



# Exchange programme Vrije Universiteit Amsterdam

Vrije Universiteit Amsterdam - Exchange programme Vrije Universiteit Amsterdam - 2024-2025

## Exchange

Vrije Universiteit Amsterdam offers many English-taught courses in a variety of subjects, ranging from arts & culture and social sciences, neurosciences and computer science, to economics and business administration.

The International Office is responsible for course approval and course registration for exchange students. For details about course registration, requirements, credits, semesters and so on, please [visit the exchange programmes webpages](#).

# Environmental Toxicology

Course Code	AB_1020
Credits	6
Period	P1
Course Level	300
Language Of Tuition	English
Faculty	Faculty of Science
Course Coordinator	dr. R. Oldenkamp
Examiner	dr. R. Oldenkamp
Teaching Staff	dr. R. Oldenkamp, dr. ir. T.H.M. Hamers, prof. dr. M.P. Berg
Teaching method(s)	Practical, Study Group, Lecture, Computer lab

## Course Objective

In the course Environmental Toxicology, you will become familiar with the basic principles of environmental toxicology, including aspects of environmental chemistry, exposure, toxicity and risk assessment of chemicals. By successfully completing the course, you will be able to:

- Recognize well-known (classes of) chemical pollutants and characterize their sources.
- Describe how chemical properties, as well as environmental and toxicokinetic processes, determine the fate of chemicals in the environment and in biota.
- Calculate environmental concentrations using basic quantitative mass balance equations and interpret the results.
- Develop and apply a simple human exposure model and interpret the results.
- Calculate internal concentrations from external exposures using simple toxicokinetic models and interpret the results.
- Recommend suitable methods for assessing the (eco)toxicity of individual chemicals and complex mixtures in samples of soil, water and tissues.
- Describe the modes of action for well-known chemical pollutants.
- Explain different types of effect-based monitoring techniques and how they can be used in ecotoxicological risk assessment.
- Apply a conceptual trait-based model to link exposure of organisms to chemicals to potential effects on ecosystem processes.
- Apply (eco)toxicological knowledge and prevailing computational methods in the human and ecotoxicological risk assessment of chemicals.

## Course Content

The Environmental Toxicology course offers an introduction to the recognition, analysis and prediction of environmental and human health problems caused by potentially toxic chemicals. During the course, we will follow various chemicals along the source-to-outcome pathway (SOP), from their fate in the environment to their effects on individuals, populations, and communities. Emphasis lies on the relation between the physicochemical and toxicological properties of chemicals and the environmental and human health risks they pose. Throughout the course, you will learn about key aspects from environmental chemistry, toxicology and ecology. You will apply this knowledge in a risk assessment for your own 'pet chemical', using the computational methods and models that are typically used in risk assessment practice.

The course is structured into five consecutive modules (with the underlying theory in bullet points):

### ***Introduction to environmental toxicology***

- History and aims of environmental toxicology;
- Overview of potentially hazardous chemicals;
- Hazard characterisation.

### ***From source to exposure***

- Distribution and fate of chemicals in the environment;
- Bioavailability and human exposure.

### ***From exposure to molecular initiating event***

- Uptake, transformation and elimination kinetics;
- Bioconcentration, bioaccumulation and biomagnification.

#### ***From molecular initiating event to whole organism effects***

- Exposure-response relationships;
- Modes of action;
- Mixture toxicity;
- Bioassays, biosensors and biomarkers.

#### ***From single organisms to communities and ecosystems***

- Environmental and human risk assessment of chemicals;
- Communities' response to chemicals using individual response traits;
- Ecosystem response to chemicals using individual effect traits;
- Response-to-effect trait framework.

### **Additional Information Teaching Methods**

All subject matter is first introduced by one or more lectures and/or interactive sessions, followed by working groups or computer practicals in which you will bring the theory to practical application. In addition, you will join in a group project that runs throughout the course, performing a risk assessment study for a single chemical (your 'pet chemical'). This project ends in a group presentation for your fellow students and instructors. For working groups and computer practicals, attendance is mandatory; for lectures and interactive sessions, attendance is not mandatory but highly recommended. In total, time is divided over the course as follows:

- Lectures ± 20 hours;
- Interactive sessions ± 10 hours;
- Working groups and computer practicals ± 30 hours;
- Self study + project ± 80 hours;
- Exam 3 hours.

### **Method of Assessment**

You will be graded via a written exam (80% of your final grade). The group presentation and the accompanying documentation of your risk assessment study will be graded and contributes 20% to your final grade. Each mark should be 5.5 or higher to pass the course and obtain a final grade (no compensation). Group assignments graded below 5.5 can be revised. Revised group assignments will receive a grade not higher than 5.5.

### **Literature**

The course will make use of the Open Online Textbook Environmental Toxicology (Van Gestel et al., 2019). A link to the book will be made available to the students.

### **Additional Information Target Audience**

Optional course for 3rd year bachelor students in the minor programme Evolutionary Biology and Ecology (Biology; Gezondheid en Leven). The course is open to students from other teaching programmes, but some basic understanding of biology and chemistry is required. Students from other programmes should contact the course coordinator and ask the examination committee of their own teaching programme for permission to attend the course.

### **Additional Information**

This minor course requires a minimum of 25 participants to take place.

Students who followed the course before academic year 2023-2024 and want to resit the exam should contact the course coordinator for recommendations on additional learning activities.