南方科技大学 SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY

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**	分子微生物学 Molecular Microbiology
2.	**授课院系 Originating Department**	医学院 School of Medicine
3.	**课程编号 Course Code**	MED221
4.	**课程学分 Credit Value**	3
5.	**课程类别 Course Type**	专业基础课 Major Foundational Courses
6.	**授课学期 Semester**	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）**	梁海华，医学院，联系方式：lianghh@sustech.edu.cn, Liang haihua, School of Medicine,lianghh@sustech.edu.cn
9.	**实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact**	
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	32			16 （Seminar）	48

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

本课程旨在从分子水平上介绍人体病原菌在正常及疾病状态下生命活动及其规律的一门学科，主要研究生物大分子的功能、结构、相互作用及其同疾病发生、发展的关系；聚焦于病原体的相关分子模式及机体的识别模式，细菌的免疫系统、分泌系统及毒力系统；病毒工厂和病毒与宿主相互作用的分子基础等。

This course aims to introduce the life activities and laws of human pathogenic bacteria in normal and disease states from the molecular level. It is mainly focused on studying the function, structure, interaction of biological macromolecules and their relationship with the occurrence and development of diseases; It is focused on investigating he relevant molecular patterns of pathogens and the recognition patterns of the body, the immune system, secretion system and virulence system of bacteria; the molecular basis of virus factories and the interaction between viruses and hosts, etc.

16. 预达学习成果 Learning Outcomes

课程结束时，学生将能够：（1）掌握微生物遗传信息分子核酸的精细结构和基因组结构特点；（2）了解遗传信息的传递及调控等基本理论知识；（3）理解分子微生物学研究的基本思路和原理；（4）了解分子微生物学发展概况和进展；（5）掌握分子微生物学研究中的基本技术。

Upon completion of this course students will be able to describe: (1) master the fine structure and genome structure of microbial genetic information molecular nucleic acid; (2) understand the basic theoretical knowledge of genetic information transmission and regulation; (3) understand the basics ideas and principles of molecular microbiology research; (4) understand the development and progress of molecular microbiology; (5) master the basic techniques in molecular microbiology 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.)

一、绪 论 Introduction

1. 1 病原微生物学的发展历史 The history of pathogenic microbiology

1. 2 分子生物学的发展 Development of molecular biology

1. 3 病原微生物的基因组学 Genomics of pathogenic microbes

1. 4 病原微生物的分子检测技术 Molecular detection technology of pathogenic microorganisms

二、细菌分类、命名与鉴定的研究方法 Bacterial classification, nomenclature, and identification

2. 1 细菌分类的研究历史 History of bacterial taxonomy research

2. 2 细菌分类的依据与方法 The basis and method of bacterial classification

2. 3 细菌的命名 Nomenclature of bacteria

2. 4 细菌的鉴定 Identification of bacteria

三、分子微生物学常用的技术 Technology commonly used in molecular microbiology

3. 1 核酸提取技术 Nucleic acid extraction technology

3. 2 分子克隆技术 Molecular cloning technology

3. 3 基因载体 Gene vector

3. 4 基因表达系统 Gene expression system

3. 5 同源重组技术 Homologous recombination technology

四、微生物的基因组学 Microbial genomics

4. 1 基因组学的定义 Definition of genomics

4. 2 致病菌的基因组学 （金黄色葡萄球菌、铜绿假单胞菌等）Genomics of pathogens (Staphylococcus aureus, Pseudomonas aeruginosa et al)

五、微生物的群体生态分子机制 Molecular mechanism of colony ecology of microorganisms

5. 1 宏基因组 Metagenomics

5. 2 群体感应 Quorum sensing

六、新的细菌毒力因子的发现及鉴定 Discovery and identification of new bacterial virulence factors

6. 1 转座子随机突变技术 Transposon random mutagenesis

6. 2 标签标记的突变技术 Tag-tagged mutagenesis

6. 3 基于毒力基因表达调控特点的筛选技术 Screening technology based on virulence gene regulation

七、微生物的特殊存活状态及其分子机制 Special survival state of microorganisms and its molecular mechanisms

7. 1 芽孢的形成、萌发及分子机制 Spore formation, germination, and molecular mechanism

7. 2 生物膜的形成及分子机制 Molecular mechanism of biofilm formation

7. 3 活的但不可培养菌 Live but unculturable bacteria

八、微生物对胁迫环境的应激性反应 Microbial stress responses to stressful environments

8. 1 微生物热应激机制 Mechanism of microorganism response to heat stress

8. 2 微生物酸胁迫应激机制 Mechanism of microorganism response to acid stress

8. 3 微生物氧化胁迫应激机制 Mechanism of microorganism response to oxidative stress

8. 4 微生物其它应激机制 Other mechanisms of microorganism response to stresses

九、新兴分子生物学技术在病原微生物检测中的应用 Application of emerging molecular techniques in the detection of pathogenic microorganisms

