

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	医学影像系统实验 Medical imaging systems laboratory
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	BMEB 325
4.	课程学分 Credit Value	2
5.	课程类别 Course Type	专业选修课 Major Elective Courses
6.	授课学期 Semester	春季 Spring
7.	授课语言 Teaching Language	中英文 English and 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)	彭诚, 工程师, 生物医学工程系 台州楼 319 室 pengc@sustc.edu.cn 0755-8801-8713 PENG Cheng, Engineer, Biomedical Engineering Rm. 319, Taizhou Hall pengc@sustc.edu.cn 0755-8801-8713
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)	20

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			64		64
12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	医学影像系统原理. Principles of medical imaging system				
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

结合医学影像系统理论教学，对 X-CT、磁共振成像和超声成像进行实践；并介绍和实验 X-CT 的仿真与重建方法、磁共振成像仿真与超声成像体模测量。

Accompany with the course 'Principles of medical imaging', this course includes the practicums of X-CT, MRI and ultrasound imaging. Also the basic simulation and image reconstructions of X-CT and MRI will be introduced and practiced. The phantom measurements by ultrasound imaging system will be performed.

16. 预达学习成果 Learning Outcomes

通过本实验课程，学生将对 X-CT、磁共振成像和超声成像具有直接体验。掌握基本的 X-CT 仿真和重建方法、磁共振成像，加深对 M 型、B 型和多普勒超声成像的基本原理和成像效果的了解。

After completing this course, students should get to know the imaging procedures of the main medical imaging systems: X-CT, MRI and ultrasound imaging. They should also master a few basic simulation and reconstruction methods of X-CT and MRI.

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.)

- Lab 1. (4 hours) 数字图像基础和 Matlab 基础练习; Digital image basics and Matlab basics
- Lab 2. (4 hours) 时(空)域和频域, 傅里叶变换和滤波器; Time/space domain and frequency domain, Fourier transform and filters
- Lab 3. (4 hours) X-CT 1: 投影仿真 (Radon 变换); X-CT 1: Projection simulation (Radon transform)
- Lab 4. (4 hours) X-CT 2: 图像重建; X-CT 2: Image reconstruction (Parallel beams)
- Lab 5. (4 hours) X-CT 3: MicroCT 动手实践; X-CT 3: Hands-on practice (MicroCT)
- Lab 6. (4 hours) X 光成像图像质量评估及其他; Radiograph image quality evaluation and others
- Lab 7. (4 hours) MRI 1: NMR 仿真; MRI 1: NMR simulation
- Lab 8. (4 hours) MRI 2: 图像重建; MRI 2: Imaging reconstruction
- Lab 9. (4 hours) MRI 3: 动手实践; MRI 3: Hands-on practice - group 1
- Lab 10. (4 hours) MRI 3: 动手实践; MRI 3: Hands-on practice - group 2
- Lab 11. (4 hours) 超声成像 1: 人体各部位成像 (B 型、M 型、多普勒超声); Ultrasound imaging 1: Physical examination (B mode, M mode, Doppler mode)
- Lab 12. (4 hours) 超声成像 2: 仿体测量; Ultrasound imaging 2: Phantom measurement
- Lab 13. (4 hours) 图像处理基础-1; Medical image processing basics - 1
- Lab 14. (4 hours) 图像处理基础-2; Medical image processing basics - 2
- Lab 15. (4 hours) 医院影像科现场教学; Field trip to hospital
- Final Presentation (4 hours) 期末报告

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

推荐参考资料:

Gengsheng Zeng. Medical Image Reconstruction A Conceptual Tutorial. 高等教育出版社. 2010

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		10		
小测验 Quiz				

课程项目 Projects			
平时作业 Assignments	60		
期中考试 Mid-Term Test			
期末考试 Final Exam			
期末报告 Final Presentation	20		
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

