

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	遗传学实验 Genetics Laboratory
2.	授课院系 Originating Department	生物系 Department of Biology
3.	课程编号 Course Code	BIO303
4.	课程学分 Credit Value	2
5.	课程类别 Course Type	专业核心课（生物科学、生物技术专业） Major Core Courses(Biological Sciences, Biotechnology Majors) 专业选修课（生物信息学专业） Major Elective Courses(Bioinformatics Major)
6.	授课学期 Semester	春季 Spring
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)	马小英 工程师 南方科技大学 生物系 广东省深圳市西丽区 南方科技大学 第一教学楼 231 室 Tel (电话): 0755-8801-8746 Email: Maxy@sustc.edu.cn Dr. MA xiaoying, Engineer, Department of Biology South University of Science and Technology of China Nanshan District, Shen Zhen, Guang Dong, P.R. China 赵颖岚 工程师 南方科技大学 生物系 广东省深圳市西丽区 南方科技大学 第一教学楼 231 室 Tel (电话): 0755-8801-8749 Email: zhyl@sustc.edu.cn Dr. Zhao yinglan, Engineer, Department of Biology South University of Science and Technology of China Nanshan District, Shen Zhen, Guang Dong, P.R. China
9.	实验员/助教、所属学系、联系	贾方兴 实验员

方式

Tutor/TA(s), Contact

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选课人数限额(可不填)

10. 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
		课堂实验 56 学时 class experiment 56 h	课后实验观察 8 学时 Observation after class 8 h	

学时数
Credit Hours

12. 先修课程、其它学习要求
Pre-requisites or Other Academic Requirements

BIO301 遗传学 Genetics
BIO222 生物化学与分子生物学实验 Biochemistry and Molecular Biology Laboratory

13. 后续课程、其它学习规划
Courses for which this course is a pre-requisite

无 None

14. 其它要求修读本课程的学系
Cross-listing Dept.

无 None

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

遗传学实验将帮助学生更加深入地理解一系列遗传学基本原理，掌握遗传学常用的实验方法和实验技术。学生通过具体实验项目的学习，可有效提高动手能力和动脑能力。本课程将积极引导正确、科学地观察、记录实验现象，分析实验结果，科学处理实验数据，科学查阅文献资料，通过撰写实验报告提高学生撰写科研论文的能力。本课程还将着重培养学生良好的实验习惯和严谨的科学思维，促进学生创新意识的形成和综合素质的提高。

Genetics experiments will enhance students' understanding about a serial of genetic principles. Students will master some frequently used experimental methods and techniques. According to some specific experiments, students' abilities of practices and thoughts will improve efficiently. This course will provide chances to students to study the scientific records, scientific data analysis, and scientific articles. The ability of writing scientific article will improve a lot by lab report writing trainings. Genetic laboratory will emphasize the trainings about students' experimental habits and scientific thinking. Students' innovative consciousness and comprehensive quality will be promoted.

16. 预达学习成果 Learning Outcomes

通过对本课程的学习，学生将熟悉和掌握传统遗传学和现代分子遗传学常用的实验方法和实验技能，可科学分析来自昆虫、动物、植物及人类遗传物质的多种遗传信息，学生的实验操作技能和科学思维均可得到提升。通过本课程的学习，学生可增强对遗传学理论知识的理解，提高创新意识和综合素质。

According to the studies of genetic laboratory, students will master the basic experimental methods and techniques for classical and modern molecular genetic study. Students can do scientific analysis using the genetic materials from inserts, animals, plants, and human tissues. This course will promote students' operation skills and scientific thinking. Students will get a better understanding about genetic theories and their innovative consciousness and comprehensive quality will be promoted.

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.)

NO.1 Lab Safety & Course Introduction (4h)

实验室安全与课程介绍(4h)

Lab safety, course evaluation, course requirement, course content and schedule.

介绍实验室安全，课程评估方式、课程要求、课程内容及时间安排等。

Experiment 1: Polytene Chromosome Observation of Chironomus Salivary Glands(4h)

实验 1：红虫唾液腺多线染色体观察(4h)

To visualize the polytene in Chironomus salivary glands

解剖红虫并观察其唾液腺中的多线染色体。

Experiment 2: UV Light Mutagenesis of Saccharomyces cerevisiae (4h)

实验 2：紫外线诱变酵母(4h)

To study the mutagenesis effect of UV light in living microorganism S. cerevisiae.

学习紫外线对微生物酵母的诱变效果。

Experiment 3: Introduction to Caenorhabditis elegans(4h)

实验 3：线虫介绍(4h)

To gain experiences on handling worms. To study the phenotypes of different mutants. To study the life cycle of C. elegans.