9. 1 新一代测序技术 Next generation sequencing technology

9. 2 组学技术 Omics technology

9. 3 新型基因编辑技术 Novel gene editing technology

十、病原体相关分子模式识别的分子机制 Molecular mechanisms of pathogen-associated molecular pattern recognition

10. 1 病原体相关分子模式 Pathogen-associated molecular patterns

10. 2 机体的模式识别受体 Recognition receptors of body pattern

10. 3 PAMP在病原体致病中的意义 Significance of PAMP in pathogenic pathogenicity

十一、微生物水平基因转移 Microbial horizontal gene transfer

11. 1 细菌的可移动遗传元件 Mobile genetic elements of bacteria

11. 2 水平基因转移的方式和机制 Methos and mechanism of horizontal gene transfer

11. 3 水平基因转移的研究方法 Research methods of horizontal gene transfer

11. 4 水平基因转移在生物进化中的作用 The role of horizontal gene transfer in biological evolution

十二、细菌的分泌系统 Bacterial secretion systems

12. 1 I 型分泌系统 Type I secretion system

12. 2 II型分泌系统 Type II secretion system

12. 3 III型分泌系统 Type III secretion system

12. 4 V型分泌系统 Type V secretion system

12. 5 VI型分泌系统 Type VI secretion system

十三、微生物群落与宿主相互作用 Microbial community-host interactions

13. 1 人体各部位的微生物群落特征 Characteristics of microbial communities in various parts of the human body

13. 2 微生物群落与人体代谢 Microbial communities and human metabolism

13. 3 微生物群落与免疫系统 Microbiome and the immune system

十四、病原细菌耐药的分子机理 Molecular mechanism of drug resistance of pathogenic bacteria

14. 1 细菌产生耐药的原因 The reason why bacteria develop resistance

14. 2 耐药分子机制阐述 Elaboration of the molecular mechanism of drug resistance

十五、病毒与宿主细胞相互作用的分子基础 Molecular basis of virus-host interactions

15. 1 病毒受体研究进展 Research progress of viral receptors

15. 2 整合素在病毒感染宿主细胞过程中的作用 The role of integrins in viral infection of host cells

15. 3 宿主细胞泛素化系统与病毒的相互作用 Interaction of host ubiquitination system with viruses

15. 4 干扰素的抗病毒作用 Antiviral effects of interferon

十六、真菌的致病机制及耐药机理 Pathogenic and drug resistance mechanism of fungi

Section	Topic	Hours
1	绪论 Introduction	**3**
2	细菌分类、命名与鉴定的研究方法 Bacterial classification, nomenclature, and identification	3
3	分子微生物学常用的技术 Technology commonly used in molecular microbiology	3
4	微生物的基因组学 Microbial genomics	3
5	微生物的群体生态分子机制 Molecular mechanism of colony ecology of microorganisms	3

6	新的细菌毒力因子的发现及鉴定 Discovery and identification of new bacterial virulence factors	3
7	微生物的特殊存活状态及其分子机制 Special survival state of microorganisms and its molecular mechanisms	3
8	微生物对胁迫环境的应激性反应 Microbial stress responses to stressful environments	3
9	新兴分子生物学技术在病原微生物检测中的应用 Application of emerging molecular techniques in the detection of pathogenic microorganisms	3
10	病原体相关分子模式识别的分子机制 Molecular mechanisms of pathogen-associated molecular pattern recognition	3
11	微生物水平基因转移 Microbial horizontal gene transfer	3
12	细菌的分泌系统 Bacterial secretion systems	3
13	微生物群落与宿主相互作用 Microbial community-host interactions	3
14	病原细菌耐药的分子机理 Molecular mechanism of drug resistance of pathogenic bacteria	3
15	病毒与宿主细胞相互作用的分子基础 Molecular basis of virus-host interactions	3
16	真菌的致病机制及耐药机理 Pathogenic and drug resistance mechanism of fungi	3

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

教材 Textbooks：

1、《微生物学》 沈萍、陈向东主编，高等教育出版社

2、《分子微生物学前沿》饶贤才、胡福泉主编，科学出版社

3、《分子生物学》 Robert F. Weaver 主编，科学出版社

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				
课程项目 Projects				
平时作业 Assignments		40		
期末实验考试 Final lab Exam				
期末考试		50		

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