

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	生物医学工程设计（一） Biomedical Engineering Design 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	BMEB 422
4.	课程学分 Credit Value	4
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)	责任教师：彭诚，生物医学工程系 pengc@sustech.edu.cn 学术导师：生物医学工程系所有老师均参与指导
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	32		64		96

12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	N/A
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	生物医学工程设计 II
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

生物医学工程设计是生物医学工程专业学生的“顶点”设计课程，共两学期。在本课程中，学生们设计有创新性的生物医学器件、系统或产品，能够满足一系列预设的标准。学生需要考虑设计的各个方面并将其推向市场。在第二个学期结束时，学生可以完成原型机制作和相应的验证。

在完成设计过程中，学生将

1. 具有分析问题的能力；
2. 能够用头脑风暴方式找到解决问题的方法；
3. 确定最终设计方案并能够通过严苛的设计审查；
4. 能够用科学的方法计划和管理项目；
5. 能够运用理论分析手段支持设计内容；
6. 针对以上 1-5 项，提交书面文件和口头报告；
7. 理解现实世界中伦理的含义；
8. 明白知识产权在现代竞争社会中的重要性。

Biomedical Engineering Design is the "Capstone" project experience of biomedical engineering students. The overarching goal of this two-semester class sequence is for you to design a novel biomedical device/system/product that satisfies a set of pre-defined criteria. By the end of the second semester, the students will have produced multiple prototypes, and conduct the verification of their design.

During this course, the students will learn and practice the design process, as well as exploring the commercialization aspects of biomedical product development, so as to

1. Develop problem specifications;
2. Brainstorm alternative solutions to problems;
3. Select a final design approach and defend a critical design review;
4. Understand how to schedule, plan and manage a project using CPM or PERT methods;
5. Conduct analysis to substantiate design concepts;
6. Deliver written documentation and oral presentations of items 1-5;
7. Understand the ethical implications of engineering in real world;
8. Understand importance of intellectual property in the modern competitive world.

16. 预达学习成果 Learning Outcomes

完成本课程后，学生将可以：

1. 在现实约束条件下（如经济、环境、社会、政治、伦理、健康和安全性、可制造性及可持续发展性）设计系统、原件或流程，以满足预定需求；
2. 工程知识：能够将数学、自然科学、工程基础和专业知识用于解决复杂工程问题。
3. 问题分析：能够应用数学、自然科学和工程科学的基本原理，识别、表达、并通过文献研究分析复杂工程问题，以获得有效结论。

4. 设计/开发解决方案：能够设计针对复杂工程问题的解决方案，设计满足特定需求的系统、单元（部件）或工艺流程，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。
5. 环境和可持续发展：能够理解和评价针对复杂工程问题的工程实践对环境、社会可持续发展的影响。
6. 职业规范：具有人文社会科学素养、社会责任感，能够在工程实践中理解并遵守工程职业道德和规范，履行责任。
7. 个人和团队：能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色。

Upon completion of this course, the students should be able to:

1. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
2. Apply knowledge of mathematics, science, and engineering.
3. Identify, formulate, and solve engineering problems.
4. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
5. Have the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
6. Have an understanding of professional and ethical responsibility.
7. Collaboratively function on multidisciplinary teams;

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.)

学生选择本系一位教授为学术导师，每周需要与学术导师进行 30-60 分钟的项目进展讨论、交流，并且做好记录。在期中和期末进行项目口头汇报，在期末提交项目中期研究报告/论文。

学生还需要参加工学院组织的综合设计讲座，内容包含学生在进行产品设计可能碰到的各种实际问题，如生产管理与供应链、Business Principles and Key Trend、知识产权、工程伦理与专业素质培养等。

Every student needs to find a faculty advisor. Throughout the term, students need to have a design review meeting with their faculty advisors per week. During the meetings students need to present their project work to that time as well as the plans moving forward. All the presentation and discussion in the design review meetings should be well recorded by students.

All students need to give mid-term and final presentations by the midpoint and the final of the semester.

A series of lectures will be provided to the students by College of Engineering, aiming to introduce the common information in product design and commercialization, such as production management and supply chain, business principles and key trend, intellectual property, engineering ethics and professional quality training etc.

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

教材为各老师课件

No fixed textbook. The professors' lecture slides will be used as references.

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		24		
课程项目 Projects				
平时作业 Assignments				
期中考试 Mid-Term Test				
期末考试 Final Exam				
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)		项目汇报（22%） 专业表现（24%） 技术表现（10%） 研究报告（20%）		

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

具体评分标准：

序号	项目	内容	分数	参评人员
1	项目汇报	期中与期末 PPT 口头汇报	22	导师、责任教师、学生参加评分，导师、责任教师 + 占 50%，学生占 50%
2	课堂测验	参加系列讲座以及系列讲座课堂测验	24	责任教师（课堂测验与出勤各占 12 分，特殊情况可以补考）
3	专业表现	参加每周项目汇报 项目交流与讨论	24	学术导师
4	技术表现	创造力，分析能力，设计能力和综合能力	10	学术导师、责任教师
5	研究报告	项目中期研究报告/论文 (项目设计、理论分析与计算)	20	学术导师、责任教师
	总分		100	

