Form 2B

City University of Hong Kong

Information on a Course
offered by Department of Mechanical and Biomedical Engineering
with effect from Semester B in 2011/2012

Part I

Course Title: **Computer Controlled Systems**

Course Code: **MBE6002**

Course Duration: **One Semester**

No. of Credit Units: **3**

Level: **B6**

Medium of Instruction: **English**

Prerequisites: **MEEM3049 (offered until Semester A 2011/12)/**
MBE3049 Control Principles

Precursors: **Nil**

Equivalent Courses: **MEEM6002 Computer Controlled Systems**

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:

This course aims to develop an in-depth understanding of real-time control of automated systems using digital computers. The objective is for students to learn how to apply control theory in implementation with computers. The mathematical techniques will be introduced for discrete domain analysis and design. It will enhance students' skills for analysis, design and implementation of control systems.

2. Course Intended Learning Outcomes (CILOs)

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

No.	CILOs	Weighting* (if applicable)
1.	to **give** an account of the fundamentals of digital control and control implementation using digital computer	2
2.	to **analyze** discrete-time systems using z-transform	3
3.	to **Design** discrete-time control systems using z-plane and frequency domain methods	3
4.	to **Apply** state-space based controller design for discrete time systems	3
5.	to **Adapt** digital control design methods to controller design for systems such as robots, industrial equipment and processes	1

***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 (1)

TLAs	Large Class Activities	Small Group Activities	Laboratory Work	Total (hrs)
CILO 1	2	-	3	5
CILO 2	8	1	1	10
CILO 3	6	1	3	10
CILO 4	6	-	2	8
CILO 5	4	-	2	6
Total (hrs)	26	2	11	39

The main teaching activities will be in the form of lectures but the lectures are sometimes broken up with small group discussions where students work with their neighbors before feeding back the results to the class. The laboratory work will be conducted in small groups of 5-6 students for each lab.

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)

ILO No	Examination (2.5 hours)	Test	Laboratory Report	Total (%)
CILO 1	5	2	5	12
CILO 2	20	8	3	31
CILO 3	15	5	5	25
CILO 4	15	4	2	21
CILO 5	5	1	5	11
Total (%)	60	20	20	100

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:

Examination, test(s) and laboratory reports will be numerically-marked.

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:

Digital control fundamentals, z-transform, z-plane analysis of discrete-time systems, design of discrete-time control systems, control implementation using computers, controller design using state feedback, robot control.

Recommended Reading:

K. Ogata, Discrete-Time Control Systems, Prentice Hall, Inc.
K. J. Astrom and B. Wittenmark, Computer Controlled Systems, Prentice Hall, Inc.
R. G. Jacquot, Modern Digital Control Systems, Marcel Dekker.
F. F. Franklin, J. J. Powell and M. L. Workman, Digital Control of Dynamic Systems, Addison Wesley.
Clearance W. DE Silva, Control Sensors and Actuators, Prentice Hall.
F. Franklin, J. J. Powell and A. Emani-Naeini, Feedback Control of Dynamic Systems, Addison Wesley.
F. L. Lewis, C. T. Abdallah and D. M. Dawson, Control of robot manipulators, Macmillan Publishing Co.
J. L. Fuller, Robotics, Prentice Hall.

Online Resources:

Online learning materials will be provided via University computer network.