

ISES Europe Training Series



Domain of Expertise 2 (DoE 2)

Lecture Title: Fundamentals of Environmental Chemistry and (Eco)Toxicology

Lecturer: Gerald Bachler, Wasma Al-Husainy, Lucy Wilmot, Chris Hughes

Lecture Overview

This lecture provides an introduction to the fundamental principles of environmental chemistry and (eco)toxicology. It examines the adverse effects arising from exposure to chemical and physical stressors, as well as the processes that govern their fate and behaviour in both the environment and the human body. The lecture explores how stressors are absorbed, distributed, metabolised, and eliminated within organisms, alongside their transport, transformation, and persistence once released into the environment. Finally, the lecture introduces the principles of stressor identification, evaluation, and hazard assessment.

Learning Objectives

The principal learning objectives for this lecture are that by the end of the session and having reviewed the additional learning resources you will have gained an understanding about the following:

- Explain the fundamental principles of environmental chemistry and (eco)toxicology.
- Evaluate the Absorption, Distribution, Metabolism, and Elimination (ADME) of stressors within organisms.
- Describe the environmental fate, behaviour, and chemical transformation of stressors.
- Understand the key steps involved in hazard identification and hazard assessment.
- Explain how limit and threshold values are derived and applied in risk assessment.

Learning Resources

The following online learning resources will support your learning alongside the lecture slides from this lecture. Please access them via the hyperlinks as resources for students:

Environmental Toxicology

Kees van Gestel

<https://open.umn.edu/opentextbooks/textbooks/940>

ISES Europe Training Series



Element 2: Environmental Fate and Transport

Agency for Toxic Substances and Disease Registry (ATSDR)

https://www.atsdr.cdc.gov/pha-guidance/conducting_scientific_evaluations/exposure_pathways/environmental_fate_and_transport.html

Hazard and risk assessment of chemicals – an introduction (Chapter 3)

Swedish Chemical Agency (KEMI)

<https://www.kemi.se/download/18.32f4eb311753c0a67fe1cf6/1604653630900/Guidance-Hazard-and-risk-assessment-an-introduction.pdf>

Appendix to Chapter R.8: Guidance for preparing a scientific report for health-based exposure limits at the workplace

European Chemical Agency (ECHA)

https://echa.europa.eu/documents/10162/2324906/ircsa_r8_appendix_oels_en.pdf/f1d45aca-193b-a7f5-55ce-032b3a13f9d8