

**City University of Hong Kong
Course Syllabus**

**offered by Division of Building Science and Technology
with effect from Semester A 2018/19**

Part I Course Overview

Course Title: Advanced Building Services Systems and Management

Course Code: BST20584

Course Duration: 1 semester

Credit Units: 3 credits

Level: A2

Proposed Area:
(for GE courses only)

Arts and Humanities
 Study of Societies, Social and Business Organisations
 Science and Technology

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

(A 150-word description about the course)

This course aims to provide students with an understanding of the advanced building services systems of HVAC services, electrical services, fire services, and plumbing & drainage services. In the course, the students will learn the advanced knowledge in building energy management and cost management. The basic requirements for the advanced building services systems of building services installations will also be introduced.

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 knowledge and principles of advanced building services systems of HVAC services, electrical services, plumbing and drainage services, fire services, and energy management.	30	✓	✓	
2.	classify and apply the principles of different types of advanced building services systems and energy management systems to building services design and installation.	30		✓	✓
3.	interpret and apply appropriate codes, standards, and guidelines for the design and installation of these advanced building services systems.	10		✓	✓
4.	describe alternative energy conservation measures in terms of energy management, energy codes and cost assessment.	20		✓	
5.	describe typical building development design and project administration in Hong Kong.	10	✓	✓	
		100%			

* If weighting is assigned to CILOs, they should add up to 100%.

Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

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	
Pre-Class Study	A Pre-Class Study is a combination of selected reference books and/or lecture notes reading and question generation which requires students to read relevant reference book sections and generate questions before a class.	✓*	✓*	✓*	✓*	✓*	No direct contribution to contact hours
Seminar	Seminar is an in-class activity in groups involving oral presentation by lecturers and discussion with students on a selected topic through illustrating exercises, real-life examples and question generation by the students and answering by peers or by the lecturer.	✓	✓	✓	✓	✓	3hrs/wk for 13 weeks
Assignment	An Assignment is a combination of case problems and/or calculation exercises for guided students' learning.	✓*	✓*	✓*	✓*	✓*	No direct contribution to contact hours

* this will not directly contribute to contact hours

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		
Coursework: 40%							
Assignment/Report	✓	✓	✓	✓	✓	40%	Three assignments in the format of MC containing the HVAC services, the electrical services, and the fire, plumbing and drainage services.
Examination: 60% (duration: 2.5 hours, if applicable)							

* The weightings should add up to 100%.

100%

Note: A student must obtain a minimum mark of 35 in both coursework and examination and an overall mark of 40 to pass the course.

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. Assignment report and final examination	1. Understanding of the scientific principles and the working mechanisms of advanced building services systems.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	2. Capability to identify and explain how the principles are applied to building energy management and cost management					
	3. Evidence of original thinking.					

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.)

1. HVAC Services:

Air side system/equipment: Special air distribution; heat recovery equipment; desiccant dehumidification and cooling; new heat exchanger; radiant ceiling cooling.

Water side system/equipment: Scale control technologies; heat recovery equipment; thermal energy storage; district cooling; heat-driven refrigeration cycles; solar energy application.

Building Energy Performance Enhancement through Design and Control Optimizations.

2. Electrical Services:

Smart grid system/equipment: Smart metering; storage (peak shifting/shedding); demand response; electric vehicle to generation.

Renewable energy system/equipment: Smart grid connection; DC distribution; photovoltaic.

Building management system: Control and communication protocols; architecture.

3. Fire, Plumbing and Drainage Services:

Advanced fire services system/equipment: Pre-action installation; alternative installation.

Advanced plumbing system/equipment: Convertible energy from drainage disposal; recycling of wastewater/rainwater and sewage system; risk assessment in drainage system.

4. Energy and Project Management:

Carbon and energy audit: Carbon footprint; scopes of emission & removal; codes and standards.

Economic analysis: Payback period; life cycle costing.

Project Management: Budgeting and tendering.

Contract award and administration.

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.	ASHRAE Handbook – Refrigeration, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (latest edition).
2.	Technical Guidelines on Renewable Energy Power Systems, Electrical & Mechanical Services Department, HKSAR Government, 2007
3.	NFPA 2001: Standard on Clean Agent Fire Extinguishing Systems (latest edition)
4.	Blower G. J. (2006). Plumbing: Mechanical Services: Book One. 5th ed. Prentice Hall.
5.	Payne, R. (1984). Drainage and Sanitation. UK: Longman Group United Kingdom.

2.2 Additional Readings

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

1.	ASHRAE Handbook – HVAC Systems and Equipment, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (latest edition).
2.	CIBSE Guide B: Heating, ventilating, air conditioning and refrigeration, the Chartered Institution of Building Services Engineers (latest edition).
3.	Eicker U 2009, Low Energy Cooling for Sustainable Buildings, John Wiley & Sons, Ltd.
4.	HK EE Net, EMSD, Hong Kong SAR Government, website: http://ee.emsd.gov.hk
5.	Hermann Merz, Thomas Hansemann, Christof Hubner, Introduction to Building Automation, Springer Berlin Heidelberg, 2009
6	List of F.S.D. Circular Letters http://www.hkfsd.gov.hk/eng/circular.html
7	LPC Rules for Automatic Sprinkler Installations Incorporating BSEN 12845
8	Hong Kong Government Architecture Services Department website: http://www.archsd.gov.hk/
9	Hong Kong Government Electrical & Mechanical Services Department website: http://www.emsd.gov.hk/
10	https://www.clponline.com.hk/ev/Pages/Home.aspx?lang=EN
11	Wise, A. F. E. and Swaffield J. A. (2002). Water Sanitary and Waste Service for Buildings. 5th ed. Butterworth-Heinemann.
12	The Hong Kong Institute of Architects, the Hong Kong Institute of Construction Mangers, the Hong Kong Institute of Surveyors. Agreement & Schedule of Conditions of Building Contract for use in the Hong Kong Special Administrative Region, Private Edition - With Quantities.