获得线虫相关的操作经验，观察线虫不同的突变体表型，学习和观察线虫的生命周期。

Experiment 4: Imaging of C. elegans Embryos(2h)

实验 4: 线虫胚胎观察(2h)

To image living C. elegans embryos by light microscope and fluorescence microscope.

利用光学显微镜和荧光显微镜观察线虫活体胚胎的生命活动。

Experiment 5: RNA Interference (RNAi) in C. elegans(2h)

实验 5: 线虫的 RNA 干扰 (2h)

To deplete cyk-4 or gfp in C. elegans by RNAi feeding method.

通过喂养的方式对线虫进行 RNA 干扰, 敲除基因 cyk-4 或 gfp 基因的表达。

Experiment 6: Mating of C. elegans(2h)

实验 6: 线虫的杂交(2h)

To re-evaluate the Mendel's Law by the mating of C. elegans.

通过线虫杂交, 重新评估孟德尔经典遗传学定律。

Experiment 7: Chi-Square Test in Genetics (2h)

实验 7: 遗传学中的卡方检验(2h)

To practice how to calculate χ^2 value and how to analyze our experimental results in genetics.

通过练习卡方检验的计算方法, 学习如何分析遗传学实验结果。

Experiment 8: Site-Directed Mutagenesis of GFP(4h)

实验 8: 绿色荧光蛋白 GFP 的定点诱变(4h)

To understand the basic principles of site-directed mutagenesis introduced by PCR.

学习 PCR 介导的定点诱变的基本原理与方法。

Experiment 9: DNA Extraction and PCR Analysis of Single Nucleotide Polymorphism (SNP) in C. elegans (1) (4h)

实验 9: 线虫 DNA 提取及 PCR 分析其单核苷酸多态性 SNP(1) (4h)

To study the single nucleotide polymorphism (SNP) in C. elegans. Practice to extract DNA from C. elegans and amplify the target sequences by polymerase chain reaction (PCR).

学习线虫中的单核苷酸多态性，练习线虫 DNA 的提取，对目标片段进行 PCR 扩增。

Experiment 10: DNA Extraction and PCR Analysis of Single Nucleotide Polymorphism (SNP) in *C. elegans* (2) (4h)

实验 10: 线虫 DNA 提取及 PCR 分析其单核苷酸多态性 SNP(2) (4h)

To study the single nucleotide polymorphism (SNP) in *C. elegans*. Practice the restriction mapping method.

学习线虫中的单核苷酸多态性，利用限制性酶切法分析 SNP。

Experiment 11: Genetic Identification by PCR in Human(4h)

实验 11: 利用 PCR 对人类个体进行遗传鉴定(4h)

To study genetic identification by the VNTR analysis of D1S80 and sex determination with SRY. The DNA sample will be obtained from the hair root.

分析 D1S80 中的分子标记 VNTR，对人类个体进行亲缘关系的遗传鉴定。利用 SRY 基因进行人类个体的性别鉴定。本实验的样本来自人的头发。

Experiment 12: Genomic DNA Isolation and ISSR Analysis in Plant (1) (4h)

实验 12: 植物基因组 DNA 提取及 ISSR 分析 (1) (4h)

To study the cultivar identification in plant by the ISSR analysis. Practice the isolation of genomic DNA from young leaves of plants.

学习利用 ISSR 分子标记进行植物的品种鉴定。利用植物叶片进行植物基因组 DNA 的提取。

Experiment 13: Genomic DNA Isolation and ISSR Analysis in Plant (2) (4h)

实验 13: 植物基因组 DNA 提取及 ISSR 分析 (2) (4h)

To study the cultivar identification in plant by the ISSR analysis

学习在植物中利用 ISSR 分子标记进行品种鉴定。

Experiment 14: Isoenzyme Analysis of Plant Esterase by PAGE(4h)

实验 14: 利用 PAGE 胶进行植物脂酶同工酶分析(4h)

To understand the technique of isoenzyme analysis.

学习同工酶分析技术。

NO.14 Course Review (4h)

课程回顾(4h)

Students' oral presentation.

学生口头报告

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

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				
课堂表现 Class Performance		30		
小测验 Quiz		20		
课程项目 Projects				
平时作业 Assignments		20		
期中考试 Mid-Term Test				
期末考试 Final Exam				
期末报告 Final Presentation		10		
其它(可根据需要 改写以上评估方式) Others (The above may be modified as necessary)		20 实验报告 (lab report)		

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

本课程经生物系本科教学指导委员会审议通过。

This Course has been approved by Undergraduate Teaching Steering Committee of Department of Biology.

