City University of Hong Kong

Information on a Course
offered by Department of Mechanical and Biomedical Engineering
with effect from Semester A 2013/2014

Part I

Course Title: **Nano-manufacturing**

Course Code: **MBE6046**

Course Duration: **One semester**

Credit Units: **3**

Level: **P6**

Medium of Instruction: **English**

Prerequisites: **Nil**

Precursors: **Nil**

Equivalent Courses: **MBE8104 Nano-manufacturing**

Exclusive Courses: **Nil**

Note: Students may repeat a course, or an equivalent course, to improve course grade only if the previous course grade obtained is C or below.

Part II

1. Course Aims

More than $1 trillion/year by 2015 in new technologies and products and 2 million jobs have been projected by nanotechnology. Nanomanufacturing is crucial to bring nanotechnology out of the laboratory into the factory for commercial scale-up and applications. This course aims to introduce the modern multidisciplinary nanomanufacturing to the students and get them prepared for the new industrial revolution led by rapid progresses in nanotechnology. It covers important topics in nanomanufacturing such as top-down and bottom-up manufacturing, reliability and defect control, and many key issues on how to conduct nanomanufacturing today and overcome its many technical barriers. Moreover, this course will also promote discovery learning through Web 2.0.

2. Course Intended Learning Outcomes (CILOs)

Upon successful completion of this course, students should be able to:

No.	CILOs	Weighting* (if applicable)
1.	**Describe** the basic knowledge of nanotechnology and nanomanufacturing	**1**
2.	**Explain** the main techniques and processes of nanomanufacturing	**3**
3.	**Apply** nanomanufacturing techniques to perform synthesis and characterization of nanowires/rods	**2**
4.	**Discover** interesting application(s) of the synthesized nanowires/rods	**2**

***Weighting ranging from 1,2,3 to indicate the relative level of importance in an ascending order.**

3. 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)

Activity Type	Timetabled Activity (Hours per week)
Lecture/Tutorial/Laboratory Mix	Lecture (2); Laboratory/Tutorial (1)

CILO No.	Large Class Activities	Laboratory/Tutorial Activities	Total Hours
CILO 1	5	--	5
CILO 2	15	1	16
CILO 3	3	6	9
CILO 4	3	6	9
Total	26	13	39

Large Class Activities: lectures on the topics of the keyword syllabus; promoting discovery learning through Web 2.0

Laboratory/Tutorial Activities: lab experiment projects and tutorial classes; promoting discovery learning through Web 2.0

4. Assessment Tasks/Activities (ATs)

(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)

CILO No.	Test	Labs & Discovery Learning	Examination (2 hours)	Total (%)
CILO 1	5	-	15	20
CILO 2	15	-	35	50
CILO 3	-	15	-	15
CILO 4	-	15	-	15
Total (%)	**20**	30	50	100

Test: 20% Marks, 1 hour.

Laboratory Experiments & Discovery Learning: 30% marks; students' performance in on hand lab experiments.

Examination: 50% Marks, 2 hours.

For a student to pass the course, at least 30% of the maximum mark for the examination should be obtained.

5. Grading of Student Achievement:

Grade Table

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
P	-	Pass

Please refer to the SGS's website for details.

Part III

Keyword Syllabus

Background to nanotechnology and nanomanufacturing, top-down approach, bottom-up approach, combined top-down and bottom-up nanomanufacturing approaches, registration and alignment, reliability and defect control, nanomanufacturing industry survey, leaving the laboratory: regulatory and societal issues confronting nanotechnology commercialization.

Recommended Reading
Textbook:
Ahmed Busnaina, “Nanomanufacturing Handbook”, CRC Press, 2007, 432 pages
ISBN-10: 0849333261
ISBN-13: 978-1420004922

Other Reading:
Bharat Bhushan, “Springer Handbook of Nanotechnology”, Springer, 2nd rev. and extended ed., 2007, ISBN: 978-3-540-29857-1

Mark J. Jackson, “Micro and Nanomanufacturing”, Springer, 1st ed. 2006, Corr. 2nd printing, 2007, 702 pages, ISBN: 978-0-387-25874-4

Online Resources
Online learning material is provided via University computer network.