SEE6226: ECOSYSTEM AND ENVIRONMENTAL TOXICOLOGY

Effective Term
Semester B 2024/25

Part I Course Overview

Course Title
Ecosystem and Environmental Toxicology

Subject Code
SEE - School of Energy and Environment
Course Number
6226

Academic Unit
School of Energy and Environment (E2)

College/School
School of Energy and Environment (E2)

Course Duration
One Semester

Credit Units
3

Level
P5, P6 - Postgraduate Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
Nil

Equivalent Courses
SEE8226 Ecosystem and Environmental Toxicology

Exclusive Courses
Nil

Part II Course Details

Abstract

This course will cover the general aspects of ecosystems and environmental toxicology of different contaminants. Environmental toxicology studies the interaction between different contaminants and organisms (including humans), and thus the integration of biology and chemistry is a must. In this course, the general principles of ecosystem dynamics and different classes of contaminants (such as metals, organic contaminants, radionuclides, and emerging chemicals of concerns) will be first introduced. The environmental transport, bioaccumulation and bioavailability, and toxicological assessments of these contaminants will then be thoroughly evaluated and compared. Emphasis will be placed on the 'interface' of different environmental (or biological) matrixes. Different mathematical or empirical models used to study the transport, bioaccumulation, and toxicity of contaminants will be introduced. Finally, the more applied aspects of environmental toxicology will be discussed using real case examples in Hong Kong or elsewhere. The course will also provide basic framework to conduct realistic environmental risk assessments of different contaminants in the environments.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe the scope of environmental toxicology study and recognize the major classes of pollutants;	10	x		
2	Synthesize the major concepts in environmental toxicology study, such as the entry and fate, bioaccumulation and bioavailability and toxicity assessment;	30		x	
3	Evaluate the ecological and biological responses of pollutants at different levels;	30	x	x	x
4	Assess methods in conducting ecotoxicology research, such as the kinetic modelling, biomonitoring, toxicity testing, biomarkers and toxicity mechanisms study.	20		x	x
5	Critically evaluate and synthesize the current literature	10	x	x	x

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Lectures are used to describe and illustrate the basic concepts principles and methods of environmental toxicology.	1, 2, 3, 4, 5	3 hrs per wk

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Assignments	1, 2, 3, 4, 5	20	
2	Mid-term Test	1, 2, 3, 5	40	

Continuous Assessment (%)

60

Examination (%)

40

Examination Duration (Hours)

2

Additional Information for ATs

To pass a course, a student must do ALL of the following:
1) obtain at least 30% of the total marks allocated towards coursework (combination of assignments, pop quizzes, term paper, lab reports and/ or quiz, if applicable);
2) obtain at least 30% of the total marks allocated towards final examination (if applicable); and
3) meet the criteria listed in the section on Assessment Rubrics.

Assessment Rubrics (AR)

Assessment Task

Assignments (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to analyse problems and synthesize knowledge in environmental toxicology

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

Mid-term test (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to apply knowledge and skills to analyse, calculate, and solve problems in environmental toxicology

Excellent

(A+, A, A-) High

Good
(B+, B, B-) Significant

Fair
(C+, C, C-) Moderate

Marginal
(D) Basic

Failure
(F) Not even reaching marginal levels

Assessment Task
Final exam (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
Ability to apply knowledge and skills to analyse, calculate, and solve problems in environmental toxicology

Excellent
(A+, A, A-) High

Good
(B+, B, B-) Significant

Fair
(C+, C, C-) Moderate

Marginal
(D) Basic

Failure
(F) Not even reaching marginal levels

Assessment Task
Assignments (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Ability to analyse problems and synthesize knowledge in environmental toxicology

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Basic

Failure
(F) Not even reaching marginal levels

Assessment Task
Mid-term test (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Ability to apply knowledge and skills to analyse, calculate, and solve problems in environmental toxicology

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Basic

Failure
(F) Not even reaching marginal levels

Assessment Task
Final exam (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Ability to apply knowledge and skills to analyse, calculate, and solve problems in environmental toxicology

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

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(B-, C+, C) Basic

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Part III Other Information

Keyword Syllabus
Ecosystems, toxicology, ecotoxicology, metals, pesticides, organic contaminants, emerging chemicals of concerns, radionuclides, nanomaterials, microplastics, pollutants, bioavailability, bioaccumulation, kinetic modelling, equilibrium, toxicity, molecular biomarkers, population, bioassays, interface, marine biology, speciation, fugacity, biomonitoring, environmental risk assessments, water quality.

Reading List

Compulsory Readings

	Title
1	Blasco J, Chapman PM, Campana O, Hampel M (2016) Marine Ecotoxicology: Current Knowledge and Future Issues. Elsevier.
2	Newman MC, Clements WH (2008) Ecotoxicology: A Comprehensive Treatment. CRC Press

Additional Readings

	Title
1	Landis WG, Sofield RM, Yu MH (2011) Introduction to Environmental Toxicology: Molecular Substructures to Ecological Landscapes 5th Edition. CRC Press.
2	Yu MH, Tsunoda H, Tsunoda M (2011) Environmental Toxicology: Biological and Health Effects of Pollutants 3rd edition. eBook published in 2016. Taylor and Francis https://doi.org/10.1201/b11677.