

OCES 4320 Marine Toxicology

Spring 2022-2023

1. Instructors:

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2. Course Description

This course aims to provide students with a science background to understand toxicology within the scope of marine environments. It is focused on modern principles of marine ecotoxicology, covering topics from main classes of traditional and emerging contaminants in the ocean to their toxicological implications on various biotic components and marine ecosystem health. It will also introduce new and advanced technologies for understanding ecotoxicology in the marine environment.

3. Intended Learning Outcome

On successful completion of this course, the students are expected to be able to:

- demonstrate fundamental understanding of concepts such as biotransformation, bioaccumulation, toxicity, and trophic transfer
- describe how foreign substances can cause damage at different levels: from molecules to ecosystems
- describe biotransformation and bioaccumulation of foreign substances in cells
- understand the sources and the movement of contaminants in the environment
- identify and describe different scientific methods to critically evaluate complex, emerging environmental pollutants at global and local scales
- address challenges in marine toxicology by integrating scientific knowledge, technical applications, and innovative technology
- apply the knowledge in daily life to contribute to marine environmental protection.

4. Course Assessment Scheme

- Class participation (40%), including attending classes, taking in-class quizzes, etc.
- Midterm Exam (30%)
- Final Exam (30%)

5. Student Learning Resources:

Primary Reference textbook(s):

Julián Blasco, Peter M Chapman, Olivia Campana, Miriam Hampel (2016), Marine ecotoxicology: Current knowledge and future issues, ISBN: 0128033711

https://lbdiscover.hkust.edu.hk/bib/cdi_askewsholts_vlebooks_9780128033722

Michael C. Newman, Fundamentals of ecotoxicology: The science of pollution, Fifth Edition.

<https://lbdiscover.hkust.edu.hk/bib/991013142459003412>

Supplementary materials: A range of reading and web resources will be made available on Canvas (canvas.ust.hk) prior to each lecture.

6. Lecture topics and schedule

Wk	Topic	Reference	Instructor
1	Introduction to Marine Toxicology		JZ
	Pollutants in the marine environment (overview)		JZ
2	Uptake, Biotransformation & Detoxification		JZ
	Bioaccumulation & Biomagnification		JZ
3	Factors Influencing Bioaccumulation and Trophic transfer		JZ
	Toxicity effects I: Biochemical mechanisms		JZ
4	Toxicity effects II: Physiological effects of pollutants		JZ
	Toxicity effects III: Changes in communities and ecosystems		JZ
5	Evaluation of toxicity I: Saltwater Toxicity Tests		JZ
	Evaluation of toxicity II: Sediment Toxicity Testing		JZ
6	Evaluation of toxicity III: Mesocosm and Field Toxicity Testing		JZ
	Evaluation of toxicity IV: Biomarkers		JZ
7	<i>Mid-term Exam</i>		
	Source of contaminants and routes by which they enter ecosystem		OH
8	Movements and global transport of pollutants in the marine environment (I)		OH
	Movements and global transport of pollutants in the marine environment (II)		OH
9	Introduction to organic pollutants		OH
	Emerging new contaminants in the marine environment		OH
10	Traditional methods to characterize organic pollutants		OH
	Advanced methods to characterize organic pollutants		OH
11	Introduction to microplastics (I): Definition & history		OH
	Introduction to microplastics (II): Great Bay Area		OH
12	New techniques in ecotoxicology: in-situ monitoring, ROV, modelling and big-data techniques		OH
	<i>Holiday break</i>		
13	Current pollution problems, Ecological risk, and Evolution of resistance to pollution		OH
	Global change – Marine ecotoxicology in the future		OH
14	<i>Final Exam</i>		