

## 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.	<b>课程名称 Course Title</b>	<p>化学生物学综合实验和科研实践</p> <p><b>Integrated Laboratory Research Training -Chemical Biology</b></p>
2.	<b>授课院系 Originating Department</b>	<p>生命科学学院化学生物学系</p> <p>Department of Chemical Biology, School of Life Sciences</p>
3.	<b>课程编号 Course Code</b>	BIO484
4.	<b>课程学分 Credit Value</b>	6
5.	<b>课程类别 Course Type</b>	专业选修课 Major Elective Courses
6.	<b>授课学期 Semester</b>	春季 Spring / 夏季 Summer / 秋季 Fall
7.	<b>授课语言 Teaching Language</b>	中英双语 English & Chinese
8.	<b>Instructor(s), Affiliation &amp; Contact</b> (For team teaching, please list all instructors)	<p>课程负责人：廖茂富，讲席教授，<a href="mailto:liaomf@sustech.edu.cn">liaomf@sustech.edu.cn</a></p> <p>团队成员：</p> <p>廖茂富，讲席教授，<a href="mailto:liaomf@sustech.edu.cn">liaomf@sustech.edu.cn</a></p> <p>陈永龙，副教授，<a href="mailto:chenyl@sustech.edu.cn">chenyl@sustech.edu.cn</a></p> <p>龚欣，副教授，<a href="mailto:gongx@sustech.edu.cn">gongx@sustech.edu.cn</a></p> <p>黄鸿达，副教授，<a href="mailto:huanghd@sustech.edu.cn">huanghd@sustech.edu.cn</a></p> <p>李颜颜，助理教授，<a href="mailto:liy6@sustech.edu.cn">liy6@sustech.edu.cn</a></p> <p>沈庆涛，副教授，<a href="mailto:shenqt@sustech.edu.cn">shenqt@sustech.edu.cn</a></p> <p>王玲，助理教授，<a href="mailto:wangl8@sustech.edu.cn">wangl8@sustech.edu.cn</a></p> <p>闫凯歌，助理教授，<a href="mailto:yankg@sustech.edu.cn">yankg@sustech.edu.cn</a></p> <p>余聪，副教授，<a href="mailto:yuc@sustech.edu.cn">yuc@sustech.edu.cn</a></p> <p>蔡舒君，助理教授，<a href="mailto:caisi@sustech.edu.cn">caisi@sustech.edu.cn</a></p> <p>隋森芳，长期杰出访问教授，<a href="mailto:suisf@mail.tsinghua.edu.cn">suisf@mail.tsinghua.edu.cn</a></p> <p>Course Coordinator: LIAO Maofu, Chair Professor, <a href="mailto:liaomf@sustech.edu.cn">liaomf@sustech.edu.cn</a></p> <p>Group Members:</p> <p>LIAO Maofu, Chair Professor, <a href="mailto:liaomf@sustech.edu.cn">liaomf@sustech.edu.cn</a></p> <p>CHEN Yonglong, Associate Professor, <a href="mailto:chenyl@sustech.edu.cn">chenyl@sustech.edu.cn</a></p>

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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
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学时数  
Credit Hours

		156	实验室研讨会以及口头报告: 36 Lab meeting and presentation: 36	192
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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 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

本课程致力于给学生提供融入生物科研活动的机会和平台, 通过进入实验室开展和化学生物学研究项目相关的实践活动, 并参与课题组内的学术讨论, 来促进学生掌握基本实验技术和体会现代生物学的科研思路。

This course aims to provide a platform and opportunity for the students to be part of biological research activity, allowing them to enter the laboratories, perform work in chemical biology related projects, and join group discussions. This course will help the students to master basic experimental techniques and understand the strategies of modern biological research.

