

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	基因工程学 Genetic Engineering				
2.	授课院系 Originating Department	生物系 Department of Biology				
3.	课程编号 Course Code	BIO401-16				
4.	课程学分 Credit Value	3				
5.	课程类别 Course Type	专业核心课（生物技术专业） Major Core Courses (Biotechnology Major) 专业选修课（生物科学、生物信息学专业） Major Elective Courses (Biological Sciences, Bioinformatics)				
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)	吴柘, 生物系; 第二科研楼 325: wuz@sustech.edu.cn Zhe WU, Department of Biology; Rm 325, Research Building Two.				
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)	30				
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	8		期中, 考试 复习, 考试 Review and Exam	48

12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	BIO320 分子生物学 Molecular Biology
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	本课程为生物系专业必修课，是从事生物学研究的重要基础课程；其他非生物学专业学生也可选修本课程。 This course shall be taken by those majoring in biology and considering to do basic and/or clinical research in the future. It is also suitable for non-specialists to acquire general knowledge of genetic engineering.
14. 其它要求修读本课程的学系 Cross-listing Dept.	None 无

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

为本科生介绍在分子水平对遗传物质的操纵，实现改造和利用生命体系的理论和技术。

To introduce basic concepts and technologies of genetic material manipulation for the purpose of modifying and utilizing living systems.

16. 预达学习成果 Learning Outcomes

通过本课程，学生将系统学习基因工程所涉及的各项基本技术，掌握技术背后的原理，概念，常规操作流程及应用，了解基因工程在基因编辑，功能基因组学等方面的最新进展。

The audience will acquire comprehensive knowledge about the basic principles of genetic engineering, master the principles and procedures behind key tools and techniques of genetic engineering, and get familiar with recent advance in the field such as gene editing and functional genomics.

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.)

Part 1: A brief introduction of Genetic Engineering, 1hrs

Part 2: The basis of genetic engineering 3hrs

Few key facts of Molecular Biology 1hrs

Gene organization, Gene expression and genome 2hrs

Part 3: Working with Nucleic Acids –isolation, quantification and detection 8hrs

Isolation of DNA and RNAs 1hrs

Handling and Quantification of Nucleic acids 1hrs

Detection of Nucleic acids – labeling, gel electrophoresis, hybridization and quantitative PCR. 4hrs

DNA sequencing – 2hrs

Part 4: Cloning a gene of your interest - Key tools in Molecular Cloning 12hrs

A basic procedure of molecular cloning 1hrs

Key tools - PCR 2hrs

- Key tools - Restriction enzymes 2hrs
 - Key tools- DNA/RNA modifying enzymes and DNA/RNA ligase 2hrs
 - Key tools- Host Cell 1hrs
 - Key tools- Plasmid, Phage and Vectors for eukaryotic cells. 2hrs.
 - Selection, screening, and analysis of Recombinants. 2hrs
- Part 5: Different Strategies in gene cloning – 4hrs
- Cloning from DNA and RNA – 1hrs
 - Recombination, Gateway cloning, Golden Gate cloning and Gene synthesis – 3hrs
- Part 6: Genetic engineering in action – application of genetic engineering 6hrs.
- Making Proteins - Making protein in different systems 1hrs
 - Protein Engineering – 1hrs
 - Genetic engineering in plant – 2hrs
 - Genetic engineering in animal – 2hrs
- Part 7: Latest Advance in Genetic Engineering 6hrs
- Gene editing – 2hrs
 - Human Genome Project, Encode Project and Next generation sequencing – 3hrs
 - Ethics in Genetic Engineering – 1hrs

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

Textbook: An Introduction to Genetic Engineering, 3rd edition, Desmond S.T. Nicholl

Further Reading: Molecular Cloning, 4th edition, Michael R. Green

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		10		
课堂表现 Class Performance				
小测验 Quiz		5		
课程项目 Projects				
平时作业 Assignments		25		
期中考试 Mid-Term Test				
期末考试 Final Exam		40		

期末报告 Final Presentation	20		
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**

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

