

课程大纲 COURSE SYLLABUS

1.	课程代码/名称 Course Code/Title	生态毒理学 Ecotoxicology															
2.	课程性质 Compulsory/Elective	专业选修课 Professional Elective Courses															
3.	开课单位 Offering Dept.	环境科学与工程学院 School of environmental science and Engineering															
4.	课程学分/学时 Course Credit/Hours	3/48															
5.	授课语言 Teaching Language	中英双语 English & Chinese															
6.	授课教师 Instructor(s)	裘文慧															
7.	开课学期 Semester	春季 Spring															
8.	是否面向本科生开放 Open to undergraduates or not	否 No															
9.	先修要求 Pre-requisites	无 None															
10.	教学目标 Course Objectives	<p>本课程以生态层次为纲、环境污染物为主线，重点讲授环境污染物对动物、植物、微生物及其生态系统的毒性效应、毒性作用机理以及生态风险评价方法，使学生理解外来化合物与自然环境之间的相互作用关系，拓张对环境毒性的认识视野；了解生态系统内毒物的来源、传播和归宿，掌握生态毒理学检测和监测的基本途径和方法；利用生态毒理学的知识应对环境污染生态防治，将理论与实际结合起来。</p> <p>The course of “Ecotoxicology” focuses on the toxic effects, toxic mechanism and ecological risk assessment methods of environmental pollutants on animals, plants, microorganisms and their ecosystems, so as to enable students to understand the interaction between foreign compounds and the natural environment and expand their understanding of environmental toxicity; Understand the source, transmission and destination of poisons in the ecosystem, and master the basic ways and methods of ecotoxicological detection and monitoring; Use the knowledge of ecotoxicology to deal with the ecological prevention and control of environmental pollution, and combine theory with practice.</p>															
11.	教学方法 Teaching Methods	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">授课方式 Teaching Method</th> <th style="text-align: center;">讲授 Lectures</th> <th style="text-align: center;">习题/辅导/讨论 Tutorials</th> <th style="text-align: center;">实验/实习 Lab/Practical</th> <th style="text-align: center;">其它(请具体注明) Other (Please specify)</th> <th style="text-align: center;">总学时 Total</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">学时数 Credit Hours</td> <td style="text-align: center;">40</td> <td style="text-align: center;">8</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">48</td> </tr> </tbody> </table>				授课方式 Teaching Method	讲授 Lectures	习题/辅导/讨论 Tutorials	实验/实习 Lab/Practical	其它(请具体注明) Other (Please specify)	总学时 Total	学时数 Credit Hours	40	8	0	0	48
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12.	教学内容 Course Contents	
Section 1	生态毒理学的概论 Introduction to ecotoxicology 概述生态毒理学，生态毒理学的发展历史和展望，生态毒理学的基本研究方法 This chapter summarizes ecotoxicology, the development history and Prospect of ecotoxicology, and the basic research methods of ecotoxicology	
Section 3	环境与环境污染物 Environment and environmental pollution 概述环境与环境污染，环境污染物的概念和分类 This chapter summarizes the environment and environmental pollution, the concept and classification of environmental pollutants	
Section 4	环境污染与生态系统 Environment pollution and ecosystems 概述生态因子及其作用特征，生物种、种群及群落，生态系统及其特征 This chapter summarizes ecological factors and their action characteristics, biological species, populations and communities, ecosystems and their characteristics	
Section 5	毒性作用的主要概念与类型 Main concepts and types of toxic effects 概述毒性作用，毒性作用的类型，联合毒性作用 This section summarizes toxic effects, types of toxic effects, and combined toxic effects	
Section 6	毒性作用的机制及影响因素 Mechanism and factors of toxic effects 综述毒性作用的机制，包括毒性物质干扰正常受体配体的相互作用，细胞膜损伤，干扰细胞内钙稳态和细胞能量的产生，自由基与氧化损伤，概述影响毒性作用的因素 This chapter summarizes the mechanisms of toxicity, including toxic substances interfering with the interaction of normal receptor ligands, cell membrane damage, interfering with intracellular calcium homeostasis and cell energy production, free radicals and oxidative damage, and summarizes the factors affecting toxicity	
Section 7	基于课程主题“环境污染与生态系统”的小组汇报讨论 Group report and discussion based on the subject of the environmental pollution and ecosystem 学生关于“环境污染与生态系统”进行自主讨论 An independent discussion on "environmental pollution and ecosystem" between students	
Section 8	生物膜的结构与环境污染物的生物转运 Structure of biofilm and biological transport of environmental pollutants 概述生物膜的结构和功能，生物转运的方式，环境污染物的吸收、分布及排泄 This paper summarizes the structure and function of biofilm, the mode of biological transport, and the absorption, distribution and excretion of environmental pollutants	

