

Ecotoxicology and Biodegradation of marine pollutants – Marine ecotoxicology

Synopsis

This course introduces the foundations of ecotoxicology applied to the marine environment. It examines how chemical pollutants enter, circulate and transform in marine ecosystems, and how they affect biological systems at multiple levels of organization. The course pays particular attention to persistent organic pollutants (POPs), plastics and microplastics, trace elements and mercury, and addresses the interactions between contamination and global change.

Aims

The course aims to provide students with a conceptual and analytical framework for understanding the sources, fate and biological effects of marine pollutants, while fostering critical thinking and scientific communication skills in environmental sciences.

Objectives

At the end of the Unit, the student should:

1. identify major anthropogenic chemical stressors in the marine environment and their pathways of exposure;
2. explain toxicological processes such as bioaccumulation, biomagnification, toxicity and mixture effects;
3. evaluate impacts of pollutants across individuals, populations, communities and ecosystems;
4. critically analyse scientific literature in marine ecotoxicology;
5. communicate scientific information clearly in a professional conference format;

Key Skills Acquired

Upon completion, students will be able to:

1. critically review and interpret scientific studies related to marine pollution;
2. prepare and deliver a concise scientific oral presentation (speed-talk format);
3. synthesize complex scientific information from peer-reviewed literature;
4. understand the links between pollutant pathways, trophic transfer and ecosystem vulnerability;
5. appreciate the relevance of marine ecotoxicology to environmental management and human health.

Programme

- Introduction to ecotoxicology: definitions, scope, anthropogenic stressors
- Impacts of pollutants across biological levels (individuals to ecosystems)
- Persistent organic pollutants (POPs) in the marine environment
- Trace elements and mercury in marine food webs and biogeochemistry
- Pollution in a changing ocean: climate interactions, emerging contaminants
- Case studies and literature-based discussions

Learning & Teaching (35 hr Th; 15 hr Pr)

1. **Lectures (ex cathedra):** introduction to concepts and theoretical frameworks.
2. **Tutorials:** mandatory reading of scientific papers at home or during classes followed by structured in-class group discussions.

3. **Seminars:** guest lecturers (ULiège and invited researchers) presenting current research in marine ecotoxicology.
4. **Scientific assignment:** preparation of an individual speed-talk evaluated during the examination session.

Teaching Staff

Krishna Das

Semester: 1

Timetable slot To be advised

ECTS: 6

Level: Mandatory

Bibliography

The following resources are provided to support teaching and learning throughout the course:

- PowerPoint slides and lecture materials made available to students at the beginning of the course via the online platform eCampus;
- A curated selection of scientific papers (PDF format) used for tutorials and seminar preparation;
- Reference textbooks in marine ecotoxicology (indicative list provided at the start of the semester);
- Supplementary online resources including video materials and recorded conference presentations relevant to the course themes;
- Additional recommended readings for students wishing to deepen specific topics.

A complete list of references and digital links is made available to students on the course platform eCampus.

Assessment

The evaluation is based on an individual scientific speed-talk (4 minutes) followed by a structured scientific discussion. The assessment focuses on:

- the scientific quality and clarity of the presentation;

- the student's ability to communicate a complex scientific message in a concise and accessible way;
- critical thinking during the discussion, including the capacity to answer questions and defend interpretations;
- the depth of understanding of the selected scientific article, including its context, methodology, results and implications.

Course Evaluation

Course evaluation is conducted through **Evalens ULiège**, the University's official online system for student feedback on teaching and learning. It allows students to provide structured feedback on course content, organization and teaching quality, and contributes to continuous improvement of the programme.