City University of Hong Kong

Information on a Course offered by Department of Electronic Engineering with effect from Summer Term 2013

Part I

Course Title:	Nanotechnology for Devices and Microsystems
Course Code:	EE6615
Course Duration:	One Semester
No. of credits:	3
Level:	P6
Medium of Instruction:	English
Prerequisites*:*	Nil
Precursors*:*	Nil
Equivalent Course:	Nil
Exclusive Courses:	Nil

Part II

Course Aims:

The aim of the course is to provide students with theoretical knowledge and analytical skills necessary for an in-depth understanding of the chemistry and physics of nanofabrication technologies used in microelectronics and microsystems. Highlighted topics include patterning, interconnects, and packaging technology for nanostructures, devices, and microsystems.

Course Intended Learning Outcomes (CILOs)
Upon successful completion of this course, students should be able to:

No.	CILOs
1.	Explain the principles of nanofabrication technology
2.	Apply nanotechnology to nanostructures, devices and microsystems fabrication
3.	Design nanotechnology for specific nanostructures, devices and microsystems
4.	Recognize limits of nanotechnology for different applications
5.	Perform independent studies to identify future developments of nanotechnology in nanostructures, nanodevices, and microsystems

Teaching and Learning Activities (TLAs)

(Indicative of likely activities and tasks designed to facilitate students' achievement of the CILOs. Final details will be provided to students in their first week of attendance in this course)

CILO 1	Lectures, problem solving and discussion during tutorials, take home and in-class assignments, independent research study on new developments in the principles of nanofabrication technology.
CILO 2	Lectures, problem solving and discussion during tutorials, take home and in-class assignments related to applications of nanotechnology.
CILO 3	Lectures, problem solving and discussion during tutorials, take home and in-class assignments to design nanotechnology for specific nanostructures, devices and microsystems.
CILO 4	Lectures, problem solving and discussion during tutorials, take home and in-class assignments to recognize limits of nanotechnology for different applications.
CILO 5	Lectures, perform independent research study on new developments of nanotechnology in nanostructures, nanodevices and microsystems.

Timetabling Information

Pattern	**Hours**
Lecture:	*39 hrs**

* Some of the lectures will be conducted as tutorials, demonstrations, and presentations.

Assessment Tasks/Activities

(Indicative of likely activities and tasks designed to assess how well the students achieve the CILOs. Final details will be provided to students in their first week of attendance in this course)

	Type of assessment tasks	Weighting (if applicable)
Continuous Assessment	Homework, test, report, and presentation	50%
Examination	Written exam	50% 2 hrs

To pass the course, students are required to achieve at least 35% in course work, 35% in the examination.

Grading of Student Achievement:

Letter Grade	**Grade Point**	**Grade Definitions**
A+ A A-	4.3 4.0 3.7	Excellent:
B+ B B-	3.3 3.0 2.7	Good:
C+ C C-	2.3 2.0 1.7	Adequate:
D	1.0	Marginal:
F	0.0	Failure:

Constructive Alignment with Programme Outcomes

PILO	How the course contribute to the specific PILO(s)
1, 2, 3, 4	Students are required to apply the fundamental theoretical knowledge and analytical skills for an in-depth understanding of nanotechnology for nanostructures, nanodevices and microsystems. The students have many opportunities to formulate and solve problems using the learnt knowledge and skills.
2, 3, 4, 5	Students are required to complete an independent research study on new developments of nanotechnology in nanodevices and microsystems.
6	Students are required to give an oral presentation of their independent research studies.

Part III

Keyword Syllabus:

- Overview of nanotechnology
- Clean rooms facilities for nanofabrication
- Patterning technology for nanostructures, nanodevices, and microsystems
- Introduction of dopants to control conductivity and form shallow junctions
- Nanoimprint technology for three dimensional nanostructures and nanodevices
- High resolution etching and profile control technology
- Electrical contact formation and multiple level interconnects
- Packing technology for nanodevices and microsystems

Recommended Reading:

- Silicon VLSI Technology - Fundamentals, Practice and Modeling, Plummer, Deal, and Griffin (Prentice Hall, 2000).
- Fabrication Engineering at the Micro- and Nanoscale, Stephen A. Campbell (Oxford University Press, 2008).
- Fundamentals of Microfabrication and Nanotechnology, Marc J. Madou, (CRC Press, 3rd Edition, 2011).

Online Resources (if any)