

City University of Hong Kong

**Information on a Course
offered by the School of Creative Media
with effect from Semester A in 2012 / 2013**

Part I

Course Title: Making Things Blip, Blink & Move: Introduction to Physical Computing

Course Code: SM5332

Course Duration: One Semester (13 weeks)

No. of Credit Units: 3 units

Level: P5

Medium of Instruction: English

Prerequisites: Nil

Precursors: Nil

Equivalent Courses: Nil

Exclusive Courses: Nil

Part II

1. Course Aims:

This graduate studio is aimed at introducing students to the fundamentals of electronics, physical computing, and embodied system programming. Through circuit emulation, circuit hacking and reverse engineering, students will acquire foundational knowledge in the theory and practice of electronics. Students will also learn to build physical artifacts that can exhibit reactive and intelligent behaviors.

This unit serves as a foundation for students to proceed with pervasive computing, robotics, and other more advance interactive applications. This class also serves as an introduction to the Arduino microprocessor platform.

2. Course Intended Learning Outcomes (CILOs)

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

No.	CILOs
1.	Recognize, identify and describe: <ul style="list-style-type: none"> • Key electronic components • Common circuits
2.	Approach an understanding of the technical complexity of pre-existing electronic artworks
3.	Build physical artifacts that exhibit reactive and intelligent behaviour
4.	Demonstrate the principles of interaction design
5.	Apply: <ul style="list-style-type: none"> • Knowledge and skills in electronics and physical computing to creative projects • Understanding of human motion and reaction in creative projects
*6.	Integrate tactile technology and electronics into students' own art practice through additional self-initiated tasks.

* Negotiated Learning Outcome (NLO) explicitly articulating the elements of Discovery oriented learning.

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)

TLAs	ILO No
<ul style="list-style-type: none"> - Lectures with audio-visual illustration - Field-trip / hacker space visits - Summary / notes of assigned reading - In-class presentation and critique - In-class exercises 	CILO 1 to 4
<ul style="list-style-type: none"> - Creation of interactive art work / product - In-class presentation and critique 	CILO 4 to 6

4. 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/activities	ILO No
<ul style="list-style-type: none"> - Summary / notes of assigned reading - In-class presentation on the interactive artworks / devices 	CILO 1 & 2
<ul style="list-style-type: none"> - In-class circuit-building, Arduino-coding and other technical exercises - Class assignments 	CILO 1 to 3
<ul style="list-style-type: none"> - Design, implement and present an end-of-semester creative work - Maintenance of a learning log book / blog 	CILO 4 to 6
<ul style="list-style-type: none"> - Participation in in-class discussion - Contribution to classmates' critique sessions 	CILO 1 to 6

5. Grading of Student Achievement:

Refer to Grading of Courses in the Academic Regulations for Taught Postgraduate

Degrees.

Class works 20%
 Projects assignments 70%
 Class participation 10%
 Grading pattern: Standard (A+AA-...F)

A. Summary / Notes of Assigned Reading

This assessment will grade on rationality, clarity and fluency of argument and comment.

Letter Grade	Grade Point	Grade Definitions	Description
A+ A A-	4.3 4.0 3.7	Excellent	<ul style="list-style-type: none"> - Rich content, excellent ability to interpret and integrate various resources - Rigorous organization, coherent structure, systematic composition - Precision in argument, well defined and reasoned points of view grounded in insightful interpretation of existing literature - Readiness to respond to peer opinion and other views initiated in class discussion - Discussion shed light on new dimensions of the issue
B+ B B-	3.3 3.0 2.7	Good	<ul style="list-style-type: none"> - Adequate content, sufficient ability to integrate various resources based on demand - Reasonable organization with balanced structure and composition - Clear elaboration of ideas that sticks to the point, with clearly differentiated issues, ability to interpret opinions independently - Sufficient responses to peer comments to sustain a discussion
C+ C C-	2.3 2.0 1.7	Adequate	<ul style="list-style-type: none"> - Adequate content, fair ability to integrate various resources based on demand - Fair organization with adequate structure and composition - Relevant points made to the subject matter in question - Ability to respond to other statements and engage in class discussion
D	1.0	Marginal	<ul style="list-style-type: none"> - Weak content, limited use of resources - Poor organization, structure and composition - Relevant points to the subject matter, marginal ability to interpret opinions - Ability to respond to other comments in simple terms
F	0.0	Failure	<ul style="list-style-type: none"> - Inadequate content, no/ irrelevant use of resources - No organization, structure or/and composition - Irrelevant points to the subject matter, no ability to interpret opinions - Fail to respond to other comments

