

BiS 271

Prof. Je-Kyun Park
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Spring 2007

Room 220, E16 Building
M. W. F. 11:00-11:50
<http://nanobio.kaist.ac.kr>

BiS 271 BioNanoEngineering

Synopsis

This course offers science and technology fundamentals involved in BioNanoEngineering. Topics include the principles, materials and applications of electromechanical, thermofluidic, biochemical and optoradiative functions in bio-oriented and bio-inspired nanoengineering systems. Special emphasis focus on the biomaterials and nanoscale technology in biological systems.

Credit

3:0:3 (6), Undergraduate, Required Subject of Department of BioSystems.

Recommended Prerequisite

None. General Biology, Chemistry and Physics, or equivalent.

Grading

Attendance and participation (5%), Homework (reading, survey, and problem solving) and Quiz (25%), Midterm Exam (30%), Final Exam (40%)

Office Hours

M. W. F. 14:00-16:00 (Room 1119, E16)

Teaching Assistants

Eu Jin Um (eujinum@kaist.ac.kr, Tel: 4355 or 5355, Room 801-805);
Minseok S. Kim (dodakdl); Sungyoung Choi (sinetic);
Ju Hun Yeon (yjh22); Seung Hoon Kim (euphony);
Myung Gwon Lee (mglee); Hyundoo Hwang (YellowBean)

Textbook

1. Greco R. S., Prinz, F. B., and Smith, R. L. (eds.) (2005) Nanoscale Technology in Biological Systems, CRC Pres, ISBN: 0849319404.
2. Lecture Notes, Handouts and Articles.

References

1. Ratner, M. and Ratener, D. (2003) Nanotechnology A Gentle Introduction to the Next Big Idea, Prentice Hall, ISBN: 0131014005.
2. Selected chapters from science and engineering textbooks on Biology, Chemistry, Physics, Mechanics, Materials, Physiology, etc.
3. Selected articles from scientific magazines or technical journals, such as Nature, Science, Scientific American, etc.

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Lecture Schedule

Week	Topics	Contents	Text (Chap)
1	I. Introduction	Course Outline and Terminology	
2	II. Bio/Nano Materials and Properties	1. Biomaterials	1, 2
3		2. Nanomaterials	3
4		3. DNA Nanotechnology	3
5	III. Micro/Nanofabrication and Detection	1. Microfabricated Biosensors	4
6		2. Cell Patterning and Microfabricated Cell Culture Systems	5
7		3. Cellular Mechanotransduction	6
8	Course Review & Midterm Exam.		
9	IV. Nanomedicine	1. Micro- and Nanoelectromechanical Systems in Medicine and Surgery	11
10		2. Molecular Imaging	12
11	V. Cell Engineering Applications	1. Tissue Engineering and Artificial Cells	13
12		2. Micro- and Nanotechnology for Cell Biology	14
13	VI. BioNanoEngineering Applications	1. Smart Drug	16
14		2. Nanobiosensor	17
15		3. Nanotechnology in Cancer	18
16	Course Summary & Final Exam		