

ISES Europe Training Series



Domain of Expertise 5 (DoE 5)

Lecture Title: Exposure Assessment and Risk Characterisation

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Lecture Overview

This lecture aims to provide a solid foundation in exposure assessment and risk characterization in the context of environmental science and human health. Participants will be introduced to the concept of aggregate exposure assessment, which evaluates total exposure from multiple sources and routes, offering a more comprehensive view of potential risks. The course will explore methods for conducting cumulative assessment strategies, focusing on the combined impact of multiple stressors that may affect the same biological targets. These approaches are crucial for understanding complex scenarios in which various factors contribute to health outcomes. By the end of the lecture, participants will have gained the essential skills and knowledge to apply these methodologies effectively in real-world contexts.

Additionally, the course will offer an overview of typical risk characterization techniques, ranging from qualitative methods, which rely on subjective judgment, to quantitative approaches that involve precise measurements and calculations. Participants will also learn how to select appropriate threshold limit values based on the objectives of exposure and risk 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:

- Describe key concepts of exposure assessment and risk characterisation in environmental science and human health.
- Explain the importance of aggregate exposure assessment in evaluating total exposure from multiple sources and routes.
- Identify methods used in cumulative exposure assessment strategies to analyse the impact of multiple stressors.
- Select the appropriate threshold limit value (TLV) for assessing exposure risks in various environmental and occupational settings.
- Differentiate between qualitative and quantitative exposure assessment techniques.



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:

Guidance on Information Requirements and Chemical Safety Assessment – Part D: Framework for exposure assessment (Version 2.0)

European Chemical Agency (ECHA)

https://echa.europa.eu/documents/10162/17224/information_requirements_part_d_en.pdf/70da6d4b-5acf-40d9-8b75-1e1c311378df

Guidance on Information Requirements and Chemical Safety Assessment – Part E: Risk Characterisation (Version 3.0)

European Chemical Agency (ECHA)

https://echa.europa.eu/documents/10162/17224/information_requirements_part_e_en.pdf/1da6cadd-895a-46f0-884b-00307c0438fd

Framework for Cumulative Risk Assessment

US Environmental Protection Agency (US-EPA)

<https://www.epa.gov/risk/framework-cumulative-risk-assessment>

Aggregate Exposure and Cumulative Risk Assessment—Integrating Occupational and Non-occupational Risk Factors

Lentz TJ, Dotson GS, Williams PRD, Maier A, Gadagbui B, Pandalai SP, Lamba A, Hearl F, Mumtaz M

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4654690/>

The Global Landscape of Occupational Exposure Limits—Implementation of Harmonization Principles to Guide Limit Selection

Deveau M, Chen C-P, Johanson G, Krewski D, Maier A, Niven KJ, Ripple S, Schulte PA, Silk J, Urbanus JH, Zalk DM, Niemeier RW

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4654639/>