Fall Semester, 2009

SYLLABUS

Nanobiotechnology

(나노바이오공학, Course Number : 461.612)

Instructor : Tai Hyun Park (박 태 현)

Lecture Schedule

1. Introduction to nanobiotechnology
2. What is nano?
3. Biomolecules
4. DNA nanotechnology
5. DNA computing
6. Nanoparticle
7. Biomagnetic nanoparticle
8. Nanowire and Nanotube
9. Biosensors, SPR, & QCM
10. Receptors and signal transduction
11. Electronic noses and olfactory system
12. Cell culture on a chip and anti-apoptosis engineering

Lecture Note

http://biotech.snu.ac.kr

References

1. C. M. Niemeyer and C. A. Mirkin, “Nanobiotechnology”, Wiley-VCH (2004)
2. C. A. Mirkin and C. M. Niemeyer, “Nanobiotechnology II”, Wiley-VCH (2007)

Midterm and Final Exam

Midterm and Final will be closed book.
In general, exams cannot be made-up.

Grades

Midterm : 40%
Final : 30%
Presentation : 20%
Attendence : 10%

Office Hours

Tuesday and Thursday 10:30-12:00 am
Office: 302-918, Phone: 880-8020
E-mail: thpark@snu.ac.kr

Nanobiotechnology is

---- the application of nanotechnology-the study of things on the "nano" scale, where a nanometer is one billionth of a meter (10^{-9} meter)-within the life sciences.

--- The primary goal of fusing these industries is to invent devices that combine engineering and biology-thus, bioengineering of the super-small. With applications already under way, near-term results are expected.

The potential impact of products built around nanobiotechnology

» Tiny machines that roam the body, finding and destroying viruses or cancer cells

» Superfast drug discovery at a fraction of today's cost

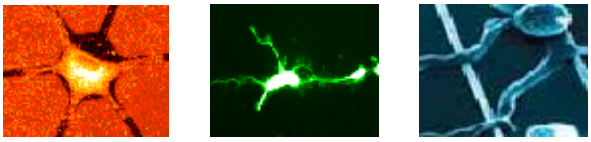
» Ultraspecific drug targeting

» Biosensors (for pollutants) not possible with current technology

» Medical devices that use biomotors with moving parts no larger than a protein

http://www.nbtc.cornell.edu/edu_course_streams.htm

Spring 2004



Nanobiotechnology

Below are links to the archived videos from the Nanobiotechnology Course, Spring 2004.

Click on the lecture title to view.

You will need Real Player installed on your computer

Click here for more information

Date	Lecture Title	Lecturer(s)
January 27	Introduction to course & nanobiotechnology	Batt, Waldron
January 29	Communication/design	Batt
February 3	Biology	Pollack
February 5	Biological problem (video not available)	Helmann
February 10	Biological problem	Kraus
February 12	Biological problem	Sheetz
February 17	Introduction to microfabrication	Skvarla
February	In-class design work	Batt, Waldron

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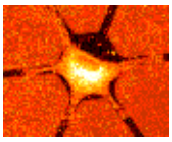
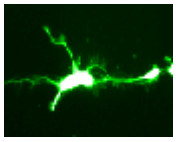
February 24	Soft materials	Ober
February 26	Combinatorial materials	McQuade
March 2	Combinatorial materials	McQuade
March 4*	Microscopy	Zipfel
March 9	Biology	Batt
March 11	Optics	Lipson
March 16	Fluidics	Stroock
March 18*	MEMS	Lal
March 30	Nano money	Herbert
April 1	Nanofluidic devices	Craighead
April 6	Microfluidic Devices for the Study of Chemotaxis	Bodenschatz
April 8	Nanostructured Hybrids for Sensing & Separation	Wiesner
April 13	Carbon nanofibers for intracellular applications	Simpson
April 15*	Innovations in chemical sensors and biosensors	MacCraith
April 20	Mechanical manipulation of single biological molecules	Wang
April 22	Tales from Topological Oceans	Austin
April 27*	Project presentations	students
April 29	Project presentations	sutdents
May 4	Project presentations	students
May 6	Assessment	students, TA

Nanobiotechnology Course, Fall 2008

www.nbtc.cornell.edu/edu_course.htm

Tuesday and Thursday - 10:00 - 11:25

BLACKBOARD COURSE ENVIRONMENT

Download a pdf of the course syllabus

Course Survey

READING ASSIGNMENT FOR TODAY'S LECTURE (8/29/07) CLICK HERE

Nanobiotechnology is the application of nano- and micro-fabrication methods to build tools for exploring the mysteries of biological systems. It is a graduate-level course that will cover the basics of biology and the principles and practice of microfabrication techniques with a focus on applications in biomedical and biological research. One objective of the course is to facilitate a means through which biologists and engineers can communicate. A team design project that stresses interdisciplinary communication and problem solving will be one of the course requirements.

Course Goals

Physical science, life science and engineering students will collaborate to research a biological problem, craft a technological solution and design a device to implement the technology.

Students will communicate with each other through team-based activities and through an on-line discussion board and chat room to facilitate interdisciplinary collaborations.

Nanobiotechnology Course, Fall 2008

- Syllabus (separate file)

Nanobiotechnology

Commercial Opportunities from Innovative Concepts

By Ian J. Mehr, Ph.D., M.B.A.

Published: April, 2002

Contents of Nanobiotechnology

By Ian J. Mehr, Ph.D., M.B.A.

Published: April, 2002

Table of Contents

Section Summary

IEEE Proceedings: Nanobiotechnology

Introduction to the Journal

Nanobiotechnology (or bionanotechnology) is the convergence of nanotechnology with biotechnology.

It involves the processing, fabrication and packaging of organic or biomaterial devices or assemblies in which the dimension of at least one functional component lies between atomic lengths and the wavelength of visible light.

Launched in 2003, *IEE Proceedings Nanobiotechnology* covers all aspects of research and emerging technologies especially relating to the interactions between biomolecules and biomolecular assemblies with electronic structures or materials.

What is Nano? A Definition….

* Nano… one billionth (10^{-9})

* Nanoscience

….. the study of the fundamental principles of molecules and structures with at least one dimension roughly between 1 and 100 nanometers

* Nanostructure

….. structure with at least one dimension roughly between 1 and 100 nanometers

* Nanotechnology

….. the application of nanostructures into useful nanoscale devices

cf. MEMS (Microelectromechanical Systems)

….. concerned with structures between 1,000 and 1,000,000 nanometers

At the nanoscale, the most fundamental properties of materials and machines depend on their size in a way they don’t at any other scale.

The nanoscale is a magical range.

….. the smallest of human-made devices

….. the largest molecules of living things