City University of Hong Kong
Course Syllabus

offered by
Department of Mechanical Engineering
with effect from Semester A 2019 / 2020

Part I Course Overview

Course Title:	Introduction to Electromechanical Systems
Course Code:	MNE2108
Course Duration:	1 semester
Credit Units:	2 credits
Level:	B2
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites[#]: *(Course Code and Title)*	MA1201 Calculus and Basic Linear Algebra II **or** MA1301 Enhanced Calculus and Linear Algebra II
Precursors: *(Course Code and Title)*	Nil
Equivalent Courses: *(Course Code and Title)*	MBE2108 Introduction to Electromechanical Systems
Exclusive Courses: *(Course Code and Title)*	MBE2029/BME2029/MNE2029 Electrical and Electronic Principles I

[#]**Waived for students admitted with Advanced Standing if the course is not a College-specified course**

Part II Course Details

1. Abstract

(A 150-word description about the course)

Electromechanical systems, owing to numerous applications such as in telecommunications, instrumentation, healthcare, energy and environment, have dramatically impacted the way we live. This course will provide a coherent presentation of the fundamental concepts, design, fabrication methods underpinning the electrochemical systems, in the context with contemporary applications in engineering. Various skills to analyse the electromechanical system at multiple length and time scales will be covered. The challenges facing the current electromechanical systems will be discussed as well.

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.	Explain the basic concepts relevant with electromechanical systems.			✓	
2.	Apply various methods to analyse the electromechanical systems at multiple length and time scales.			✓	
3.	Compare various methods to manufacture and integrate electromechanical systems.			✓	
4.	Employ the system-level integration and scaling principles to develop electromechanical systems for multifunctional applications.			✓	✓
** If weighting is assigned to CILOs, they should add up to 100%.*		N.A.			

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	
Lecture	Explain the fundamental concepts, design, fabrication methods as well as the analytical methods related with the electromechanical systems.	✓	✓	✓	✓	2 hrs/week
Laboratory Demonstration	Showcase some state of the art electromechanical devices as well as the individual building blocks underpinning these integrated systems.	✓	✓			2 hrs total

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		
Continuous Assessment: 40%						
Tests	✓	✓	✓	✓	30%	2 tests
Laboratory Report	✓	✓			10%	
Examination: 60% (duration: 2 hours)						
** The weightings should add up to 100%.*					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

(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. Tests	Describe the fundamentals of building blocks widely used in the electromechanical systems.	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Laboratory Report	Report the working principles and applications of electromechanical systems	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Examination	Explain the basic concepts, fabrication methods and analyse electromechanical systems.	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

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

Electric laws and resistive circuits
Circuit analysis
Inductance and capacitance
Filters, frequency response, and resonance
Diodes and applications
Bipolar junction transistors
Field effect transistors
Operational amplifiers and applications
Scaling law
MEMS
Sensors and actuators
Microfabrication

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.	A.R. Hambley, Electrical Engineering, Principles and Applications, Prentice Hall, 4th or later edition.

2.2 Additional Readings

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

1.	G. Rizzoni, Principles and Applications of Electrical Engineering, McGraw Hill, 4th or later edition.
2.	N. Maluf, An Introduction to Microelectromechanical Systems Engineering, Artech House Publisher, 2nd or later edition.