

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	生物医学工程（一） Biomedical Engineering 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	BMEB313
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	3 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)	刘超，生物医学工程系，助理教授； Chao Liu, Biomedical Engineering, Assistant Professor, liuc33@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)	

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

The objectives of this course are:

- (1) To introduce students to classical and modern biomedical engineering in the field of biomechanics;
- (2) To utilize mathematics, physics, and basic sciences to devise and implement solutions to biomechanical problems;
- (3) To develop the ability to apply concepts to various problems.

本课程教学目标: 1. 从生物力学的领域出发, 给学生介绍传统和现代生物医学工程概念; 2. 使用数学、物理和基础学科来设计解决生物力学问题的方案; 3. 培养学生解决实际问题的能力;

16. 预达学习成果 Learning Outcomes

1. To attain basal knowledge of engineering methodology as applied to biomechanics
2. To attain a holistic appreciation of the various areas in biomechanics and to develop the ability to apply concepts to various problems.

1. 掌握生物力学问题的工程方法的基础知识;
2. 了解和掌握生物力学内的各个领域的概念, 培养解决生物医学工程学科问题的能力。

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: 材料力学-微积分复习 Mechanics of materials - force, calculus review (2 学时)
- Lecture 2: 细胞生物力学-粘弹性 Cellular biomechanics - viscoelasticity (2 学时)
- Lecture 3: 细胞的机械转导与机械刺激 Mechanotransduction and mechanical stimulation of cells (2 学时)
- Lecture 4: 肌肉和运动 Muscles and movement (2 学时)
- Lecture 5: 骨 The bone (2 学时)
- Lecture 6: 骨折力学 Bone fracture mechanics (2 学时)
- Lecture 7: 骨的功能性适应 Bone functional adaptation (2 学时)
- Lecture 8: 肌骨相互作用 Muscle-bone interaction (2 学时)
- Lecture 9: 软结缔组织概述 Soft connective tissues overview (2 学时)
- Lecture 10: 软结缔组织-机械性能 Soft connective tissues - mechanical properties (2 学时)
- Lecture 11: 软结缔组织-粘弹性 Soft connective tissues - viscoelasticity (2 学时)
- Lecture 12: 期中考试 Mid-term test (2 学时)
- Lecture 13: 运动 Locomotion (2 学时) - 课程项目立项 project proposal due
- Lecture 14: 眼生物力学 Ocular biomechanics (2 学时) - 期中考试总结 Mid-term review
- Lecture 15: 呼吸系统-呼吸生物力学 The respiratory system - biomechanics of breathing (2 学时)
- Lecture 16: 呼吸系统-传质 The respiratory system - mass transfer (2 学时)
- Lecture 17: 呼吸系统-颗粒运输 The respiratory system - particle transport (2 学时)
- Lecture 18: 间质流体流动, Darcy 定律 Interstitial fluid flow, Darcy's law (2 学时)
- Lecture 19: 血流动力学-血液流变学 Hemodynamics - blood rheology (2 学时)
- Lecture 20: 血流动力学-大动脉 Hemodynamics - large artery (2 学时)
- Lecture 21: 血流动力学-小血管 Hemodynamics - small vessels (2 学时)
- Lecture 22: 循环系统-心脏 The circulatory system - the heart (2 学时)
- Lecture 23: 课程项目汇报 Project presentations (2 学时)
- Lecture 24: 研究现状及复习 Current research and review (2 学时) 课程项目报告上交 project report

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

1. Introduction to Biomedical Engineering (3rd Ed.), Enderle JD, Bronzino J (eds.), Academic Press, 2011
2. Introductory Biomechanics From Cells to Organisms, 1st Edition, Cambridge University Press

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				
课堂表现 Class Performance				
小测验 Quiz				
课程项目 Projects		20		
平时作业 Assignments				
期中考试 Mid-Term Test		20		
期末考试 Final Exam		60		
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