

## Subject Description Form

Subject Code	<b>BSE2701</b>
Subject Title	<b>System Design I</b>
Credit Value	3
Level	2
Pre-requisite	Either one (BSE2101 Electrical Installations I <u>or</u> BSE2201 Air Conditioning I <u>or</u> BSE2301 Plumbing and Drainage)
Co-requisite	Nil
Exclusion	Nil
Objectives	<ol style="list-style-type: none"> <li>1. To introduce the relevant codes, regulations and design criteria for different building services systems.</li> <li>2. To introduce the computer aided design software for basic building services systems design.</li> <li>3. To provide an opportunity to apply the theoretical knowledge and skills learned in earlier parts of the course for designing various building services systems.</li> <li>4. To provide appreciation of the entire design process.</li> </ol>
Intended Learning Outcomes	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> <li>a) undertake the procedures and development of designing building services systems based on the knowledge from all building services engineering and management subjects;</li> <li>b) identify and use various codes, regulations, guidelines for building services design;</li> <li>c) select and apply appropriate various computer and manual methods for the preparation of all building services drawings, calculations and design reports;</li> <li>d) produce sufficiently detailed and workable schematic drawings for each of the Mechanical Ventilation and Air Conditioning (MVAC), Fire, Electrical, Plumbing and Drainage Services systems;</li> <li>e) have a good knowledge of the professional practice (both consultant and contractor) for both design and installation issues;</li> <li>f) recognize the use of good project and time management to complete a project within a limited time frame;</li> <li>g) work as a collaborative member of a design team; and</li> <li>h) communicate design and reports effectively.</li> </ol>
Subject Synopsis/ Indicative Syllabus	<p><u>Subject Synopsis</u></p> <p>This subject enables students to develop strong basic design skills on various building services systems in a new building. It allows students to understand relevant regulatory design requirements, design criteria, essential design techniques and design process for individual trade of design. Load estimation and justifications on choices of design will also be introduced. Students will learn services distribution and produce schematic diagrams for various systems. Space requirements and allocation for plants and systems will also be emphasized. Design software will also be demonstrated and guided design software exercises will be given to students to work on.</p> <p><u>Indicative Synopsis</u></p> <p><b>An introduction to design process, considerations and space allocation:</b> Introduction to design process. Design conditions and considerations. Space requirements for proper operation and maintenance.</p> <p><b>An overview of local regulations, codes and design criteria:</b> Means of Escape. Sanitary requirements. Buildings Ordinance. Supply rules of power utilities. Code of Practice for Minimum Fire Service Installations and Equipment. British Standards (BS). Loss Prevention Council (LPC) rules. National Fire Protection Association (NFPA) Standards. Lighting design guides. Environmental Protection Department (EPD)'s practice notes for professional persons. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) standards. Chartered Institution of Building</p>

	<p>Services Engineers (CIBSE) guides.</p> <p><b>Design software applications:</b> Software for Overall Thermal Transfer Value (OTTV), cooling load calculation, lighting design and lift traffic analysis.</p> <p><b>Outline design:</b> Design criteria for air-conditioning and ventilation, electrical, lift, lighting, water supply, sanitation and fire services. Load estimation. Brief descriptions on the building services systems with explanations and justifications on the choice of design. Proposed plant room locations and requirements, and outline of services distributions. Schematic diagrams for the proposed services systems.</p>																																							
Teaching/Learning Methodology	<p>The entire range of building services design work for a new building can be distinctly separated into two stages. This subject “System Design I” covers the first stage of outline design for the major building services systems, which will also form the content of work required for the project. Another subject “System Design II” in the following semester will continue the project. Throughout the whole project, design tutors acting as both supervisors and consultants will guide the students to complete the work by group discussions/tutorials.</p> <p>Students will work in a group of 3 or 4 for individual design exercises. Each group member is required to work individually for different trades of building services. The exercise will focus on design practice, design requirements and the use of computer aided design software. All these exercises will be based on a simple building with layout chosen by design tutors.</p>																																							
Assessment Methods in Alignment with Intended Learning Outcomes	<table border="1" data-bbox="368 786 1485 1084"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</th> <th colspan="8">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> <th>d</th> <th>e</th> <th>f</th> <th>g</th> <th>h</th> </tr> </thead> <tbody> <tr> <td>Design exercises</td> <td>100</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>Total</td> <td>100</td> <td colspan="8"></td> </tr> </tbody> </table> <p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <ol style="list-style-type: none"> <li>Individual design exercises on different trades of building services systems of a new building will be used to assess students’ abilities to understand the basic skills in designing various systems and applying design software to different building services systems in this outline design stage. All the intended subject learning outcomes will be achieved and assessed.</li> </ol>		Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)								a	b	c	d	e	f	g	h	Design exercises	100	✓	✓	✓	✓	✓	✓	✓	✓	Total	100								
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Student Study Effort Expected	<p>Online contact:</p> <ul style="list-style-type: none"> <li>▪ Project work</li> </ul> <p>Other student study effort:</p> <ul style="list-style-type: none"> <li>▪ Information searching</li> <li>▪ Drawing production</li> <li>▪ Reports</li> </ul> <p>Total student study effort</p>	<p></p> <p>39 Hrs.</p> <p></p> <p>25 Hrs.</p> <p>26 Hrs.</p> <p>30 Hrs.</p> <p>120 Hrs.</p>																																						

