



# BB2480 Energi och miljö 7,5 hp

Energy and Environment

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

## Fastställande

Kursplan för BB2480 gäller från och med HT10

## Betygsskala

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

## Utbildningsnivå

Avancerad nivå

## Huvudområden

Bioteknik

## Särskild behörighet

## Undervisningsspråk

Undervisningsspråk anges i kurstillfällesinformationen i kurs- och programkatalogen.

## Lärandemål

**General metabolism and physiology**

- describe and understand how specific organisms in anaerobic industrial and environmental accumulate end products from a specific carbon source. Describe by using metabolic schemes how energy and cofactors are regenerated.
- understand and describe the basis for the carbon and nitrogen cycling in the nature from the point of the microorganisms and their energy metabolism
- describe the processes of biofilm formation and quorum sensing and show why these are important in industrial and environmental processing by giving and explaining relevant examples
- describe the mechanism of a chosen metabolic process into large detail

### **Fuels**

- describe the processes for biofuel production that are technically developed today with respect to raw material, microorganism/metabolism and conversion process.
- speculate on benefits and drawbacks based on different sources of biomass presently used but also of alternative and future sources
- discuss the pro's and con's of the bioprocesses in relation to traditional fuels based on known facts on total yields and energy content but also side effects
- understand the CO<sub>2</sub> emission of the fuels and relate this to the carbon cycling
- know the basic outline of the different fuel generations and know of the present status with respect to the research in the field
- be able to make recommendations with respect to the creation of a sustainable society
- understand the principles of the microbiology of Archeae: methanogens

### **Sustainable production of chemicals and biomaterials**

- know of common chemicals and materials that are produced by microbial processes and some of their characteristic properties.
- be able to outline the cell type used, the appropriate metabolism and the control of this.
- understand the basic outline of Life Cycle Analysis (LCA)

### **Food and beverages**

- give examples of fermented food and understand the microbial background to the products
- describe into metabolic detail how fermented beverages are produced
- describe the basic principles to how food is spoiled and concepts how to avoid this
- calculate sterilisation times
- understand the concept of probiotics and give examples on particular products

### **Waste treatment**

- describe the principles for soil sanitation and composting, discern possible problems and suggest measures to mitigate them
- describe the general principles which are used today to purify waste water with respect to both the aerobic and anaerobic process parts with emphasis is on carbon and nitrogen removal.
- know of the limitations and the degree of purification that can be achieved
- be able to relate the waste processes to emission of greenhouse gases

## Microbial mining

- understand and describe the prerequisites to when microbial mining can be used in correlation to conventional mining techniques
- understand the metabolism of the organisms which can be used for the purpose and their preferred substrates and the coupling to chemical reactions in this process
- understand and describe the principles to how mining is performed in the large scale
- understand the principles of the microbiology of Archeae: extremophiles

## Kursinnehåll

## Kursupplägg

Lectures, 5 credits

Literature study, 2,5 credits

## 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.

## Övriga krav för slutbetyg

- One final examination
- Participation in mandatory seminars
- Give one seminar presentation

## 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.