KD2240 Ecological Chemistry 6.0 credits

Ekologisk kemi

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for KD2240 valid from Spring 2011

Grading scale

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

Education cycle

Second cycle

Main field of study

Specific prerequisites

Admission requirements for independent students:
75 university credits (hp) in chemistry or chemical engineering, 20 university credits (hp) in mathematics and 6 university credits (hp) in computer science or corresponding. Documented proficiency in English corresponding to English B.

**Admission requirements for programme students at KTH:
**At least 150 credits from grades 1, 2 and 3 of which at least 110 credits from years 1 and 2, and bachelor's work must be completed, within a programme that includes:
75 university credits (hp) in chemistry or chemical engineering, 20 university credits (hp) in mathematics and 6 university credits (hp) in computer science or corresponding.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

The overall aim is to present fundamental knowledge in the area and will include theory and methodology to collect and identify biologically relevant compounds. Examples will be given from both terrestrial and aquatic organisms. You will be able to get an overview of sustainable biological control methods of pest organisms in agriculture and forestry as well as in urban areas.

After the course the students should be able to

* know about the common methods to isolate biologically active natural products

* choose and use the appropriate chemical collection and isolation methods

* separate a mixture of compounds with chromatography techniques (2D-GC, GC-MS, HPLC-MS, MPLC)

- know about the advantages and disadvantages when identifying compounds using mass spectrometry
- identify and separate chiral volatile compounds
- test the activity of compounds or fractions using a bioassay (windtunnel, olfactometer, and other bioactivity test methods)
- understand the importance in involving structure-activity studies to optimize the bioactivity of chemical substances
- use dispensers to create a controlled release of biologically active compounds
- discuss sustainable alternatives to the conventional use of insectides, fungicides and herbicides used in gardening, agriculture and forestry
- know about basic terminology in chemical ecology as pheromones, kairomones, allomones and more generally semiochemicals
- know about important reserach areas in ecological chemistry, chemical communication
- discuss the advantages – disadvantages with biological control methods
- plan a project with the goal to identify and apply biologically active compounds in the control of pest organisms.

Course contents

In the course we will identify modern research areas, both theoretical and applied, which deal with interactions by chemical substances, i.e. semiochemicals, between animals, plants and environment. In addition we will discuss the effect of chemical signals originating from pollutants on insect behaviour.

Techniques (both in chemistry and biology) which are used to collects and identify odor and taste related compounds will be presented.

Importance of chemical communication in living organisms (e.g. humans, other animals and pest insects) will be discussed. Examples of successful exchange of poisonous chemicals to species specific environmentally friendly chemical signals will be given.

The course is interdisciplinary and comprises of chemical and biological research areas. The course and laborations will combine analytical chemistry, separation sciences, biochemistry, organic synthesis, polymer chemistry, dispenser technology, surface chemistry and structure activity calculations.

The laborations will be thematic in groups constituting 2-4 people. Students are encouraged to bring own problems or ideas.

Undergraduate, Ph D students and high school teachers, with chemical and biological interests are welcome to participate. Chemistry courses at undergraduate level with at least the first courses in chemistry and organic chemistry (KTH) or 10p chemistry (SU) are recommended.

Course literature

Selected publications

Examination

- TEN1 - Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 3.0 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Other requirements for final grade

Eexamination (TEN1, 3 hp).
Home examination with written and oral presentation of the laboration (LAB1, 3 hp)

Ethical approach

- All members of a group are responsible for the group's work.

- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.