Note: All A+/A/A- grade assignment should comply with the highest performance of Discovery-oriented learning.

B. Creative Work / Product Design

Students should demonstrate ability to utilize primary and secondary sources, execute creative ideas and projects.

Letter Grade	Grade Point	Grade Definitions	Description
A+ A A-	4.3 4.0 3.7	Excellent	<ul style="list-style-type: none"> - Work has strong affective quality and the articulation of personal styles and signature - Excellent appreciation, exploration and/or application of the aesthetic and expressive qualities of the medium - Work raises questions and instill insights about the process of conception, creative strategization and production - Innovative exploration by combining knowledge from different disciplines (e.g. mathematics, psychology, physics, anthropology, etc.) to create an inter-disciplinary project - Efficient adjustment of plans and strategies in response to resources (time, space, equipment, etc) available with constructive adjustment
B+ B B-	3.3 3.0 2.7	Good	<ul style="list-style-type: none"> - Strong appreciation, exploration and/or application of the aesthetic and expressive qualities of the medium - Ability to create project/ work that demonstrate the processes of thinking and creative exploration - Proper adjustment of plans and strategies in response to resources (time, space, equipment, etc) available and constructive feedback/ suggestions
C+ C C-	2.3 2.0 1.7	Adequate	<ul style="list-style-type: none"> - Basic appreciation and/or application of the aesthetic and expressive qualities of the medium - Limited ability to create project/ work that demonstrate the processes of thinking and creative exploration - Adjustment of plans and strategies in response to resources (time, space, equipment, etc) available
D	1.0	Marginal	<ul style="list-style-type: none"> - Marginal appreciation of the aesthetic and expressive qualities of the medium - Marginal ability to create project/ work that demonstrate the processes of thinking and creative exploration - Limited adjustment of plans and strategies in response to resources (time, space, equipment, etc) available
F	0.0	Failure	<ul style="list-style-type: none"> - No appreciation of the aesthetics and expressive qualities of the medium - Fail to create project/ work that demonstrate the processes of thinking and creative exploration - Minimal adjustment of plans and strategies in response to resources (time, space, equipment, etc) available

Note: All A+/A/A- grade assignment should comply with the highest performance of Discovery-oriented learning.

C. In-Class Presentation

This assessment will grade on content and fluency of presentation. Students should show their co-operation to conduct a well-organized presentation with their own argument and evidence from readings and notes.

Letter Grade	Grade Point	Grade Definitions	Description
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A+ A A-	4.3 4.0 3.7	Excellent	<ul style="list-style-type: none"> – Rich, informative content, excellent grasp of the material with in-depth and extensive knowledge of the subject matter – Rigorous organization, coherent structure, and systematic exposition with a strong sense of narrative – Superior presentation skills: distinct pronunciation, fluent expression and appropriate diction, exact time-management – Critical analysis with insightful comments opening up new issues, or suggesting the ability to theorize
B+ B B-	3.3 3.0 2.7	Good	<ul style="list-style-type: none"> – Adequate content with firm grasp of the material that informs the audience on a subject matter – Reasonable organization, balanced structure and composition – Good verbal communication: comprehensible pronunciation, fluent expression and diction, fair time-management
C+ C C-	2.3 2.0 1.7	Adequate	<ul style="list-style-type: none"> – Adequate content with comprehensive grasp of the material demonstrating basic knowledge of the subject matter – Fair organization, weak structure and composition – Fair presentation skills: acceptable pronunciation, expression and diction, fair time-management
D	1.0	Marginal	<ul style="list-style-type: none"> – Weak content, loose grasp of the general ideas with some knowledge of the subject matter – Poor organization, structure and composition – Poor presentation skills: marginal pronunciation, expression and diction, poor time-management
F	0.0	Failure	<ul style="list-style-type: none"> – Inadequate content, fail to identify the general ideas with knowledge of the subject matter – No organization, structure or/and composition – Poor presentation skills: marginal pronunciation, expression and diction, minimal time-management

