

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	植物生物学综合实验和科研实践 Integrated Laboratory Research Training--Plant Biology
2. 授课院系 Originating Department	生命科学学院生物系 Department of Biology, School of Life Sciences
3. 课程编号 Course Code	BIO481
4. 课程学分 Credit Value	6
5. 课程类别 Course Type	专业选修课 Major Elective Courses
6. 授课学期 Semester	春季 Spring / 夏季 Summer / 秋季 Fall
7. 授课语言 Teaching Language	中英双语 English & 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)	课程负责人: 郭红卫, 讲席教授, guohw@sustech.edu.cn 团队成员: 梁建生, 教授, liangjs@sustech.edu.cn 杜嘉木, 教授, dujm@sustech.edu.cn 黄安诚, 副教授, huangac@sustech.edu.cn 李瑞熙, 副教授, lirx@sustech.edu.cn 翟继先, 副教授, zhajix@sustech.edu.cn 吴柘, 副教授, wuz@sustech.edu.cn 宋毅, 助理教授, songy3@sustech.edu.cn Peter Pimpl, 副教授, pimpl@sustech.edu.cn Course Coordinator: GUO Hongwei, Chair Professor, guohw@sustech.edu.cn Group Members: LIANG Jiansheng, Professor, liangjs@sustech.edu.cn DU Jiamu, Professor, dujm@sustech.edu.cn HUANG Ancheng, Associate Professor, huangac@sustech.edu.cn LI Ruixi, Associate Professor, lirx@sustech.edu.cn

		ZHAI Jixian, Associate Professor, zhajix@sustech.edu.cn WU Zhe, Associate Professor, wuz@sustech.edu.cn SONG Yi, Assistant Professor, songy3@sustech.edu.cn Peter Pimpl, Associate Professor, pimpl@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)	每学年开设 1-2 个教学班级, 每班级限额 5 人。 1-2 classes per school year with a maximum of 5 students per class.				
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			192		192
12.	先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	生物学原理, 普通生物学实验 Principles of Biology, General Biology Laboratory				
13.	后续课程、其它学习规划 Courses for which this course is a pre-requisite	无				
14.	其它要求修读本课程的学系 Cross-listing Dept.	无				

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

本课程的教学目标是为本科生搭建基础理论知识和科学研究之间的桥梁, 旨在帮助本科生快速适应科研工作, 并提高实践动手能力, 帮助本科生尽快投入到科研工作中去。该课程将会把植物生物学基础理论知识与实验室科研实践紧密联系, 一方面促进学生在实践中深化对基础理论的理解, 提高对课程体系中基础理论课程的感性认识, 提高学生对植物生命现象、机理机制的探索兴趣; 另一方面, 用理论指导实践创新, 以提高本科生的创新探索精神。

The central aim of Integrated Laboratory Research Training - Plant Biology is to act as an efficient connection between knowledge studying of text book to real research. This course will enhance abilities of real practice and research creativity for undergraduate students, helping them to quickly adapt to the role of a real scientific researcher. This course will join the basic plant biology knowledge to research practice in laboratory, boosting the understanding to basic theory, enhancing the perceptual knowledge to basic theory during systematic course study, improve the interesting of exploring plant biology phenomenon, theory and mechanism. Meanwhile, this course will guide the creativity through knowledge, inspiring the creativity and exploring spirit of undergraduate student.

16. 预达学习成果 Learning Outcomes

在完成本课程后, 学生将会:

1. 理解植物学基础理论;
2. 理解植物学常用的研究方法和技术;
3. 掌握植物分子遗传学、植物细胞生物学、生物化学、植物组学的基本理论;

4. 熟练运用植物学常规研究方法和技术。

After this course, the students will be benefited by

- 1, Understanding the basic principles in plant biology;
- 2, Comprehending the methods and techniques generally used to study plants;
- 3, Understanding the essentials corresponding to molecular genetics, plant cell biology, plant biochemistry, and plant omics;
- 4, Be fully capable of running their own projects through applying techniques and skills learned in this course.