16. 预达学习成果 Learning Outcomes

在完成本课程后, 学生将会

(1) 得到在生物实验室实践的经验;

- (2) 掌握一些基本的化学生物学相关实验技术;
- (3) 提高学术交流的能力;
- (4) 更好地理解如何开展现代生物学科研。

Upon completion of this course, the students will

- (1) gain experience of doing work in a biological research laboratory;
- (2) master some basic experimental techniques related to chemical biology;
- (3) improve abilities in scientific communications;
- (4) understand better how to perform modern biological research.

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: 分子克隆&蛋白表达和纯化, 64 学时, 龚欣、闫凯歌、李颜颜**

1. 聚合酶链式反应, DNA 质粒酶切、连接、转化及筛选, 引入突变, 凝胶电泳;
2. 基因组目标基因的提取、扩增及克隆到多种表达载体;
3. 多种表达系统和思路 (大肠杆菌、酵母、昆虫细胞、哺乳动物细胞等);
4. 多种纯化方法和策略 (亲和层析, 离子交换, 分子筛, 定点荧光标记);

**Part I: Molecular cloning & Protein Expression and Purification, 64 hours, GONG Xin, YAN Kaige, LI Yanyan**

1. Polymerase Chain Reaction, DNA plasmid enzymatic cut ligation、transfection and selection, insert mutation, gel electrophoresis;
2. Extraction, amplification and cloning of genomic target genes into multiple expression vectors;
3. Multiple expression systems and ideologies (E. coli, yeast, insect cells, mammalian cells, etc.);
4. Multiple purification methods and strategies (affinity chromatography, ion exchange, molecular sieves, spot fluorescent labeling);

**第二部分: 蛋白性质分析&化学分子研究蛋白, 64 学时, 陈永龙、余聪、沈庆涛、王玲**

1. 化学性质研究 (酶活、热稳定性、荧光偏振、等温滴定定量热法、微尺度热泳等);
2. 物理性质研究 (相分离, 二级结构, 测定质量、糖基化、磷酸化等);
3. 化学分子与结构 (小分子调节蛋白活性、分子对接、基于结构的小分子结合位点分析);
4. 化学分子与功能 (小分子抑制剂在细胞和个体水平产生的效果);

**Part II: Protein property analysis & protein study by Chemical Molecules, 64 hours, CHEN Yonglong, YU Cong,**

**SHEN Qingtao, WANG Ling**

1. Chemical property studies (enzyme activity, thermal stability, fluorescence polarization, isothermal titration calorimetry, microscale thermophoresis, etc.);
2. Physical property studies (phase separation, secondary structure, determination of mass, glycosylation, phosphorylation, etc.);
3. Chemical molecules and structures (small molecule regulation of protein activity, molecular docking, structure-based analysis of small molecule binding sites);
4. Chemical molecules and functions (effects produced by small molecule inhibitors at the cellular and individual level);

**第三部分：结构解析，64 学时，廖茂富，黄鸿达，隋森芳**

1. 冷冻电镜（负染电镜、电镜数据分析、冷冻电镜样品制备、三维重构和分类、搭建原子模型）；
2. 晶体结构解析，结构预测。

**Part III: Structural Analysis, 64 hours, LIAO Maofu, HUANG Hongda, SUI Senfang**

3. Cryo-Electron Microscopy (Negative-stain electron microscopy, electron microscopy data analysis, cryo-electron microscopy sample preparation, 3D reconstruction and classification, building atomic models);
4. Crystal structure analysis, structure prediction.

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

无 none

**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		40		
课堂表现 Class Performance				
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		

其它（可根据需要  
改写以上评估方  
式）  
**Others (The  
above may be  
modified as  
necessary)**

	30 (每个部分独立撰写实验报告和做口头报告) Experiment report and oral presentation for each independent part.		
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20. 记分方式 **GRADING SYSTEM**

<input type="checkbox"/> A. 十三级等级制 <b>Letter Grading</b> <input checked="" type="checkbox"/> B. 二级记分制（通过/不通过） <b>Pass/Fail Grading</b>
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**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.
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