

Environmental Risk Assessment (1002606)

Cursusomvang *(nominale waarden; effectieve waarden kunnen verschillen per opleiding)*

Studiepunten 5.0 **Studietijd 150 u** **Contacturen** **50.0 u**

Aanbodsessies en werkvormen in academiejaar 2022-2023

A (semester 1)	Engels	Gent	hoorcollege	20.0 u
			werkcollege: PC- klasoefeningen	20.0 u
			groepswerk	2.5 u
			practicum	7.5 u

Lesgevers in academiejaar 2022-2023

De Schamphelaere, Karel	LA22	Verantwoordelijk lesgever
Asselman, Jana	LA22	Medelesgever
Janssen, Colin	LA22	Medelesgever
Verougstraete, Violaine	LA22	Medelesgever

Aangeboden in onderstaande opleidingen in 2022-2023

	stptn	aanbodsessie
Bachelor of Science in Environmental Technology	5	A
Master of Science in Electromechanical Engineering (afstudeerrichting Control Engineering and Automation)	5	A
Master of Science in Electromechanical Engineering (afstudeerrichting Electrical Power Engineering)	5	A
Master of Science in Electromechanical Engineering (afstudeerrichting Maritime Engineering)	5	A
Master of Science in Electromechanical Engineering (afstudeerrichting Mechanical Construction)	5	A
Master of Science in Electromechanical Engineering (afstudeerrichting Mechanical Energy Engineering)	5	A
International Master of Science in Agro- and Environmental Nematology	5	A
Master of Science in Biology	5	A
Master of Science in Chemical Engineering	5	A
Master of Science in de bio-ingenieurswetenschappen: milieutechnologie	5	A
Master of Science in de ingenieurswetenschappen: chemische technologie	5	A
Master of Science in Environmental Science and Technology	5	A
Master of Science in Sustainable Materials Engineering	5	A
Uitwisselingsprogramma bio-ingenieurswetenschappen: milieutechnologie (niveau master-na-bachelor)	5	A

Onderwijstalen

Engels

Trefwoorden

risks and safety of chemicals, environmental toxicology, toxicology, ecotoxicology, (eco)toxicity tests, risk assessment of chemicals, dose-response evaluation, environmental pollution, human health, effects analysis, exposure analysis

Situering

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 for ecosystems and humans. A strong focus is on understanding how different physical, chemical, biological and ecological processes contribute to chemicals exposure, effects and, ultimately, risk. Finally, the various aspects of the theory will be brought into practice by means of hands-on training into exposure and effects testing in the laboratory ('practicum') and quantitative (real-life) chemicals risk assessment ('PC exercises', 'group work').

Inhoud

LECTURES

General introduction

- The dawn of (eco)toxicology: the case of DDT
- General scheme of risk assessment: hazard, exposure, effects and risks
- Human versus ecological risk assessment
- Overview of regulatory frameworks for various chemical groups (REACH, CLP, biocides, plant protection products, pharmaceuticals)
- Risk assessment versus Risk management

Environmental Exposure Assessment

- Emission
- Equilibrium partitioning
- Intra- and inter-media transport
- Transformation of chemicals (biotic and abiotic 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

- Design and analysis of ecotoxicity tests
- PNEC derivation using assessment factors
- PNEC derivation using species sensitivity distributions
- Mixture toxicity

Ecotoxicology at Population, Community and Ecosystem Level

- Experimental and modeling approaches
- Extrapolation from lab to field across space and time

Human toxicology and risk assessment

- General framework and aspects of toxicity
- Effects (hazard) assessment
- Exposure assessment
- Risk characterization
- Risk management

PRACTICUM (WETLAB)

- Biodegradation and ecotoxicity test
- Demonstrations of ecotoxicological techniques and data analysis

PC EXERCISES (PCLAB)

- Biodegradation and dose-response analysis
- Environmental exposure, effect and risk assessment
- Human exposure and risk assessment

GROUPWORK

Students need to search environmental fate, exposure and effects data on a certain chemical, critically review and interpret the dataset, perform a risk assessment, and present this to the entire group.

Begincompetenties

Basic knowledge of biology, ecology, physics and chemistry

(Goedgekeurd)

Eindcompetenties

- 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
- 3 Apply quantitative techniques for dose-response, exposure, effect and risk evaluation
- 4 Interpret, critically analyze and report on scientific literature on (eco)toxicology and risk assessment

Creditcontractvoorwaarde

Toelating tot dit opleidingsonderdeel via creditcontract is mogelijk mits gunstige beoordeling van de competenties

Examencontractvoorwaarde

Dit opleidingsonderdeel kan niet via examencontract gevolgd worden

Didactische werkvormen

Groepswerk, hoorcollege, practicum, werkcollege: PC-klasoefeningen

Leermateriaal

- Selected chapters from the Van Leeuwen and Vermeire (2007) book - online version available via Springer
- Lecture notes: slides presented during the theory lectures, practicum and PC exercises
- Course notes for the practicum and PC exercises
- Video recordings of theory lectures
- Lecture and course notes are made available via Ufora

Referenties

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

Vakinhoudelijke studiebegeleiding

- A dedicated question and answer session can be organized upon request after all theory lectures
- Lecturers and academic assistants can be consulted (after electronic appointment only) for additional guidance

Evaluatiemomenten

periodegebonden en niet-periodegebonden evaluatie

Evaluatievormen bij periodegebonden evaluatie in de eerste examenperiode

Schriftelijk examen met open vragen, schriftelijk examen met meerkeuzevragen, vaardigheidstest

Evaluatievormen bij periodegebonden evaluatie in de tweede examenperiode

Schriftelijk examen met open vragen, schriftelijk examen met meerkeuzevragen, vaardigheidstest

Evaluatievormen bij niet-periodegebonden evaluatie

Participatie, werkstuk, peer-evaluatie

Tweede examenkans in geval van niet-periodegebonden evaluatie

Examen in de tweede examenperiode is enkel mogelijk in gewijzigde vorm

Toelichtingen bij de evaluatievormen

Periodic evaluation:

- Theory: 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.
- Skills test: closed book test; students will need to solve one or more 'integrated problems' for which integrated knowledge obtained during the lectures, practicals and PC exercises classes is required

Permanent evaluation:

- Group Work: Groups of 3-6 students will have to gather environmental fate, exposure, and effects data on a certain chemical, critically review and analyse it and perform a risk assessment. They need to submit a report and present their findings to all other students and need to be able to discuss these with them as well as with the lecturers. In the case that a second chance exam is needed for this part, the work has to be improved, presented to the

lecturer and defended individually.

- Participation during practicals, PC exercises, and group work

Eindscoreberekening

The calculation of the global examination mark will be as follows:

1. Periodic evaluation: 60% of the total mark (12 points of the 20)

1.1 Theory: 40% of the total mark (8 points of the 20)

1.2 Skills test: 20% of the total mark (4 points of the 20)

2. Permanent evaluation: 40% of the total mark (8 points of the 20)

2.1 Group work: 40% of the total mark (8 points of the

20)

For group work: if there is a clear difference in the input between the different group members, the examination mark for this part can be different between the different group members.

To pass, the students must score at least half of the points on periodic (6/12) and permanent evaluation (4/8). Students who score less than half of the maximum score for either periodic or permanent evaluation, will only be able to receive a maximum global examination mark of 9/20. Students who eschew period aligned (periodic) or non-period aligned (permanent) evaluations or who eschew participation in practicum, PC exercises, or groupwork for this course unit may be failed by the examiner.