



# BB2010 Environmental Toxicology 9.0 credits

## Miljötoxikologi

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

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

## Establishment

Course syllabus for BB2010 valid from Autumn 2017

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Biotechnology

## Specific prerequisites

### **Admission requirements for programme students at KTH:**

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 on a programme in Biotechnology, Chemistry or Environmental Sciences

### **Admission requirements for independent students:**

20 ECTS in biotechnology/cellular biology/molecular biology; 20 ECTS in chemistry; 20 ECTS in mathematics/numerical analysis/computer science

## Language of instruction

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

## Intended learning outcomes

After passing the course, the student should be able to:

- Recognize dangerous molecules and what properties make a molecule dangerous
- Understand that a molecule which is harmless, through metabolism, can be transformed into a molecule which is potentially dangerous, and recognize mechanisms for doing that.
- Understand that among those natural life processes, there are inherently, potentially dangerous processes/molecules which can be abused if the protection around them is disturbed. For example, the activation of oxygen which results in reactive oxygen compounds like free radicals. The activation of programmed cell death at the wrong time is another example.
- Explain the damages which arise when molecular protection functions and reparations systems become overloaded
- Explain environmental toxicology in several ways; interference caused by people can make organisms show stress/defensive reactions, which, in turn, leads to the culture of toxic and environmental affecting substances as well as ecological imbalance.
- Point out possibilities to substitute xenobiotics (e.g. biocides) with biological processes/methods. It is important to be able to suggest alternatives and not just disapprove. It is important to recognize how natural protection/defense systems are designed and function in order to, for example, be able to give organisms help to help themselves.
- In one's professional role, think critically with one's own knowledge and identify environmental toxicology problems and possess a bank of facts and scientific language in order to communicate those ideas to the authority and toxicology specialists.

## Course contents

The environmental toxicology course is a broad course, which spans from molecules to ecosystems. The course gives an understanding for foreign subjects (xenobiotics) and their effects on humanity and the environment; consequently, animals and plants. The course consists of an application of the bio program's basic chemical and biochemical knowledge in an environmental toxicological context. Water-soluble and fat-soluble are central molecular properties which become significant in a new respect. Heredity is not only the sequence of DNA-bases; but also the power to make use of those sequences that are hereditary, but with another hereditary mechanism (epigenetics), which can be affected by the environment. Important knowledge which is mediated is that organisms' biochemical/physiological control systems are sensitive to xenobiotics, and interferences result in extensive, increasing, and

often long-term harmful effects on gene activity, cell differentiation, embryo development, reproduction, and behaviour. The student becomes aware of those connections and develops sensitivity for environmental toxicology problems. An overall goal is that the student in his/her own future occupation will avoid including environmental toxicology problems in products and processes, but also, in the early stages, identify problems if they come up.

Other parts consist of independent practice assignments concerning possible environmental toxicology problems.

## Course literature

Primarily material distributed in connection to lectures. Book is announced at start of the course.

## Examination

- TENA - Written exam, 6.0 credits, grading scale: A, B, C, D, E, FX, F
- ÖVNA - Exercise, 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.

## Other requirements for final grade

One written examination (TEN1; 6 credits, grading scale A-F), one assignment (ÖVN1; 3 credits, grading scale Pass/Fail)

## 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.