

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	定量生理学（一）Quantitative Physiology I				
2.	授课院系 Originating Department	生物医学工程系 Department of Biomedical Engineering				
3.	课程编号 Course Code	BMEB311				
4.	课程学分 Credit Value	3				
5.	课程类别 Course Type	专业核心课 Major Core 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)	郭琼玉，助理教授， guoqy@sustc.edu.cn Qiongyu Guo, Assistant Professor, guoqy@sustc.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)					
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	48				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.	

教学大纲及教学日历 SYLLABUS

15. **教学目标 Course Objectives**

使用工程的手段对细胞和分子功能进行定量的理解；本课程利用生理学的概念和数学技术来获得定量分析以及设计细胞体系的能力。

Develop a quantitative understanding of cellular and molecular function using engineering approaches. This course applies biophysical concepts and mathematical techniques to provide the skills needed to quantitatively analyze and ultimately design cellular system.

16. **预达学习成果 Learning Outcomes**

为学生奠定细胞和分子层面的生理学基础，使学生掌握用数学方法和公式理解生理学过程，为学生使用基本细胞生理学理解相关生物医学和临床应用提供理论依据。

We expect that the students will (1) gain a solid understanding of the physiological principles associated with cellular and molecular functions; (2) be able to use mathematical methods and models to interpret physiological processes; and (3) obtain basic concepts of cell physiology to illuminate related biomedical research and clinical applications.

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.)



Lecture 1.	绪论 (3 学时) Introduction
Lecture 2.	化学动力学 (3 学时) Chemical kinetics
Lecture 3.	酶 (3 学时) Enzymes
Lecture 4.	氧气运输 (3 学时) O ₂ transport
Lecture 5.	扩散第一部分 (3 学时) Diffusion Part I
Lecture 6.	扩散第二部分 (3 学时) Diffusion Part II
Lecture 7.	熵 (3 学时) Entropy
Lecture 8.	计算建模 (3 学时) Computational modelling
Lecture 9.	细胞膜和跨膜转运 (3 学时) Membranes and carriers
Lecture 10.	生物电信号 (3 学时) Bioelectricity and Nernst potential
Lecture 11.	静止电位 (3 学时) Resting potential
Lecture 12.	可兴奋细胞膜 (3 学时) Excitable membranes
Lecture 13.	细胞骨架 (3 学时) Cell cytoskeleton
Lecture 14.	肌肉 (3 学时) Motors and muscle
Lecture 15.	生物力学 (3 学时) Mechanobiology
Lecture 16.	Review (3 学时)

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

1. "Medical Physiology: a cellular and molecular approach, 3rd Edition", Boron & Boulpaep, ISBN 9781455743773
2. Coursepack, containing sections from a. J Keener and J Sneyd, "Mathematical Physiology", Springer, 1998, Ch. 1 & 2. ISBN: 0387983813 b. P Nelson, "Biological Physics", Freeman and Company, 2004, Ch. 4 & 12. ISBN: 0716743728
3. This course requires MATLAB for computational modeling of chemical kinetics. SEAS has provided access to a student version of MATLAB, through the Mathworks website. For more information, please see:
<https://portal.seas.columbia.edu/matlab/>

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		0		

课堂表现 Class Performance	0		
小测验 Quiz	0		
课程项目 Projects	0		
平时作业 Assignments	40		
期中考试 Mid-Term Test	30		
期末考试 Final Exam	30		
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

