Course Specifications
Valid as from the academic year 2019-2020

Introduction to Eco-toxicology and Risk Assessment (E078060)

Course offerings and teaching methods in academic year 2019-2020

A (semester 1)  English  lecture  22.5 h
guided self-study  7.5 h

Lecturers in academic year 2019-2020
De Schamphelaere, Karel  LA22  lecturer-in-charge
Asselman, Jana  LA22  co-lecturer
Janssen, Colin  LA22  co-lecturer

Offered in the following programmes in  2019-2020

<table>
<thead>
<tr>
<th>Programme</th>
<th>crdts</th>
<th>offering</th>
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<tbody>
<tr>
<td>Master of Science in Electromechanical Engineering (main subject Control Engineering and Automation)</td>
<td>3</td>
<td>A</td>
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<tr>
<td>Master of Science in Electromechanical Engineering (main subject Electrical Power Engineering)</td>
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<td>Master of Science in Electromechanical Engineering (main subject Maritime Engineering)</td>
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<td>Master of Science in Electromechanical Engineering (main subject Mechanical Construction)</td>
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<tr>
<td>Master of Science in Electromechanical Engineering (main subject Mechanical Energy Engineering)</td>
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<tr>
<td>International Master of Science in Agro- and Environmental Nematology</td>
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<td>A</td>
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<tr>
<td>Master of Science in Chemical Engineering</td>
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<tr>
<td>Master of Science in Sustainable Materials Engineering</td>
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<tr>
<td>Master of Science in Chemical Engineering</td>
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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

(Approved)
• 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

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 feedback

(Approved)
Evaluation methods
  end-of-term evaluation

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