Life Cycle Analysis/Assessment

Ability to judge and to adopt a standpoint

- have an overview of waste biomass worldwide and be able to critically reflect on its benefits and drawbacks with regard to microbial production of selected substances and with respect to the needs of the society
- be able to evaluate the merits of different biofuels with respect to the efficiency of their biological production processes, the product quality in relation to their use and the degree of sustainability of the processes
- be able to reflect on common methods for treatment of polluted water and soil regarding the efficiency of the techniques
- be able to critically read and extract information from papers in peer reviewed journals and use this as theoretical support for reaching the course goals and to find, read and extract information from such papers to form a critical opinion on a given subject

Kursinnehåll

Kursupplägg

Lectures and Seminars.

Kurslitteratur

Publications from peer reviewed journals

Compendium: Enfors: Food microbiology

Examination

- SEM1 - Seminarium, 2,5 hp, betygsskala: P, F
- TEN1 - Tentamen, 5,0 hp, betygsskala: A, B, C, D, E, FX, F

Examinator beslutar, baserat på rekommendation från KTH:s handläggare av stöd till studenter med funktionsnedsättning, om eventuell anpassad examination för studenter med dokumenterad, varaktig funktionsnedsättning.

Examinator får medge annan examinationsform vid omexamination av enstaka studenter.

När kurs inte längre ges har student möjlighet att examineras under ytterligare två läsår.

Participation at

- Lectures
- Seminars in industrial processes
- Seminars in flux analysis.

Övriga krav för slutbetyg

- SEM1-Seminar in Flux analysis and Seminar in industrial processes, 2,5 credits. Mark: P/F
- TEN1-Written examination, 5 credits. Mark: A,B,C,D,E,FX,F

Etiskt förhållningssätt

- Vid grupparbete har alla i gruppen ansvar för gruppens arbete.
- Vid examination ska varje student ärligt redovisa hjälp som erhållits och källor som använts.

- Vid muntlig examination ska varje student kunna redogöra för hela uppgiften och hela lösningen.