

## 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 <b>Course Title</b>	免疫学 Immunology				
2.	授课院系 <b>Originating Department</b>	生物系 Department of Biology				
3.	课程编号 <b>Course Code</b>	BIO405				
4.	课程学分 <b>Credit Value</b>	3				
5.	课程类别 <b>Course Type</b>	专业选修课 Major Elective Courses				
6.	授课学期 <b>Semester</b>	春季 Spring / 夏季 Summer / 秋季 Fall				
7.	授课语言 <b>Teaching Language</b>	专业选修课 (生物科学、生物技术、生物信息学专业) Major Elective Courses(Biological Sciences, Biotechnology, Bioinformatics Majors)				
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) <b>Instructor(s), Affiliation &amp; Contact</b> (For team teaching, please list all instructors)	侯春晖, 生物系; 第一科研楼 308; hou.ch@sustc.edu.cn HOU Chunhui, Department of Biology; Rm 308, 1st Research Bldg.				
9.	实验员/助教、所属学系、联系方式 <b>Tutor/TA(s), Contact</b>	待公布 To be announced				
10.	选课人数限额(可不填) <b>Maximum Enrolment (Optional)</b>					
11.	授课方式 <b>Delivery Method</b>	讲授 <b>Lectures</b>	习题/辅导/讨论 <b>Tutorials</b>	实验/实习 <b>Lab/Practical</b>	其它(请具体注明) <b>Other (Please specify)</b>	总学时 <b>Total</b>
	学时数 <b>Credit Hours</b>	46			2 期中考试 Midterm exam	48

<p>12. 先修课程、其它学习要求 <b>Pre-requisites or Other Academic Requirements</b></p>	<p>BIO206-15 细胞生物学 Cell Biology</p>
<p>13. 后续课程、其它学习规划 <b>Courses for which this course is a pre-requisite</b></p>	<p>本课程为生物学专业选修课，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，对免疫和人类健康有所了解。 This course shall be taken by those majoring in biology and plan to do basic or clinical research in the future. It is also suitable for non-specialists to understand how immune system to work to protect human from the attack of various pathogens.</p>
<p>14. 其它要求修读本课程的学系 <b>Cross-listing Dept.</b></p>	<p>None 无</p>

### 教学大纲及教学日历 SYLLABUS

15. 教学目标 **Course Objectives**

为本科生介绍基本的免疫学概念，免疫反应机理，免疫失调和疾病治疗。

To introduce basic immunology concepts suitable for students at undergraduate level.

16. 预达学习成果 **Learning Outcomes**

通过学习本课程，学生将能掌握免疫学的基本概念，理解免疫反应的过程，认识免疫学方面的问题并为将来的学习工作打下基础。

The overall learning goals for the course are: 1) to master the fundamental concepts of immunology; 2) to understand the process of immune responses; and 3) to develop interest in addressing elusive immunological questions.

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.)**

1. General Introduction (2 hours)

A historical perspective of Immunology

Important concepts for understanding the mammalian immune response

The good, bad and ugly of the immune system

2. Immune System (2 hours)

Cells of the immune system

Primary lymphoid organs-where immune cells develop

Secondary lymphoid organs-where the immune response is initiated

3. B-Cell Receptors & T-Cell Receptors (4 hours)

Receptor-ligand interactions

Common strategies used in many signaling pathways

Frequently encountered signaling pathways

The structure of antibodies

Signal transduction in B cells

T-Cell receptors and signaling

4. Cytokines and Chemokines (4 hours)

General properties of cytokines and chemokines

Six families of cytokines and associated receptor molecules

Cytokine antagonists

Cytokine-related diseases

Cytokine-based therapies

5. Innate Immunity (2 hours)

Anatomical barriers to infection

Phagocytosis

Induced cellular innate responses

Inflammatory responses

Natural killer cells

Regulation and evasion of innate and inflammatory responses

Interactions between the innate and adaptive immune systems

Ubiquity of innate immunity

6. Complement System (2 hours)

The major pathways of complement activation

The diverse functions of complement

The regulation of complement activity

Complement deficiencies

Microbial complement evasion strategies

The evolutionary origins of the complement system

7. Lymphocyte Receptor Genes (2 hours)

The puzzle of immunoglobulin gene structure

Multigene organization of Ig genes

The mechanism of V(D)J recombination



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Southern University  
of Science and  
Technology