Note: All A+/A/A- grade assignment should comply with the highest performance of Discovery-oriented learning.

D. Class Exercises, Discussion Participation and Contribution

Students' participation and performance in discussions, debates and other class activities and tutorials... Students have to show their pre-class preparation.

Letter Grade	Grade Point	Grade Definitions	Description
A+ A A-	4.3 4.0 3.7	Excellent	<ul style="list-style-type: none"> – Active in-class participation, positive listening, strong ability to stimulate class discussion and comment on other points – In-depth pre-class preparation and familiarity with peer reports and other materials – Interpret others' views with an open mind and ready to negotiate – Readiness to share personal insight via analysis and synthesis with informed views – Constructively critical, thus facilitating the discovery

			of new issues
B+ B B-	3.3 3.0 2.7	Good	<ul style="list-style-type: none"> – Active in-class participation, positive listening, ability to initiate class discussion and comment on other points – Adequate pre-class preparation and familiarity with peer reports and other materials – Interpret opinions effectively
C+ C C-	2.3 2.0 1.7	Adequate	<ul style="list-style-type: none"> – Attentive in in-class participation, listening with comprehension, but only infrequently contributing – Adequate pre-class preparation but little familiarity with peer reports and other materials – Fair ability in interpreting opinions
D	1.0	Marginal	<ul style="list-style-type: none"> – Unmotivated to participate in class discussion or comment on other people’s views – Little pre-class preparation and familiarity with peer reports and other materials – Poor ability in interpreting opinions
F	0.0	Failure	<ul style="list-style-type: none"> – Unwilling to participate in class discussion and comment on other points, even when requested by the teacher – No pre-class preparation and familiarity with peer reports and other materials – Minimal ability in interpreting opinions

Note: All A+/A/A- grade assignment should comply with the highest performance of Discovery-oriented learning.

Part III

Keyword Syllabus:

Physical Computing; Embedded System; Micro-controller; Electronics; Arduino; Processing; Human-Computer Interaction; Human-Computer Interface; Product Design; Prototyping; Interactive Environment; Interactive Installation; Sensors; Motion Tracking; Robotic Mechanic

Recommended Readings:

Igoe, T. 2007. *Making Things Talk: Practical Methods in Connecting Physical Objects*. Cambridge: O’Reilly Media.

Margolis, M. 2011. *Arduino Cookbook*. Cambridge: O'Reilly Media.

Massimo, B. 2008. *Getting Started with Arduino*. Cambridge: O'Reilly Media

Mims III, F. 2003. *Getting Started in Electronics*. Illinois: Master Publishing.

Mims III, F. 2000. *Electronic Sensors and Projects*. Illinois: Master Publishing.

Noble, J. 2009. *Programming Interactivity*. Cambridge: O'Reilly Media.

Scherz, P. 2000. *Practical Electronics for Inventors*. Columbus: McGraw-Hill.

Online resources:

- <http://www.arduino.cc>
- <http://www.processing.org>
- <http://www.fritzing.org/>
- http://www.sensorwiki.org/index.php/Main_Page
- http://www.adafruit.com/index.php?main_page=index
- <http://www.parallax.com/>
- <http://www.sparkfun.com>
- <http://www.seeedstudio.com/depot/>
- <http://www.instructables.com/>
- <http://www.hackaday.com/>