Form 2B

City University of Hong Kong

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

Part I

Course Title: **Technology Transfer to Commercialization for Engineers**

Course Code: **MBE6108**

Course Duration: **One Semester**

No. of Credit Units: **3**

Level: **P6**

Medium of Instruction: **English**

Prerequisites: **MBE5011**

Precursors: **Nil**

Equivalent Courses: **Nil**

Exclusive Courses: **Nil**

Part II

1. Course Aims:

The aim of the course is to give engineering students detailed information about the technology transfer and commercialization process. Students must already have identified an invention or research area of interest (MBE5011). First, students shall learn about intellectual property protection and licensing. They will then form teams (of 3 to 4 students) and learn how to prepare an executive summary for a business plan. This plan shall focus on the prototyping details and include a delivery schedule for product/service prototyping using commercially available design rules. Lectures will cover consideration for the user interface, transfer to mass production, product packaging, and distribution channels. Teams will then learn how to realistically extrapolate for anticipated production and distribution issues and to suggest viable solutions for a hardware-based prototype or a software-based service. The final lectures will cover valuation and associated general investment models for the prototype products and services.

Upon completing the course, students should be able to:

1. Understand how intellectual property protection applies to inventions and business models.

2. Generate a realistic operating plan to create a prototype.

3. Extrapolate from the prototype experience to address mass production issues.

4. Value and defend their prototype as the centrepiece of an investment opportunity.

2. Course Intended Learning Outcomes (CILOs)

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

No.	CILOs	Weighting* (if applicable)
1	Individually, identify the basic criteria for a patentable idea or invention and how to structure intellectual property protection.	2
2	As a team, create a realistic prototype fabrication process flow and schedule for their invention in order to identify issues associated with production scaling and usability.	3
3	As a team, propose and write an executive summary of a business plan and proposed investment model	2
4	As a team, deliver written & oral presentations of their prototype and commercialization plan.	3

***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 Mix	Lecture mixed with tutorial (3)

CILO No.	Large class Activities	Group work Activities	Individual work Activities	Total Hours
	Lecture	Tutorial	(Self study)	L+T (+S)
CILO 1	6	2	(6)	8 (+ 6)
CILO 2	9	8	(32)	17 (+ 32)
CILO 3	5	1	(10)	6 (+ 10)
CILO 4	6	2	(8)	8 (+ 8)
Total	26	13	(56)	**39** (+ 56)

Large class activities:
Lectures and case studies shall cover the topics in the schedule table (below) and in the keyword syllabus.

Group work activities :
Group projects (teams of 3 to 4 students) shall focus on creating a realistic fabrication process flow and prototyping plan for their product/service, in relation to the CILOs. Students will discuss their projects during the tutorial period and also practice their oral presentations. The final presentation assessment is based on the group presentation and a peer assessment.

Individual work activities:
Students are required to carry out self- study via webs searches (e.g. www.uspto.gov for basic patent searches) and to directly contact 3rd party rapid prototyping vendors (if they are building a product), or online distributors (e.g. Apple store, Google Marketplace, www.taobao.com, etc; for a software/service project), to obtain current design/sales rules and manufacturing/distribution cost estimates in conjunction with their prototype design. The work of the self-study will be attributed to individual students in the project report for assessment. Also, outside classroom trips to the HK Science Park and/or rapid prototyping vendors may be scheduled.

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)

Assessment Tasks / ILOs	Homeworks (2 per student)	Project Report (1 per group)	Final Group Presentation & Peer Assessment (20 min/group)	Total (%)
CILO 1	**20**	**0**	**0**	**20**
CILO 2	**20**	**20**	**0**	**40**
CILO 3	**0**	**10**	**5**	**15**
CILO 4	**0**	**10**	**15**	**25**
Total (%)	**40**	**40**	**20**	**100**

Homework Assignments: 40% Marks
Students will be required to submit two homework assignments: (A) an individual IP protection analysis paper by Week 3 and (B) a commercialization plan executive summary that includes their target specifications for the invention/service and a schedule with a breakdown of team member assignments to propose a prototype assembly process, due by the end of Week 5. (The homework assignment is due, not the prototype).

Group project report: 40% Marks

For Weeks 6 to 11, students (working in groups, and following their prototyping plan from Homework#2) shall work on creating a realistic prototype of their invention or a graphical user interface (GUI) for a service/transaction model. The prototype can either be hardware and/or a graphical user interface. Although a functional prototype is not required to pass the course, a prototype meeting their minimum specifications (from homework #2) is required for an A/A+ grade. Student will be encouraged to contact 3rd party rapid prototyping vendors and/or software/service distributors in order to incorporate current real-world costs into their rapid prototyping and business operating plans.

Group oral presentation & peer assessment: 20% Marks
For the presentation, 50% of the marks in this category is based on the presentation and 50% is based on the peer assessment.

5. Grading of Student Achievement:

To reflect the ILOs listed above, the homework, project report, and final presentation will be designed in ways which require the students to demonstrate their understanding of each topic and to solve a specific problem by applying their knowledge in an integrative manner. Grading will be based on the students' ability to demonstrate their skills convincingly.

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:

- Intellectual Property: utility patents, copyrights, claims, prior art, patent fence, tests for patentability, priority, infringement.
- Rapid Prototyping: design rules, design layout tools, process flow, fabrication, assembly,

packaging, quality control, installation, customer support, product lifetime.
- Software/service Prototyping: graphical user interface, middleware, back-end support, alpha testing, beta testing, encryption, distribution, upgrade path
- Business Plan Executive Summary: elevator pitch, market niche, pricing, executive team, return- on-investment, commercialization, term sheet, exit strategy.

Recommended Reading:

T.Byers, R.Dorf, A.Nelson, *Technology Ventures: From Idea to Enterprise*, McGraw-Hill, 2010. ISBN-10: 0073380180

C. Christensen, M. Raynor, *The Innovator's Solution: Creating and Sustaining Successful Growth*, Harvard Business School Press, 2003. ISBN-10: 1578518520

J.T. Black, *DeGarmo's Materials and Processes in Manufacturing*, Wiley, 2011 ISBN-10: 0470924675

J.Greene, *Design is How It Works: How the Smartest Companies Turn Products into Icons*, Portfolio, 2010 ISBN-10: 1591843227

Online Resources:

Patents
1. http://www.uspto.gov/
2. http://www.epo.org/

MEMS/IC Foundries
1. http://www.apmsinc.com/
2. http://www.tmt-mems.com/
3. http://www2.imec.be/be_en/collaboration/services.html

HK-based rapid prototyping and testing services Vendors
1. http://www.prototype.com.hk/
2. http://www.hkpc.org/index.php?option=com_content&view=article&id=3126&Itemid=275&lang=en
3. http://lab.hkstp.org/default2.asp

Online distribution
1. https://developer.apple.com/programs/
2. http://www.google.com/enterprise/marketplace/
3. http://aws.amazon.com/