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.)

第一部分：植物分子遗传学，48 学时，郭红卫、梁建生、翟继先

1. 聚合酶链式反应（PCR）扩增目的基因
2. DNA 的酶切及凝胶电泳
3. 片段连接、质粒转化及筛选
4. 重组质粒 DNA 的分离、纯化及鉴定
5. 植物基因组 DNA 提取及纯度和含量测定
6. 拟南芥的遗传转化

第二部分：植物细胞生物学，48 学时，Peter Pimpl、李瑞熙、翟继先

1. 植物蛋白亚细胞定位
2. 不同蛋白共定位及数据分析
3. 互作蛋白亚细胞共定位模式
4. 原生质体的制备及应用

第三部分：生物化学及植物代谢组分析，48 学时，杜嘉木、黄安诚、宋毅

1. 目标蛋白的生化分析
2. 代谢物分析仪器的介绍及使用
3. 转基因植物的代谢组分析

第四部分：植物组学实验及数据分析，48 学时，翟继先、吴柘、宋毅

1. 植物总 RNA 的提取及基因表达检测
2. 植物转录组测序 (RNA-seq)
3. 植物小 RNA 的提取及分析

Part I, Plant Molecular Genetics, 48 hours, Hongwei Guo, Jiansheng Liang , Jixian Zhai

- 1, Amplification of gene of interested using PCR (Polymerase Chain Reaction)
- 2, Digestion the PCR product using restriction endonuclease enzyme, gel electrophoresis
- 3, Ligation of DNA fragments, plasmid transformation, and resistance screening
- 4, Isolation and purification of plasmid, sequencing of construct
- 5, Isolation and analysis of plant genomic DNA
- 6, Arabidopsis transformation by floral-dip method

Part II, Plant Cell Biology, 48 hours, Peter Pimpl, Ruixi Li, Jixian Zhai

- 1, Subcellular localization of plant proteins,
- 2, Co-localization among different proteins, and image analysis
- 3, Protein-protein interactions in the cell,
- 4, Preparation of protoplasts, and its application

Part III, Biochemistry and Plant Metabolome, 48 hours, Jiamu Du, Ancheng Huang, Yi Song

- 1, Biochemical study of protein of interested
- 2, Instructions to instruments, and the application of the instruments in the study of metabolome
- 3, Metabolic analysis of transgenic plants

Part IV, Plant Omics and Data Analysis, 48 hours, Jixian Zhai, Zhe Wu, Yi Song

- 1, Plant total RNA extraction, gene expression analysis
- 2, Plant transcriptome sequencing (RNA-seq) and analysis
- 3, Plant small RNA isolation and analysis

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

无教材，参考资料为大量英文科学文献，每次课的参考资料都不一样，由授课老师提供。

No textbook. There supplementary readings are large number of scientific publications in English. It is different for each lecture and will be provided by the teacher.

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		春季/秋季学期，4 学时/周 夏季学期（6 周），8 学时/天 实验室会议: 2 次/月 Spring/Fall semester, 4 hours/week

			Summer semester (6 weeks), 8 hours/day Lab meetings: 2 times/month 是否遵守导师制定的规则, 准则和职业行为; 在实验室工作时的努力程度以及完成质量。 The evaluation provided by the supervising professor, on the basis of the following aspects: Compliance with the rules, guidelines, and professional conduct set forth by the supervisor; The diligence and quality in completing the assigned laboratory work.
小测验 Quiz			
课程项目 Projects			
平时作业 Assignments			
期中考试 Mid-Term Test			
期末考试 Final Exam			
期末报告 Final Presentation	30		完成所有模块的学习后, 以小组为单位进行项目答辩 After completing all modules, conduct project defense in groups
其它(可根据需要 改写以上评估方式) Others (The above may be modified as necessary)	项目答辩 40		(每个模块独立撰写实验报告和做口头报告) Experiment report and oral presentation for each independent module.

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

本课程经生命科学学院教学工作委员会审议通过
This course is approved by the Teaching Affairs Committee, School of Life Sciences.