Section 9	<p>环境污染物在体内的生物转化 Biotransformation of environmental pollutants in vivo 概述环境污染物的生物转化的反应类型和影响生物转化的因素 This chapter summarizes the reaction types of biotransformation of environmental pollutants and the factors affecting biotransformation</p>
Section 10	<p>生物富集 Bioconcentration 概述生物富集的概念，生物富集的过程 This chapter summarizes the concept of bioconcentration and the process of bioconcentration</p>
Section 11	<p>生物富集动力学 Bioaccumulation kinetics 综述吸附动力学，生物富集动力学 This chapter summarizes adsorption kinetics and bioconcentration kinetics</p>
Section 12	<p>影响生物富集的因素 Factors of bioaccumulation 概述环境污染物的物理化学性质，生物特性，环境因素 This chapter summarizes the physical and chemical properties, biological characteristics and environmental factors of environmental pollutants</p>
Section 13	<p>生物放大研究技术 Biomagnification research technology 概述生物放大的生态毒理学意义，金属和类金属的生物放大，有机化合物的生物放大，生物放大研究技术 This chapter summarizes the ecotoxicological significance of biomagnification, biomagnification of metals and metalloids, biomagnification of organic compounds and biomagnification research technology</p>
Section 14	<p>基于课程主题“环境污染物的生物转化和转运”的小组汇报讨论 Group report and discussion based on the subject of the biotransformation and transport of environmental pollutants 学生关于“环境污染物的生物转化和转运”进行自主讨论 An independent discussion on " the biotransformation and transport of environmental pollutants " between students</p>
Section 15	<p>环境污染物生态毒性作用的特点 Characteristics of ecotoxicity of environmental pollutants 概述环境污染物生态毒性的作用特点 This chapter summarizes the characteristics of ecotoxicity of environmental pollutants</p>
Section 16	<p>分子水平的生态毒理学效应 Ecotoxicological effects at molecular level 概述环境污染物的酶效应，DNA 损伤，蛋白合成诱导，氧化应激和抗氧化状态，对卟啉合成的影响 This chapter summarizes the enzymatic effects of environmental pollutants, DNA damage, protein synthesis induction, oxidative stress and antioxidant status, and their effects on porphyrin synthesis</p>
Section 17	<p>细胞、组织及器官水平的生态毒理学效应 Ecotoxicological effects at cell, tissue and organ levels</p>

	<p>概述细胞水平的生态毒理学效应，亚细胞水平的生态毒理学效应，细胞突变与癌变，组织、器官水平的生态毒理学效应</p> <p>This chapter summarizes ecotoxicological effects at the cellular level, ecotoxicological effects at the subcellular level, cell mutation and carcinogenesis, and ecotoxicological effects at the tissue and organ levels</p>
Section 18	<p>个体水平的生态毒理学效应</p> <p>Ecotoxicological effects at the individual level</p> <p>概述亚致死效应，致死效应，影响致死效应的因素</p> <p>This chapter summarizes sublethal effect, lethal effect and factors affecting lethal effect</p>
Section 19	<p>种群、群落及生态系统水平的生态毒理学效应</p> <p>Ecotoxicological effects at the level of population, community and ecosystem</p> <p>概述环境污染物对种群的影响，环境污染对生物群落的影响，环境污染对生态系统的影响</p> <p>This chapter summarizes the impact of environmental pollutants on populations, the impact of environmental pollution on biological communities, and the impact of environmental pollution on ecosystems</p>
Section 20	<p>基于课程主题“环境污染物的生态毒理学效应”的小组汇报讨论</p> <p>Group report and discussion based on the subject of the ecotoxicological effects of environmental pollutants</p> <p>学生关于“环境污染物的生态毒理学效应”进行自主讨论</p> <p>An independent discussion on "the ecotoxicological effects of environmental pollutants" between students</p>
Section 21	<p>动物对环境污染物的吸收、分布、排泄及转化</p> <p>Absorption, release, excretion and transformation of environmental pollutants by animals</p> <p>概述动物对环境污染物的吸收，分布与贮存，环境污染物的排泄，环境污染物的生物转化</p> <p>This chapter summarizes the absorption, distribution and storage of environmental pollutants by animals, the excretion of environmental pollutants and the biotransformation of environmental pollutants</p>
Section 22	<p>环境污染物对动物的生态毒理学效应及机制</p> <p>Ecotoxicological effects and mechanisms of environmental pollutants on animals</p> <p>综述环境污染物对动物生态毒性的主要类型，主要毒性机制</p> <p>This chapter summarizes the main types and main toxicity mechanisms of environmental pollutants to animals</p>
Section 23	<p>人工饲养动物生态毒理学</p> <p>Ecotoxicology of captive animals</p> <p>概述有毒植物和微生物引起的中毒，化学物引起的中毒</p> <p>Poisoning caused by poisonous plants and microorganisms, and poisoning caused by chemicals</p>
Section 24	<p>基于课程主题“动物生态毒理学效应”的小组汇报讨论</p> <p>Group report and discussion based on the subject of the ecotoxicological effects of animals</p> <p>学生关于“动物生态毒理学效应”进行自主讨论</p>

	An independent discussion on "the ecotoxicological effects of animals" between students
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13. 课程考核
Course Assessment

课程评估 ASSESSMENT					
19.	评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
√	出勤 Attendance	每周 Every Week	10%		
√	课堂表现 Class Performance	每周 Every Week	40%		
	小测验 Quiz				
	课程项目 Projects				
√	平时作业 Assignments	16周 Week 16	20%		
	期中考试 Mid-Term Test				
	期末考试 Final Exam				
√	期末报告 Final Presentation	16周 Week 16	30%		
	其它（可根据需要改写以上评估方式） Others (The above may be modified as necessary)				

14. 教材及其它参考资料
Textbook and Supplementary Readings

教材 Textbook

[1] 《生态毒理学》，孟紫强，高等教育出版社，2009年初版
《Ecotoxicology》，Meng, Z. Q, Higher Education Publishing House, 2009

参考资料 Supplementary Readings

[2] 《生态毒理学与案例分析》，张杭君，化学工业出版社，2021年9月初版
《Ecotoxicology and case analysis》，Zhang, H. J, Chemical Industry Publishing House, September 2021

[3] 《Fundamentals of Ecotoxicology》，Newman, M.C, Unger, M.A, Fundamentals of Ecotoxicology, 2002 (英文参考书)

[4] 《Fish Ecotoxicology》，Braunkberk, T, Hinton, D.E, SPRINGER, 2012) (英文参考书)