

## 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 <b>Course Title</b>	微能源与微系统前沿 <b>Advances in Micro Energy and Micro Systems</b>				
2.	授课院系 <b>Originating Department</b>	电子与电气工程系 Department of Electrical & Electronic Engineering				
3.	课程编号 <b>Course Code</b>	EE415				
4.	课程学分 <b>Credit Value</b>	2				
5.	课程类别 <b>Course Type</b>	专业选修课 Major Elective Courses				
6.	授课学期 <b>Semester</b>	春季 Spring				
7.	授课语言 <b>Teaching Language</b>	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) <b>Instructor(s), Affiliation &amp; Contact</b> (For team teaching, please list all instructors)	汪飞, 副教授, 电子与电气工程系, Email: <a href="mailto:wangf@sustech.edu.cn">wangf@sustech.edu.cn</a> Fei Wang, Associate Professor, Department of Electrical & Electronic Engineering, Email: <a href="mailto:wangf@sustech.edu.cn">wangf@sustech.edu.cn</a>				
9.	实验员/助教、所属学系、联系方式 <b>Tutor/TA(s), Contact</b>	张玉龙, 助教, 电子与电气工程系, Email: <a href="mailto:zhangyl3@mail.sustech.edu.cn">zhangyl3@mail.sustech.edu.cn</a> Mr. Yulong Zhang, Department of Electrical & Electronic Engineering, Email: <a href="mailto:zhangyl3@mail.sustech.edu.cn">zhangyl3@mail.sustech.edu.cn</a>				
10.	选课人数限额(可不填) <b>Maximum Enrolment (Optional)</b>	20				
11.	授课方式 <b>Delivery Method</b>	讲授 <b>Lectures</b>	习题/辅导/讨论 <b>Tutorials</b>	实验/实习 <b>Lab/Practical</b>	其它(请具体注明) <b>Other (Please specify)</b>	总学时 <b>Total</b>
	学时数 <b>Credit Hours</b>	16		32		48

12. 先修课程、其它学习要求 <b>Pre-requisites or Other Academic Requirements</b>	无 NA
13. 后续课程、其它学习规划 <b>Courses for which this course is a pre-requisite</b>	
14. 其它要求修读本课程的学系 <b>Cross-listing Dept.</b>	无 None

### 教学大纲及教学日历 SYLLABUS

15. **教学目标 Course Objectives**

本课程目标是训练学生理论与实践相结合，促进学生掌握微能源与微系统的基础知识及国际前沿动态，并学习相关的微系统加工技术及工艺原理。

This course aims to train the students with lectures combined with lab practice. Through this training, students will learn the basic knowledge and advances of micro energy and micro systems and master the basics of fabrication processes and technique principle of micro system devices.

16. **预达学习成果 Learning Outcomes**

通过本课，学生将理解一些微能源器件与微系统的基本原理；了解压电式、静电式、电磁式能量采集器件的设计与加工流程；了解气体传感器、湿度传感器、超级电容器的设计与加工流程；获得旋涂及喷涂驻极体材料的动手操作技能；获得湿度传感测试、气敏传感测试的实验技能；获得利用振动台测试能量采集器件的实验技能；还将能综述微能源与微系统的最新进展。

After this course, the students should be able to,

1. Understand fundamental of a few basic micro energy devices and microsystems;
2. Know the design and fabrication of the piezoelectric, electrostatic, electromagnetic energy harvesters;
3. Know the design and fabrication of the gas sensors, humidity sensors and supercapacitors;
4. Gain the hand-on experience of the spin-coating and spray coating of electret layer;
5. Gain the hand-on experience of the humidity sensing and gas sensing test;
6. Gain the hand-on experience of the measurement on vibration shaker for energy harvester;
7. Review the state-of-the art of the development on the micro energy and micro systems.

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.)**

Lectures (2 hours for each)

Week 1. Introduction on the course

Week 3. The history and latest development of energy harvester and microsystems

Week 5. How to read scientific articles and how to write a review report?

Week 7. The development of the gas sensors and the humidity sensors.

Week 9. The development of supercapacitors and the biosensors.

Week 11. General review of the microfabrication technologies.

Week 13. Measurement and Characterization tools for micro energy and micro systems.

Week 15. A few important softwares for the MEMS research. Summary for the course.

Labs (8 hours for each):

1. Fabrication and Characterization of GO based Humidity sensors;
2. Spin-coating and Spray-coating of electrets; Corona charging and measurement of surface charge;
3. Measurement of Vibration base Energy harvester with shaker;
4. Fabrication and Characterization of Semiconductor Gas sensors.

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

None

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		30		
小测验 Quiz				
课程项目 Projects		40		
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)**

	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**

