

课程大纲

COURSE SYLLABUS

1.	课程名称(中英文) Course Title(Chinese and English)	BioMEMS and Lab-on-a-Chip
2.	课程类别 Course Type	Elective
3.	授课院系 Originating Department	Electrical and Electronic Engineering
4.	课程学时 Credit Hours	2
5.	课程学分 Credit Value	2
6.	授课语言 Teaching Language	English
7.	授课教师 Instructor(s)	Jaewon Park
8.	先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	The class will be offered for both Master and Ph.D students and will be taught together.
9.	教学目标 Course Objectives	
	<p>The field of BioMEMS and Lab-on-a-Chip has seen tremendous growth in the past several years. The Lab-on-a-Chip concept and its advantages will be introduced. Various microfabrication techniques that are commonly used in BioMEMS device fabrications will be taught. Microfluidics, which is the foundation for most of the applications, will be covered followed by the various chemical and biomedical applications such as separation, minimally invasive diagnosis tools, implantable devices, drug delivery, and microsystems for cellular studies and tissue engineering. Students will gain a broad perspective in the area of miniaturized systems for biomedical and chemical applications.</p>	
10.	教学方法及授课创新点 Teaching Methods and Innovations	
	<p>The class will be taught by combining lectures and active discussions.</p> <p>Students will be asked to actively participate in discussion on handout research papers. Students will be trained on reading research papers with analytical point of view and learn how others look at the same issues with different perspectives. The final term project paper and presentation will allow students to express their opinions and to practice writing their scientific ideas/concepts.</p>	

11.	教学内容及学时分配 Course Contents and Course Schedule
	<p>(Tentative, subject to change)</p> <ol style="list-style-type: none"> 1. Introduction to MEMS and BioMEMS 2. Microfabrication techniques for MEMS 3. Microfabrication for BioMEMS 4. MEMS Actuators and Principles of Microfluidics 5. Surface Chemistry 6. Microfluidic devices 7. Chemical analysis systems 8. Seminar - TBD 9. Midterm 10. Implantable devices 11. Microsystems for DNA/Protein analysis <ul style="list-style-type: none"> Minimally invasive diagnosis tools 12. Neural Interface <ul style="list-style-type: none"> Microsystems for Cellular Studies 13. Applications of MEMS in Surgery <ul style="list-style-type: none"> BioMEMS packaging 14. Nanotechnology in BioMEMS 15. Term project presentation I 16. Term project presentation II 17. Seminar - TBD 18. Final Exam
12.	课程考核 Course Assessment
	<p>Class participation: 10%</p> <p>Midterm: 30%</p> <p>Final: 30%</p> <p>Term project paper and presentation: 30%</p>
13.	教材及其它参考资料 Textbook and Supplementary Readings

Textbook: Lecture notes and handouts

Supplement reading materials

- A. Manz, H. Becker, *Microsystem Technology in Chemistry and Life Sciences*, Springer
- M.J. Madou, *Fundamentals of Microfabrication*, CRC Press
- N.-T. Nguyen, S. Wereley, *Fundamentals and Applications of Microfluidics*, Artech House Publishers.