

Introduction to Environmental Risk Assessment (E078061)

Course size *(nominal values; actual values may depend on programme)*

Credits 3.0 **Study time** 90 h **Contact hrs** 30.0 h

Course offerings and teaching methods in academic year 2022-2023

A (semester 1)	English	Gent	guided self-study lecture	7.5 h 22.5 h
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Lecturers in academic year 2022-2023

De Schampheleere, Karel	LA22	lecturer-in-charge
Janssen, Colin	LA22	co-lecturer

Offered in the following programmes in 2022-2023

	crdts	offering
Master of Science in Electromechanical Engineering (main subject Control Engineering and Automation)	3	A
Master of Science in Electromechanical Engineering (main subject Electrical Power Engineering)	3	A
Master of Science in Electromechanical Engineering (main subject Maritime Engineering)	3	A
Master of Science in Electromechanical Engineering (main subject Mechanical Construction)	3	A
Master of Science in Electromechanical Engineering (main subject Mechanical Energy Engineering)	3	A
Master of Science in Chemical Engineering	3	A
Master of Science in Chemical Engineering	3	A
Master of Science in Sustainable Materials Engineering	3	A

Teaching languages

English

Keywords

Environmental toxicology, toxicology, ecotoxicology, (eco)toxicity tests, risk assessment of chemicals, dose-response evaluation, environmental pollution, effects analysis, exposure analysis

Position of the course

The aim of this course is to introduce the students in the theoretical foundations of (eco) toxicology of chemicals and in the principles of exposure, effects and risk assessment of chemicals to man and the environment. A strong focus is on understanding how different physical, chemical, biological and ecological processes contribute to chemicals exposure, effects and, ultimately, risk.

Contents

LECTURES

General introduction

- What this course is about
- Chemicals are everywhere... but risks?
- Awakening to environmental problems
- (Eco)toxicology and Risk Assessment
- The Risk management process

- Risk Assessment: Risk Characterization through Exposure Assessment and Effects Assessment
 - Course overview
- Environmental Exposure Assessment
- Emission
 - Equilibrium partitioning
 - Intra- and inter-media transport
 - Transformation (degradation)
 - (External) Exposure assessment (concentrations in water, air, soil & sediment)
 - (Internal) Exposure assessment (bioconcentration, bioaccumulation & biomagnification)

Ecotoxicology at sub-organism level

- Uptake, biotransformation, detoxification and elimination
- Molecular and cellular effects
- Adverse outcome pathways

Ecotoxicology at organism level

- Factors to consider in ecotoxicity tests
- Standardization and guidelines
- Analysis of toxicity test results
- PNEC derivation
- Secondary poisoning
- Effect QSARs

Ecotoxicology at Population, Community and Ecosystem Level

- Populations: endpoints
- Populations: determinants
- Populations: models
- Communities: experimental setups
- Communities: endpoints
- Communities: determinants
- Communities: models

Ecological risk assessment and legislation

- REACH
- Global Harmonized System (GHS) and Classification, Labelling and Packaging (CLP)
- EU pesticide regulation
- OECD Chemicals programme

Initial competences

Basic knowledge of biology, ecology, physics and chemistry

Final competences

- 1 Understand physical, chemical, biological and ecological processes that determine exposure, effects and risks of chemical to man and the environment
- 2 Know how theoretical foundations of risk assessment are brought into practice in legislation

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

Access to this course unit via an exam contract is unrestricted

Teaching methods

Guided self-study, lecture

Learning materials and price

- Selected chapters from the Van Leeuwen and Vermeire (2007) book - online version available via Springer
- Lecture notes: slides presented during the theory lectures
- Video recordings of theory lectures
- Lecture and course notes are made available via the electronic learning environment

References

van Leeuwen C.J., Vermeire T.G. (2007) Risk Assessment of Chemicals: An Introduction. Springer, 2nd edition, 688p; ISBN 978-1-4020-6101-1.

Course content-related study coaching

- A dedicated question and answer session will be organized at the end of every theory lecture
- Lecturers and academic assistants can be consulted (after electronic appointment only) for additional feed-back

Evaluation methods

end-of-term assessment

Examination methods in case of periodic evaluation during the first examination period

Written examination with open questions, written examination with multiple choice questions

Examination methods in case of periodic evaluation during the second examination period

Written examination with open questions, written examination with multiple choice questions

Examination methods in case of permanent evaluation**Possibilities of retake in case of permanent evaluation**

not applicable

Extra information on the examination methods

- Periodic evaluation: closed book exam with open questions and multiple choice questions focusing on a detailed as well as an integrated understanding of the theoretical foundations of (eco)toxicology and risk assessment

Calculation of the examination mark