BiS 673 **Spring 2018**

Prof. Je-Kyun Park
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Room 220, E16 Building
Mon & Wed, 13:00-14:15
http://nanobio.kaist.ac.kr

BiS 673 Bioelectronic Devices

Synopsis

This course covers advanced topics in the design and industrial application of biological detection technologies for biosensor, DNA chip, protein chip, cell chip, and lab-on-a-chip. Fundamental principles in these areas have emphasized to understand the biological recognition mechanism encompassing all the scales of life—from biomolecules to cells, tissues, and organisms. To exploit the transducer technologies for biomolecular and cellular assay system, topics also include a state-of-the-art technology for microfluidic device, micro total analysis system (μTAS) and an integrated nano/micro system. On the basis of recent reports in biomolecular manipulation, separation, and detection technologies, each student is required to select one presentation topic and lead one discussion session.

Credit

3 units (3:0:3)

Prerequisite

Graduate standing is required. Recommended prerequisite courses include BiS 571, or equivalent. (*Typical class size is between 10 and 15 students*.)

Grading

Presentation 20%, Exam. 50%, Final Term Paper 30%

Office Hours

Mon & Wed 14:30-16:00

Teaching Assistants

Jaejung Son (sonjj7@kaist.ac.kr, Tel.4355 or 5355, Room: 801, E16); Young Lee (youngleekaist); Juhwan Park (juhwan3275); Hwisoo Kim (hwiss)

Textbook

Albert Folch (2012). *Introduction to BioMEMS*, CRC Press, ISBN: 978-1-4398-1839-8, http://www.crcpress.com/product/isbn/9781439818398

References

1. I. Willner and E. Katz (eds.) (2005). *Bioelectronics: From Theory to Applications*, Wiley-VCH, ISBN: 3527306900.
2. M. Zourob, S. Elwary, A. Turner (eds.) (2008). *Principles of Bacterial Detection: Biosensors, Recognition Receptors and Microsystems*, Springer Science+Business Media, LLC, e-ISBN: 978-0-387-75113-9.

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Lecture Schedule

Week	Topics	Contents	Chapter
1	*Introduction*	Course Outline	
2	*Microfabrication Overview for Biodevices*	PDMS and Hydrogel Devices	1
3	*Bioelectronic Interfacing*	Micro- and Nanopatterning for Proteins and Cells	2
4	*Microfluidic Diagnostics*	Microfluidics Fundamentals	3
5		Microfluidic Components & Lab-on-a-Chip	3
6		Microfluidic Immunoassays	4
7		Point-of-Care Diagnostics	4
8	*Midterm Exam.*		
9	*Cell-based Chip & Detection*	Flow Cytometers & Cell Sorting	5
10		Cell Trapping & Single Cell Analysis	5
11		Cells-on-a-Chip & Patch Clamp Chip	5
12	*Biomicrosystems Technologies & Applications*	BioMEMS for Cell Biology	6
13		BioMEMS for Neuroscience	6
14		Tissue & Stem Cell Microengineering	7
15		Implantable Microdevices	8
16	*Final Exam.*		