

**BiS 771**

Prof. Je-Kyun Park  
Room 801, E16 Building  
jekyun@kaist.ac.kr (Tel: 4315)

**Spring 2004**

Room 220, E16 Building  
Tue, Thu 10:30-12:00  
<http://nanobio.kaist.ac.kr>

**BiS 771**  
**Nanobiotechnology**

**Synopsis**

This course deals with the most up-to-date application of nanotechnology to the life sciences. Lecture is focused on the nanofabrication. This course also covers the following discussion topics in the field of nanobiotechnology: one is the application of nano-scaled tools to biological systems and the other is the use of biological systems as templates in the development of novel nano-scaled products. Special applications include nanomedicine, nanobiosensor, nanofluidics, and nano-bio devices and systems. Each student is required to select one application topic and lead one discussion session.

**Credit**

3 units (3:0:3)

**Prerequisite**

Graduate standing is required. Recommended prerequisite courses include BiS 521, BiS 523, BiS 571, or equivalent.

**Grading**

Homeworks 20%, Midterm Exam. 30%  
Presentation & Term Paper 50%

**Office Hours**

Tue, Thu 13:00-14:30

**Teaching Assistant**

Joo H. Kang (kohinoor@kaist.ac.kr, Tel: 5355, Room 802, E16)

**Textbook**

Lecture Notes and Paper Selections

**References**

1. *Scientific American*, Volume 285, Number 3 (September 2001)
2. *Nature Biotechnology*, Volume 21, Number 10 (October 2003)
3. Ratner, M. Ratner, D. (2003) *Nanotechnology A Gentle Introduction to the Next Big Idea*, Prentice Hall, ISBN: 0131014005

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Lecture Schedule

Week	Topics	Contents
1	<i>Introduction</i>	Course Outline
2		Biological Problems
3	<i>Technology: Nanofabrications</i>	MEMS/ NEMS
4		Atomic Force Microscopy (AFM)
5		Self-assembled Monolayers/ Dip-Pen Nanolithography
6		Soft Lithography/ PDMS Molding
7		Nanoparticles, Nanowires, Nanotubes
8		<i>Midterm Exam.</i>
9	<i>Application I: Nanomedicine, Nanobiosensor, Nanofluidics</i>	Nanocrystals in Biological Detection
10		Electrochemical DNA Sensors
11		Integrated Nanoliter Systems
12	<i>Application II: Nano-Bio Devices &amp; Systems</i>	Fabrication of Novel Biomaterials through Molecular Self-assembly
13		Small-scale Systems for <i>in vivo</i> Drug Delivery
14		Future Nanomachine
15	<i>Perspective</i>	Commercializing Nanobiotechnology
16	<i>Summary</i>	