



# BB2015 Environmental Toxicology 7.5 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 BB2015 valid from Spring 2019

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Biotechnology

## Specific prerequisites

## Language of instruction

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

## Intended learning outcomes

After taking this course, the student should be able to:

- Recognize dangerous molecules and what properties make a molecule dangerous.
- Describe how a molecule which is harmless, through metabolism, can be transformed into a molecule which is potentially dangerous.
- Explain 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. Suggest alternatives and not just disapprove. 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 a future occupation as an engineer, think critically with one's own knowledge, identify and avoid including environmental toxicology problems in products and processes, but also, in the early stages, identify problems if they come up. The student should 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 how xenobiotics (substances or materials unknown to the cell/organism) can influence 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 as an engineer will avoid including environmental toxicology problems in products and processes, but also, in the early stages, identify problems if they come up.

Literature assignment (report and presentation): In a subject related to the course: search of scientific information, report writing and presentation.

## Course literature

Handouts from lectures and some scientific publications; also some recommended books

## Examination

- LIT1 - Literature assignment, 2.5 credits, grading scale: P, F
- TEN1 - Written exam, 5.0 credits, grading scale: A, B, C, D, E, FX, 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.

## 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.