City University of Hong Kong
Course Syllabus

offered by School of Creative Media
with effect from Semester A 2017 /18

Part I Course Overview

Course Title:	Making Things Blip, Blink & Move: Introduction to Physical Computing
Course Code:	SM5332
Course Duration:	One semester
Credit Units:	3
Level:	P5
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)*	Nil
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

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)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs	Weighting (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	*A2*	*A3*
1.	Recognize, identify and describe: • 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: • 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.			✓	
		100%			

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

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)

(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.						Hours/week (if applicable)
		1	2	3	4	5	6	
Lecture, research and discussion	- Lectures with audio-visual illustration - Field-trip / hacker space visits - Summary / notes of assigned reading - In-class presentation and critique - In-class exercises	✓	✓	✓	✓			
Presentation, critique and discussion	- Creation of interactive art work / product - In-class presentation and critique				✓	✓	✓	

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.						Weighting	Remarks
	1	2	3	4	5	6		
Continuous Assessment: 100%								
- Summary / notes of assigned reading - In-class presentation on the interactive artworks / devices	✓	✓					20%	
- In-class circuit-building, Arduino-coding and other technical exercises - Class assignments	✓	✓	✓				25%	
- Design, implement and present an end-of-semester creative work - Maintenance of a learning log book / blog				✓	✓	✓	45%	
- Participation in in-class discussion - Contribution to classmates' critique sessions	✓	✓	✓	✓	✓	✓	10%	
Examination: 0% (duration: , if applicable)								
							100%	

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Summary / Notes of Assigned Reading	This assessment will grade on rationality, clarity and fluency of argument and comment.	– 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	– 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	– 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	– 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	– 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
2. Creative Work / Product Design	Students should demonstrate ability to utilize primary and secondary sources, execute creative	– Work has strong affective quality and the articulation of personal styles and	– Strong appreciation, exploration and/or application of	– Basic appreciation and/or application of the aesthetic and expressive qualities of the	– Marginal appreciation of the aesthetic and expressive qualities of the	– No appreciation of the aesthetics and expressive qualities of the medium

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
	ideas and projects.	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	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	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	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	– 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
3. In-Class Presentation	This assessment will grade on content and fluency of presentation. Students should show	– Rich, informative content, excellent grasp of the material with in-depth and extensive knowledge	– Adequate content with firm grasp of the material that informs the	– Adequate content with comprehensive grasp of the material	– Weak content, loose grasp of the general ideas with some knowledge of the subject	– Inadequate content, fail to identify the general ideas with knowledge of the

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
	their co-operation to conduct a well-organized presentation with their own argument and evidence from readings and notes.	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	audience on a subject matter – Reasonable organization, balanced structure and composition – Good verbal communication: comprehensible pronunciation, fluent expression and diction, fair time-manageme nt	demonstrating basic knowledge of the subject matter – Fair organization, weak structure and composition – Fair presentation skills: acceptable pronunciation, expression and diction, fair time-management	matter – Poor organization, structure and composition – Poor presentation skills: marginal pronunciation, expression and diction, poor time-management	subject matter – No organization, structure or/and composition – Poor presentation skills: marginal pronunciation, expression and diction, minimal time-management
4. 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.	– 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	– 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	– 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	– 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	– 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

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
		– Readiness to share personal insight via analysis and synthesis with informed views – Constructively critical, thus facilitating the discovery of new issues	effectively	interpreting opinions		

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

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

1. Keyword Syllabus

(An indication of the key topics of the course.)

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

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

1.	Igoe, T. 2007. *Making Things Talk: Practical Methods in Connecting Physical Objects*. Cambridge: O'Reilly Media.
2.	Margolis, M. 2011. *Arduino Cookbook*. Cambridge: O'Reilly Media.
3.	Massimo, B. 2008. *Getting Started with Arduino*. Cambridge: O'Reilly Media
4.	Mims III, F. 2003. *Getting Started in Electronics*. Illinois: Master Publishing.
5.	Mims III, F. 2000. *Electronic Sensors and Projects*. Illinois: Master Publishing.
6.	Noble, J. 2009. *Programming Interactivity*. Cambridge: O'Reilly Media.
7.	Scherz, P. 2000. *Practical Electronics for Inventors*. Columbus: McGraw-Hill.
8.	http://www.arduino.cc
9.	http://www.processing.org
10.	http://www.fritzing.org/
11.	http://www.sensorwiki.org/index.php/Main_Page
12.	http://www.adafruit.com/index.php?main_page=index
13.	http://www.parallax.com/
14.	http://www.sparkfun.com
15.	http://www.seeedstudio.com/depot/
16.	http://www.instructables.com/
17.	http://www.hackaday.com/

2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

1.	Nil