

**City University of Hong Kong  
Course Syllabus**

**offered by Department of Mechanical and Biomedical Engineering  
with effect from Semester A 2017/18**

---

---

**Part I Course Overview**

**Course Title:** Nano-manufacturing

**Course Code:** MBE8104

**Course Duration:** One Semester

**Credit Units:** 3

**Level:** R8

**Medium of Instruction:** English

**Medium of Assessment:** English

**Prerequisites :**  
(Course Code and Title) Nil

**Precursors:**  
(Course Code and Title) Nil

**Equivalent Courses:**  
(Course Code and Title) MBE6046 Nano-manufacturing

**Exclusive Courses:**  
(Course Code and Title) Nil

## Part II Course Details

### 1. Abstract

More than \$2 trillion/year by 2020 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)

No.	CILOs	Weighting (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	A2	A3
1.	<b>Describe</b> the basic knowledge of nanotechnology and nanomanufacturing	10%		✓	✓
2.	<b>Explain</b> the main techniques and processes of nanomanufacturing	40%		✓	✓
3.	<b>Apply</b> nanomanufacturing techniques to perform synthesis and characterization of nanowires/rods	25%		✓	✓
4.	<b>Discover</b> interesting application(s) of the synthesized nanowires/rods	25%	✓	✓	✓
		100%			

A1: Attitude

*Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.*

A2: Ability

*Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.*

A3: Accomplishments

*Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.*

### 3. Teaching and Learning Activities (TLAs)

TLA	Brief Description	CILO No.				Hours/week (if applicable)
		1	2	3	4	
Large Class Activities	Lectures on the topics of the keyword syllabus; promoting discovery learning through Web 2.0	√	√	√	√	26 hours
Laboratory/Tutorial Activities	Lab experiment projects and tutorial classes; promoting discovery learning through Web 2.0		√	√	√	13 hours

### 4. Assessment Tasks/Activities (ATs)

Assessment Tasks/Activities	CILO No.				Weighting	Remarks
	1	2	3	4		
Continuous Assessment: 50%						
Test	√	√			20%	
Labs & Discovery Learning			√	√	30%	
Examination: 50% (duration: 2 hours)						
					100%	

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

## 5. Assessment Rubrics

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
Test	Understand the contents; answer the questions correctly and properly; demonstrate discovery during learning.	High	Significant	Moderate	Basic	Not even reaching marginal levels
Labs & Discovery Learning	Perform the labs successfully and demonstrate discovery during learning.	High	Significant	Moderate	Basic	Not even reaching marginal levels
Examination	Answer the questions correctly and properly.	High	Significant	Moderate	Basic	Not even reaching marginal levels

### **Part III Other Information** (more details can be provided separately in the teaching plan)

#### **1. 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.

#### **2. Reading List**

##### **2.1 Compulsory Readings**

Ahmed Busnaina, "Nanomanufacturing Handbook", CRC Press, 2007, 432 pages ISBN-10: 0849333261 ISBN-13: 978-1420004922
--

##### **2.2 Additional Readings**

Editors: Zhaoying Zhou, Zhonglin Wang, Liwei Lin (Eds.), "Microsystems and Nanotechnology", Springer, 2012, ISBN: 978-3-642-18293-8
---

#### **Online Resources**

Online learning material is provided via University computer network.