

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	环境微生物实验 Environmental Microbiological Experiments
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	ESE309
4.	课程学分 Credit Value	1
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	中文 Chinese
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)	裘文慧，环境科学与工程学院，邮箱： qiuwh@sustech.edu.cn Qiu Weihui, School of Environmental Science and Engineering
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	0		32		32

12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	先选课 Co-requisites:环境学导论 Introduction to Environmental Sciences, 环境微生物 Environmental Microbiology
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	无 N/A
14. 其它要求修读本课程的学系 Cross-listing Dept.	无 N/A

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

本课程是与《环境微生物》课程配套的实验课程，通过该课程可增强学生对微生物学的感性知识，提高动手能力，并使使学生具备以下能力：(1)能够培养，观察和鉴定环境微生物；(2)归纳、整理与分析微生物实验结果，获得有效实验结论；(3)熟练使用光学显微镜、灭菌锅、凝胶成像系统等传统微生物实验仪器。

It is an experimental course with the "Environmental microbiological". After the course students will enhance their perceptual knowledge of Environmental microbiological and improve their practical ability. 1) Understand the basic structure and working principle of ordinary optical microscope; Learn and master observe and record several basic forms of microorganisms thought optical microscopes. 2) Summarize and analyze the microorganism experiment result, obtain the valid experiment conclusion; 3) proficient in the use of optical microscope, sterilization pot, gel imaging system and other traditional microbial experimental instruments.

16. 预达学习成果 Learning Outcomes

本课程通过不仅要培养学生对于基本实验技能的掌握，更重要的是培养学生在现有实验室条件下，参与设计实验、分工协作，并独立完成相关实验报告的能力，为以后学生毕业从事环境微生物等相关的研究、工程以及管理提供实践支持。

This course will teach students to master the basic environmental microbiological experiments, not only to cultivate students for the basic experimental skills, more important is to develop students the ability to independently design and complete relevant experiments.

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.)

一、环境微生物学实验安全须知（2学时，教学第一周）

Environmental microbiology experiment safety notice (2 credit hours)

介绍环境微生物学实验安全注意事项；

Environmental microbiology experiment safety notice;

二、环境微生物实验绪论（2学时，教学第二周）

Introduction to environmental microbiology experiment (2 credit hours)

介绍环境微生物学实验教学内容，熟悉环境微生物实验课使用仪器；

To introduce the teaching contents of environmental microbiology experiment and be familiar with the instruments used in environmental microbiology experiment course;

三、显微镜的使用与微生物观察（4学时，教学第三-四周）

The use of microscopes on microbiological observations (4 credit hours)

了解普通光学显微镜的基本构造和工作原理；学习并掌握普通光学显微镜，观察和记录微生物的几种基本形态。

Understand the basic structure and working principle of ordinary optical microscope; Learn and master observe and record several basic forms of microorganisms thought optical microscopes.

四、培养基的配制，灭菌以及无菌操作的学习（4学时，教学第五-六周）

Culture medium preparation, sterilization, and sterile operation (4 credit hours)

学习制备培养基的基本技术；制备牛肉膏蛋白琼脂培养基；了解干热灭菌及高压蒸汽灭菌的操作方法。Learning the basic techniques of preparing medium;Preparation of beef paste protein AGAR medium;To understand the operation method of dry heat sterilization and high pressure steam sterilization.

五、土壤中微生物的分离和纯化技术（6学时，教学第七，八和九周）

Separation and Purification of Microorganisms in Soil (6 credit hours)

土壤是微生物生活最适宜的环境、它具有微生物所需要为一切营养物质和微生物进行生长繁殖及生存的各种条件。因此，查明土壤中微生物的数量和组成情况，对发掘土壤微生物资源和对土壤微生物实行定向控制无疑是十分必要的。本实验学会土壤微生物的检测方法，了解土壤中微生物的数量和组成；初步掌握从土壤中分离细菌的基本技术。

Soil is the most suitable environment for microbial life, and it has all kinds of conditions for the growth and reproduction of microorganisms. Therefore, it is necessary to find out the quantity and composition of microorganism in soil. The test method of soil microorganism in this experiment is to understand the quantity and composition of microorganisms in soil; Basic techniques for isolating bacteria from soil.

六、水中细菌总数的测定和大肠菌群的检测（4学时，教学第十周和十一周）

Determination of total bacteria and coliform bacteria in water (4 credit hours)

了解和学习水中细菌总数和大肠菌群的测定原理和测定意义；学习和掌握用稀释平板计数法测定水中细菌总数的方法；学

习和掌握水中大肠菌群的检测方法。

Understanding determination principle and significance of the total number of bacteria and coliform in water; To study and master the method to determine the total number of bacteria in water by dilution plate count method; To study and master the detection methods of coliform bacteria in water.

七、土壤中微生物总 DNA 的提取和凝胶显色（4 学时，教学第十二周和十三周）

The total DNA extraction of microorganism in soil (4 credit hours)

从样品总提取总的 DNA，可以土壤中微生物总 DNA 的提取试剂盒完成（成熟的商品化产品）。其实验原理为：独特的结合液/蛋白酶 K 迅速裂解细胞和灭活细胞内核酸酶，然后基因组 DNA 在高速离心盐状态下选择性吸附于离心柱内硅基质膜，再通过一系列快速的漂洗—离心的步骤，抑制物去除液和漂洗液将细胞代谢物，蛋白等杂质去除，最后低盐的洗脱缓冲液讲纯净基因组 DNA 从硅基质膜上洗脱。

The total DNA extracted from the samples can be completed by the extraction kit of total DNA in soil (mature commercial products). Its experimental principle is: the unique rapid pyrolysis combined with liquid/protease K cells and inactivate the kernel sour plum, and then genomic DNA in the condition of high speed from the sequence of salt selective adsorption on the silicon substrate in the centrifugal column membrane, and then through a series of quick rinse - centrifugal steps, inhibitor to remove liquid and drift lotion metabolites to cells, proteins such as impurity removal, the final low salt the elution buffer of pure genomic DNA from silicon substrate membrane elution.

八、细菌 16S rRNA 基因的 PCR 扩增技术（6 学时，教学第十四周、第十五周和第十六周）

PCR amplification of 16S rRNA gene. (6 credit hours)

掌握 16S rRNA 基因对细菌进行分类的原理和方法；掌握 DNA 提取、PCR 原理及方法等实验操作。

Understanding the principles and methods for the classification of bacteria by 16S rRNA gene; Mastering the methods of DNA extraction and PCR.

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

《环境微生物》，刘海春，臧玉红编著，2008 年 01 月高等教育出版社

《环境工程微生物学实验》，代群威，2010 年，化学工业出版社出版

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	1-16week	10%		
课堂表现 Class Performance	1-16week	40%		
小测验 Quiz				

课程项目 Projects				
平时作业 Assignments		50%		
期中考试 Mid-Term Test				
期末考试 Final Exam				
期末报告 Final Presentation				
其它（可根据需要 改写以上评估方式） Others (The above may be modified as necessary)				

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