B-cell receptor expression

T-cell receptor genes and expression

#### 8. MHC and Antigen Presentation (4 hours)

The structure and function of MHC molecules

General organization and inheritance of the MHC

The role of the MHC and expression patterns

The endogenous pathway of antigen processing and presentation

The exogenous pathway of antigen processing and presentation

Cross-presentation of exogenous antigens

Presentation on nonpeptide antigens

#### 9. T- and B-Cell Development (3 hours)

Early thymocyte development

Positive and negative selection

Lineage commitment

Exit from the thymus and final maturation

Other mechanisms that maintain self-tolerance

Apoptosis

The site of hematopoiesis

B-cell development in the bone marrow

The development of B-1 and marginal-zone B cells

Comparison of B- and T-cell development

#### 10. T- and B-Cell Activation, Differentiation and Memory (3 hours)

T-cell activation and the two signal hypothesis

T-cell differentiation

T-cell memory

T-dependent B-cell responses

T-independent B cell responses

Negative regulation of B cells

11. Immune Response (4 hours)

Antibody-mediated effector functions

Cell-mediated effector responses

Experimental assessment of cell-mediated cytotoxicity

Immune cell behavior before antigen is introduced

Immune cell behavior during the innate immune response

Immune cell behavior during the adaptive immune response

Immune cell behavior in peripheral tissues

12. Allergies, Hypersensitivities and Chronic Inflammation (2 hours)

Allergy: A Type I hypersensitivity reaction

Antibody-mediated (Type II) hypersensitivity reactions

Immune complex-mediated (Type III) hypersensitivity

Delayed-type (Type IV) hypersensitivity (DTH)

Chronic inflammation

13. Tolerance, Autoimmunity and Transplantation (2 hours)

Establishment and maintenance of tolerance

Autoimmunity

Transplantation immunology

14. Infectious Diseases and Vaccines (4 hours)

The importance of barriers to infection and the innate response

Viral infections

Bacterial infections

Parasitic infections

Fungal infections

Emerging and re-emerging infectious diseases

Vaccines

15. Immunodeficiency (2 hours)

Primary immunodeficiency

<p>Secondary immunodeficiency</p> <p>16. Cancer and the Immune System (2 hours)</p> <p>Terminology and common types of cancer</p> <p>Malignant transformation of cells</p> <p>Tumor antigens</p> <p>The immune response to cancer</p> <p>Cancer immunotherapy</p> <p>17. Experimental Systems and Methods (2 hours)</p> <p>Antibody generation</p> <p>Immunoprecipitation-based techniques</p> <p>Microscopic visualization of cells and subcellular structures</p> <p>Flow cytometry</p> <p>Cell cycle analysis</p> <p>Whole animal experimental systems</p> <p>2 hours for Mid-term examination.</p>
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18. 教材及其它参考资料 **Textbook and Supplementary Readings**

Required: Owen, Punt and Stranford, Kuby Immunology, 7th Edition.
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课程评估 **ASSESSMENT**

19. 评估形式 <b>Type of Assessment</b>	评估时间 <b>Time</b>	占考试总成绩百分比 <b>% of final score</b>	违纪处罚 <b>Penalty</b>	备注 <b>Notes</b>
出勤 <b>Attendance</b>		20		
课堂表现 <b>Class Performance</b>				
小测验 <b>Quiz</b>				
课程项目 <b>Projects</b>				
平时作业 <b>Assignments</b>				
期中考试 <b>Mid-Term Test</b>		40		
期末考试 <b>Final Exam</b>		40		
期末报告 <b>Final Presentation</b>				
其它 (可根据需要)				

改写以上评估方式)  
**Others (The above may be modified as necessary)**

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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.

