课程大纲
COURSE SYLLABUS

1.	**课程代码/名称** **Course Code/Title**	**柔性电子制造：材料、器件与工艺** **Flexible and Wearable Electronics: Design and Fabrication Techniques**
2.	**课程性质** **Compulsory/Elective**	专业选修课 Major Elective Courses
3.	**课程学分/学时** **Course Credit/Hours**	3/48
4.	**授课语言** **Teaching Language**	中英双语 English & Chinese
5.	**授课教师** **Instructor(s)**	丘龙斌，助理教授，机械与能源工程系， Email: qiulb@sustc.edu.cn Longbin Qiu, Assistant Professor, Department of Mechanical and Energy Engineering, Email: qiulb@sustech.edu.cn
6.	**是否面向本科生开放** **Open to undergraduates or not**	是 Yes
7.	**先修要求** **Pre-requisites**	（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.） 本科生：材料科学基础或者材料科学与工程基础或者工程材料-科学、工艺与设计 研究生：无

8. 教学目标
Course Objectives

（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）

1）研究生教学目标：通过该课程的教学使学生了解柔性电子器件的技术发展及应用的最新趋势，掌握柔性电子器件设计及制造的基础理论，了解相关器件的工作原理及材料制备技术，提高学生的创新思维意识，培养学生的工程分析及设计能力。通过该课程的教学使研究生掌握非传统制造领域，尤其是柔性电子制造领域的关键技术，为后续工作中专业能力的提升及发展奠定一定的基础。

The objectives of this course: To enable students to understand the latest trend of the development and application of flexible and wearable electronic devices, master the design and fabrication principle of flexible electronics, understand the basic working principle of related devices and the fabrication techniques for the functional materials, improve students' sense of innovative thinking, and cultivate students' engineering analysis and design capabilities. Through the teaching of this course, graduate students can master the key technologies in non-traditional manufacturing fields, especially in the field of flexible electronics fabrication, and lay a certain foundation for the improvement and development of professional ability in subsequent work.

2）本科生教学目标：让本科生了解柔性电子器件的技术原理与应用领域，以及掌握柔性电子器件的功能性材料加工技术，最终为学生今后从事与纳米制造研究、柔性电子器件等相关研发或者生产经营活动奠定良好理论基础。

Course objectives for undergraduates: To enable undergraduates to understand the design and fabrication principles and application scope of flexible electronics, and to master the techniques for the flexible electronic and functional materials fabrication. Eventually the course will lay a good theoretical foundation for students who expect to engage in R&D and/or production and operation activities related to nano-fabrication and flexible electronics, etc.

9. 教学方法
Teaching Methods

（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）

教室讲授，使用多媒体授课，进行案例解析，并设置课程报告环节，
Class room lecture, applying multimedia, case and reference study, class project (writing report + oral presentation)

对本科生和研究生使用相同方法，不同评估标准（课后作业和课程项目难度不同）。
Use the same teaching method for both undergraduate and graduate students, but with different assessment criteria (different difficulty in homework and course projects).

10. 教学内容
Course Contents
（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）

Section 1 (2 hours)	Introduction of flexible electronic technologies 柔性电子技术概述
Section 2 (6 hours)	Functional Materials for flexible electronics 柔性电子器件功能材料
Section 3 (10 hours)	Flexible functional devices: thin film transistors, sensors, solar cells etc. 柔性功能器件：薄膜晶体管、传感器、太阳能电池及可穿戴能源织物
Section 4 (4 hours)	Flexible silicon nanoelectronics 柔性硅基纳米电子器件
Section 5 (4 hours)	The mechanics of flexible electronic with layer by layer structure 柔性电子多层膜结构力学与表征
Section 6 (2 hours)	Techniques for thin film deposition 薄膜沉积技术
Section 7 (4 hours)	The encapsulation for flexible electronics 柔性电子器件封装
Section 8 (4 hours)	The micro-nano patterning techniques 微纳图案化工艺
Section 9 (2 hours)	The roll-to-roll fabrication techniques 卷对卷制造技术
Section 10 (10 hours)	The application of flexible electronics 柔性电子器件的应用

11. 课程考核
Course Assessment

①考核形式 Form of examination：考核 Assessment

②分数构成 grading policy：a.出勤 Attendance 5%; b.课堂表现 Class performance 10%; c.课程项目 Projects 40%; d.期末报告 Final report/presentation 45%

③如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）

本科生考核分数构成如下 Grading policy for ：

a.出勤 Attendance 15%; b.课堂表现 Class performance 15%; c.课程项目 Projects 40%; d.期末报告 Final presentation 30%

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

教材及参考材料：
《柔性电子制造：材料、器件与工艺》，尹周平，黄勇安 编著，科学出版社
Flexible and Wearable Electronics: Design and Fabrication Techniques, Haider K. Raad, United Scholars Publications, USA