

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	微生物学 Microbiology				
2.	授课院系 Originating Department	生物系 Department of Biology				
3.	课程编号 Course Code	BIO203				
4.	课程学分 Credit Value	3				
5.	课程类别 Course Type	专业基础课（生物科学、生物技术专业） Major Foundational Courses(Biological Sciences, Biotechnology Majors) 专业选修课（生物信息学专业） Major Elective Courses(Bioinformatics)				
6.	授课学期 Semester	春季 Spring / 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)	孙颖、生物系、联系方式: sun.y@sustech.edu.cn (Dr. Ying Sun, Department of Biology, sun.y@sustech.edu.cn) 欧西军、生物系、联系方式 ouxj@sustech.edu.cn (Dr. Xijun Ou, Department of Biology, ouxj@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)	60				
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	8		8(Oral Presentation by Students)	48

12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	无 None
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**

通过对本课程的学习，使学生能够了解和掌握如下几个方面：

- 1.对微生物的历史与现状有初步了解
- 2.了解微生物的基本结构和特性
- 3.了解微生物的生长和代谢途径
- 4.了解微生物的分子生物学和遗传学特性
- 5.了解微生物与生态环境和人类的关系

This course aims to introduce students to the fundamentals of identification, structure, physiology, and genetics of microorganisms; and the importance of microorganisms in human health, the environment, and in biotechnology.

16. 预达学习成果 **Learning Outcomes**

通过对本课程的学习，使学生能够了解和掌握如下几个方面：

- 6.对微生物的历史与现状有初步了解
- 7.了解微生物的基本结构和特性
- 8.了解微生物的生长和代谢途径
- 9.了解微生物的分子生物学和遗传学特性
- 10.了解微生物与生态环境和人类的关系

(This course aims to introduce students to the fundamentals of identification, structure, physiology, and genetics of microorganisms; and the importance of microorganisms in human health, the environment, and in biotechnology.)

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.)



Week	Periods	Topic
1	2	The history and scope of microbiology
1,2	4	Prokaryotic and eukaryotic cell structure and function
3	2	Quiz
3,4	4	Microbial nutrition and growth
5	2	Control of microorganisms
5	2	Quiz
6	2	Microbial metabolism and bacterial genome expression
7	4	The diversity of the microbial world (Bacteria and Archaea)
8	2	Quiz
9	2	The diversity of the microbial world (Protists and Fungi)
10	2	Infection and pathogenicity
11	2	Quiz
11	2	Oral presentation (by students)
12, 13	4	Non-specific and specific immunity
13	2	Oral presentation (by students)
14	2	Microbial diseases detection and control
15	2	Oral presentation (by students)
15	2	Applied microbiology
16	2	Oral presentation (by students)

Chapter 1: The history and scope of microbiology

- 1.1 Members of the Microbial World
- 1.2 The Discovery of Microorganisms
- 1.3 The Conflict over Spontaneous Generation
- 1.4 The Golden Age of Microbiology
- 1.5 The Development of Industrial Microbiology and Microbial Ecology
- 1.6 The Scope and Relevance of Microbiology
- 1.7 The Future of Microbiology

Key and difficulty: the history, current situation and future of microbiology

Chapter 2: Prokaryotic and eukaryotic cell structure and function

- 3.1 An Overview of Prokaryotic Cell Structure
- 3.2 Prokaryotic Cell Membranes
- 3.3 The Cytoplasmic Matrix
- 3.4 The Nucleoid
- 3.5 Plasmids
- 3.6 The Bacterial Cell Wall
- 3.7 Archaeal Cell Walls
- 3.8 Protein Secretion in Prokaryotes
- 3.9 Components External to the Cell Wall
- 3.10 Chemotaxis
- 3.11 The Bacterial Endospore
- 4.1 An Overview of Eucaryotic Cell Structure
- 4.2 The Plasma Membrane and Membrane Structure
- 4.3 The Cytoplasmic Matrix, Microfilaments, Intermediate Filaments, and Microtubules
- 4.4 Organelles of the Biosynthetic-Secretory and Endocytic Pathways
- 4.5 Eucaryotic Ribosomes
- 4.6 Mitochondria
- 4.7 Chloroplasts

4.8 The Nucleus and Cell Division

4.9 External Cell Coverings

4.10 Cilia and Flagella

4.11 Comparison of Prokaryotic and Eucaryotic Cells

Key and difficulty: the differences between prokaryotic and eukaryotic cell.