<p>Reading List and References</p>	<p>2021 ASHRAE Handbook – Fundamentals. ASHRAE, 2021.</p> <p>American National Standards Institute ANSI/ASHRAE Standard 62.1-2016, Ventilation for Acceptable Indoor Air Quality, ASHRAE, 2016.</p> <p>BS1192 - Collaborative production of architectural, engineering and construction information. Code of practice, 2008.</p> <p>BS1553 Part 1, Specification for graphical symbols for general engineering: Piping systems and plant, 1977.</p> <p>Building (Standards of Sanitary Fitments, Plumbing, Drainage Works and Latrines) Regulations, Chapter 123I, Laws of Hong Kong, 1997.</p> <p>CIBSE Guide A: Environmental Data, Guide D: Transportation Systems in Buildings and Guide E: Fire Safety Engineering, CIBSE, London, UK, 2015, 2015 and 2017 respectively.</p> <p>Code of Practice 101 for Distribution Substation Design, CLP Power Hong Kong Limited, the latest version.</p> <p>Code of Practice 215 Load Assessment Procedure, CLP Power Hong Kong Limited, the latest version.</p> <p>Code of Practice for Building Works for Lifts and Escalators 2011, Buildings Department (BD), Hong Kong Special Administrative Region (HKSAR), the latest version.</p> <p>Code of Practice for Energy Efficiency of Building Services Installation, Electrical and Mechanical Services Department (EMSD), HKSAR, 2015 and 2018.</p> <p>Code of Practice for the Electricity (Wiring) Regulations, EMSD, HKSAR, 2015.</p> <p>Code of Practice for Fire Safety in Buildings 2011, BD, HKSAR, the latest version.</p> <p>Codes of Practice for Minimum Fire Service Installations and Equipment and Inspection, Testing and Maintenance of Installations and Equipment, Fire Services Department (FSD), HKSAR, the latest version.</p> <p>Code of Practice for Overall Thermal Transmittance Value in Buildings, Buildings Department, Building Authority, Hong Kong, April 1995.</p> <p>Design, commissioning, operation and maintenance guides and standards from ASHRAE/ CIBSE/ Institute of Plumbing (IOP)/ Building Services Research and Information Association (BSRIA), etc., the latest edition.</p> <p>Hong Kong Waterworks Standard Requirements for Plumbing Installation in Buildings, Water Supplies Department, January 2017.</p> <p>Faye C.M. and Jeffrey D.S. Cooling and Heating Load Calculation Manual. 2nd ed. New York: ASHRAE, c1992.</p> <p>The Institution of Electrical Engineers (IEE) Wiring Regulations, 17th Edition, Institution of Engineering &amp; Technology, 2008.</p> <p>List of FSD Circular Letters, FSD, HKSAR.</p> <p>Local regulations and codes of practices for various trades of building services, the latest edition.</p> <p>LPC Rules for Automatic Sprinklers Installations Incorporating British Standard BS EN 12845 – Fixed firefighting systems – Automatic sprinkler systems – Design, installation and maintenance (with suitable modification pertinent to Hong Kong), LPC, UK, 2015.</p> <p>Plumbing Engineering Services Design Guide, IOP, UK, 2002.</p> <p>Scheme for Wider Use of Fresh Water in Evaporative Cooling Towers for Energy-efficient Air Conditioning Systems, Electrical and Mechanical Services Department, 2008.</p> <p>The SLL Code for Lighting, The Society of Light and Lighting (SLL), CIBSE, 2012.</p> <p>Supply rules of power utilities, the latest edition.</p>
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