课程详述

COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	**课程名称 Course Title**	**生态修复 Ecological Restoration**
2.	**授课院系 Originating Department**	环境科学与工程学院 School of Environmental Science and Engineering
3.	**课程编号 Course Code**	ESE 412
4.	**课程学分 Credit Value**	3
5.	**课程类别 Course Type**	专业选修课 Major Elective Courses
6.	**授课学期 Semester**	秋季 Fall
7.	**授课语言 Teaching Language**	英文 English
8.	**授课教师、所属学系、联系方式（如属团队授课，请列明其他授课教师） Instructor(s), Affiliation& Contact （For team teaching, please list all instructors）**	Ming Hung Wong, Xunwen Chen, School of Environmental Science and Engineering, SUSTech. wongmh@sustech.edu.cn, chenxw3@sustech.edu.cn.
9.	**实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact**	待公布 To be announced
10.	**选课人数限额(可不填) Maximum Enrolment （Optional）**	

11. 授课方式 Delivery 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	4	4	N/A	48

12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	N/A
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	N/A
14. 其它要求修读本课程的学系 Cross-listing Dept.	N/A

教学大纲及教学日历 SYLLABUS

15. **教学目标 Course Objectives**

This course provides a broad overview of the interdisciplinary topic of ecological reclamation of organic wastes and degraded habitats. It explores how ecological reclamation techniques can be used to convert different organic wastes into valuable products; decontaminate and restore different contaminated/disturbed habitats, including soil and water.

The first part is related to degradation of natural resources due to human activities, and the impacts on the environment and human health, with emphasis on major food contaminants. The second part reviews the basic principles of ecological restoration, and techniques commonly employed for ecological survey, restoration and toxicity analyses. The third part examines various techniques, through the use of various microbes, for converting different organic wastes into food, fertilizer, feed and fuel. The recent advances on turning organic waste into biochar is also included. The fourth part describes the common reclamation methods adopted for restoring man-made and contaminated habitats. The basic principles of soil science and the important components (i.e. plants, microbes and organic matter) for successful ecological restoration are presented. Case studies related to bioremediation and phytoremediation of contaminated soil and water are provided. Revegetation and stabilization of completed landfills and slopes are also illustrated. Finally, the fifth part is the conclusion on future prospects related to ecological sustainability.

16. **预达学习成果 Learning Outcomes**

Students will be introduced to the rapidly expanding discipline of recycling of organic wastes and restoring degraded ecosystems; through lectures, short videos, field survey, group discussion, individual presentations and reflective essays. It is hoped that the students can apply theory learnt to the implementation of waste treatment and recycling, and habitat decontamination and restoration.

17. **课程内容及教学日历 （如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人）**
Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)

COURSE OUTLINE (MH: Ming Hung Wong, XW: Xunwen Chen)

1. Human population growth and impacts
   1.1 Environmental degradation – MH 2.5h
   1.2 Exposure of pollutants and health impacts – MH 2.3h
   1.3 Writing scientific paper – MH 3h

2. Ecological restoration
   2.1 Introduction to ecological restoration- XW 1h
   2.2 Methodology and concepts in ecological restoration – XW 3h
   2.3 Basic ecotoxicology – XW 3h
   Ecological survey: application of techniques (related to restoration) – XW 4h

3. Reclamation of biological wastes
   3.1 Food, fertilizer, feed – MH 4h
   3.2 Fuel, biochar – XW 3h

4. Restoration of degraded and man-made habitats
   4.1 Basic soil properties – MH 2h
   4.2 Basic components for restoration: Plants, microbes, organic matter – MH 2h
   4.3 Bioremediation of contaminated sites– MH 2h
   4.4 Phytoremediation of contaminated sites – MH 4h
   4.5 Constructed wetlands for water purification and biological conservation – MH 4h
   4.6 Ecological restoration of completed landfills – XW 3h
   4.7 Revegetation of slopes – XW 3h

5. Future prospects on ecological sustainability – MH 2h

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

1. Cunningham WP, Cunningham MA, 2009. Environmental Science: A Global Concern, 11th Ed. McGraw-Hill, NY.
2. Lehmann J, Joseph S, 2009. Biochar for Environmental Management: Science and Technology, Routledge, London.
3. Midgle GF, 2012. Biodiversity and ecosystem function. Science 335, 174–175.
4. Miller GT, Spoolman SE, 2008. Essentials of Ecology, 5th Ed. Cengage Learning, Belmont.
5. Palmer MA, Zedler JB, Falk DA, 2016. Foundations of Restoration Ecology, 2nd Ed. Island Press, Washington.
6. Schulze ED, Beck E, Müller-Hohenstein K, 2005. Plant Ecology. Springer, NY.
7. Walker CH, Sibly RM, Hopkin SP, Peakall DB, 2012. Principles of Ecotoxicology, 4th Ed, CRC Press, Boca Raton.
8. Wong MH, 2013. Environmental Contamination, Health Risks and Ecological Restoration. CRC Press, London,
9. Wong MH, 2004. Wetlands Ecosystems in Asia: Function and Management. Elsevier, London,
10. Wong MH, Bradshaw AD, 2002. The Restoration and Management of Derelict Land: Modern Approaches. World Scientific, London.

课程评估 ASSESSMENT

19. 评估形式	评估时间	占考试总成绩百分比	违纪处罚	备注

Type of Assessment	Time	% of final score	Penalty	Notes
出勤 Attendance	N/A	10%		
课堂表现 Class Performance	N/A	0%		
小测验 Quiz	N/A	0%		
课程项目 Projects	4 h	30%		
平时作业 Assignments	N/A	0%		
期中考试 Mid-Term Test	N/A	20%		
期末考试 Final Exam	2 h	40%		
期末报告 Final Presentation	N/A	0%		
其它（可根据需要改写以上评估方式） Others (The above may be modified as necessary)	N/A	0%		

20. 记分方式 **GRADING SYSTEM**

☑ A. 十三级等级制 **Letter Grading**
☐ B. 二级记分制（通过/不通过） **Pass/Fail Grading**

课程审批 REVIEW AND APPROVAL

21. **本课程设置已经过以下责任人/委员会审议通过**
This Course has been approved by the following person or committee of authority