Chapter 3: Microbial nutrition and growth

5.1 The Common Nutrient Requirements

5.2 Requirements for Carbon, Hydrogen, Oxygen, and Electrons

5.3 Nutritional Types of Microorganisms

5.4 Requirements for Nitrogen, Phosphorus, and Sulfur

5.5 Growth Factors

5.6 Uptake of Nutrients by the Cell

5.7 Culture Media

5.8 Isolation of Pure Cultures

6.1 The Prokaryotic Cell Cycle

6.2 The Growth Curve

6.3 Measurement of Microbial Growth

6.4 The Continuous Culture of Microorganisms

6.5 The Influence of Environmental Factors on Growth

6.6 Microbial Growth in Natural Environments

Key and difficulty: the basic requirements for microbial growth

Chapter 4: Control of microorganisms

7.1 Definitions of Frequently Used Terms

7.2 The Pattern of Microbial Death

7.3 Conditions Influencing the Effectiveness of Antimicrobial Agents

7.4 The Use of Physical Methods in Control

7.5 The Use of Chemical Agents in Control

7.6 Evaluation of Antimicrobial Agent Effectiveness

Key and difficulty: understand the mechanisms how antibiotics kill microorganisms

Chapter 5: The diversity of the microbial world (Bacteria and Archaea)

Microbial Evolution, Taxonomy, and Diversity

The Archaea

Bacteria: The Deinococci and Nonproteobacteria Gram Negatives

Bacteria: The Proteobacteria

Bacteria: The Low G C Gram Positives

Bacteria: The High G C Gram Positives

Key and difficulty: the characteristics of bacteria and archaea

Chapter 6: The diversity of the microbial world (Protists and Fungi)

The Protists

The Fungi (Eumycota)

Key and difficulty: the characteristics of protists and fungi

Chapter 7: Viruses

16.1 Early Development of Virology

16.2 General Properties of Viruses

16.3 The Structure of Viruses

16.4 Virus Reproduction

16.5 The Cultivation of Viruses

16.6 Virus Purification and Assays

16.7 Principles of Virus Taxonomy

17.1 Classification of Bacterial and Archaeal Viruses

17.2 Virulent Double-Stranded DNA Phages

17.3 Single-Stranded DNA Phages

17.4 RNA Phages

17.5 Temperate Bacteriophages and Lysogeny

17.6 Bacteriophage Genomes

18.1 Taxonomy of Eucaryotic Viruses

- 18.2 Reproduction of Vertebrate Viruses
- 18.3 Cytocidal Infections and Cell Damage
- 18.4 Persistent, Latent, and Slow Virus Infections
- 18.5 Viruses and Cancer
- 18.6 Plant Viruses
- 18.7 Viruses of Fungi and Protists
- 18.8 Insect Viruses
- 18.9 Viroids and Virusoids
- 18.10 Prions

Key and difficulty: the viral cycle

Chapter 8: Infection and pathogenicity

- 33.1 Host-Parasite Relationships
- 33.2 Pathogenesis of Viral Diseases
- 33.3 Overview of Bacterial Pathogenesis
- 33.4 Toxigenicity
- 33.5 Host Defense Against Microbial Invasion
- 33.6 Microbial Mechanisms for Escaping Host Defenses

Key and difficulty: how pathogens cause infection

Chapter 9: Non-specific and specific immunity

- 31.1 Overview of Host Resistance
- 31.2 Cells, Tissues, and Organs of the Immune System
- 31.3 Phagocytosis
- 31.4 Inflammation
- 31.5 Physical Barriers in Nonspecific (Innate) Resistance
- 31.6 Chemical Mediators in Nonspecific (Innate) Resistance
- 32.1 Overview of Specific (Adaptive) Immunity
- 32.2 Antigens
- 32.3 Types of Specific (Adaptive) Immunity

32.4 Recognition of Foreignness

32.5 T Cell Biology

32.6 B Cell Biology

32.7 Antibodies

32.8 Action of Antibodies

32.9 Summary: The Role of Antibodies

and Lymphocytes in Immune Defense

32.10 Acquired Immune Tolerance

32.11 Immune Disorders

Key and difficulty: the differences between innate and adaptive immunity

Chapter 10: Microbial diseases detection and control

35.1 Specimens

35.2 Identification of Microorganisms from Specimens

35.3 Clinical Immunology

35.4 Susceptibility Testing

35.5 Computers in Clinical Microbiology

34.1 The Development of Chemotherapy

34.2 General Characteristics of Antimicrobial Drugs

34.3 Determining the Level of Antimicrobial Activity

34.4 Antibacterial Drugs

34.5 Factors Influencing Antimicrobial Drug Effectiveness

34.6 Drug Resistance

34.7 Antifungal Drugs

34.8 Antiviral Drugs

34.9 Antiprotozoan Drugs

Key and difficulty: how to define pathogens

Chapter 11: Applied microbiology

41.1 Water Purification and Sanitary Analysis

41.2 Wastewater Treatment

41.3 Microorganisms Used in Industrial Microbiology

41.4 Microorganism Growth in Controlled Environments

41.5 Major Products of Industrial Microbiology

41.6 Biodegradation and Bioremediation by Natural Communities

41.7 Bioaugmentation

41.8 Microbes As Products

41.9 Impacts of Microbial Biotechnology

Key and difficulty: microorganisms used in industry

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

Recommended Textbook:

1. Prescott's microbiology, 9th edition

By Joanne, Linda and Christopher (McGraw-Hill International Edition)

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		5		
课堂表现 Class Performance		5		
小测验 Quiz		20		
课程项目 Projects		20		
平时作业 Assignments				
期中考试 Mid-Term Test				
期末考试 Final Exam		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

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.

