

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.

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|-----|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------------------|--------------------------------------------|---------------------|
| 1. | 课程名称 Course Title | INTRODUCTION TO MEMS | | | | |
| 2. | 授课院系 Originating Department | Electronic Engineering | | | | |
| 3. | 课程编号 Course Code | EE306 | | | | |
| 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 | 春季 Spring | | | | |
| 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) | Jaewon PARK Assistant Professor Dept. of Electronic and Electronic Engineering Rm.324, No.2 Research Bldg. jwpark@sustech.edu.cn 0755-8801-8500 | | | | |
| 9. | 实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact | Song Huixue Dept. of Electronic and Electronic Engineering TA - songhx@mail.sustc.edu.cn | | | | |
| 10. | 选课人数限额(可不填) Maximum Enrolment (Optional) | 100 | | | | |
| 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 | | 32 | | 64 |

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|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements</p> | <p>PHY105B General Physics B (II)</p> |
| <p>13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite</p> | <p>This course is a microelectronic core course. This course introduces 1) the principles of typical MEMS transducers and sensors, and 2) the design and fabrication of MEMS devices. In addition to theoretical models, this course emphasizes on the exploration of commercially viable MEMS products for applications in electronics, sensors, communications, and biomedical engineering.</p> |
| <p>14. 其它要求修读本课程的学系 Cross-listing Dept.</p> | <p>None</p> |

教学大纲及教学日历 SYLLABUS

15. **教学目标 Course Objectives**

This course topics covered in this course include various transduction and sensing mechanisms (capacitive, piezoelectric, piezoresistive, magnetic, and thermal), and MEMS fabrication technologies (silicon bulk and surface micromachining, planar thin-film processing, wafer bonding, etching, and lithography). Upon completion, this course enables students to have an in-depth understanding of many MEMS products such as accelerometers, gyroscopes, pressure sensor, actuators, microphone and microfluidics devices. It also provides students with the knowledge of MEMS processes and skills to design and optimize novel MEMS products for new applications.

16. **预达学习成果 Learning Outcomes**

After completing this course, the students will be able to:

- 1) Understand overall flow of MEMS development
- 2) Familiarize themselves to various MEMS devices such as accelerometers, gyroscopes, pressure sensors and etc.
- 3) Design basic MEMS devices
- 4) Understand major fabrication techniques used in the MEMS field and find proper fabrication methods for the designed MEMS devices
- 5) Come up with creative ideas in using micromachining and MEMS devices in new 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.)

- 1.Introduction / History and future trends of MEMS
- 2.Overview of Microfabrication Technology I
- 3.Overview of Microfabrication Technology II
- 4.Silicon bulk micromachining
- 5.Surface micromachining
- 6.Review of electrical and mechanical concepts
- 7.Electrostatic sensors and actuators
- 8.Thermal sensors and actuators
- 9.Piezoresistive sensors
- 10.Magnetic sensing and actuation
- 11.Piezoelectric sensors and actuators
- 12.Other sensing methods
- 13.Final Presentation
- 14.Final Presentation
- 15.Seminar - TBD

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

Foundations of MEMS

Author: Chang Liu

Edition: 2nd

Publisher: Prentice Hall, Publication Date: March18, 2011

Internet reference materials for MEMS: <http://www.memscentral.com/>

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 | | 5 | | |
| 课堂表现 Class Performance | | | | |
| 小测验 Quiz | | | | |
| 课程项目 Projects | | | | |
| 平时作业 Assignments | | 10 | | |
| 期中考试 | | 30 | | |

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)**

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|-------------|----|--|--|
| | | | |
| | | | |
| | 30 | | |
| Lab session | 25 | | |

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