

Subject Description Form

Subject Code	BSE458
Subject Title	Building Performance Diagnosis and Management
Credit Value	3
Level	4
Pre-requisite Co-requisite Exclusion	BSE3712 Integrated System Design, or equivalent. Nil Nil
Objectives	<ol style="list-style-type: none"> 1. To appreciate that the design of buildings and building services systems need to take full account of user (occupant, operator) and operational requirements. 2. To examine how systems and equipment may not be compatible with the operating environment. 3. To learn from the operation and maintenance practices in existing buildings through reviews and surveys to understand why buildings and/or systems fail to deliver on performance. 4. To examine how design, installation, commissioning and performance diagnosis practices impact on building performance. 5. To identify good practices for use in the design of building services systems for new buildings, and retrofit and management of existing building services systems.
Intended Learning Outcomes	<p>Upon completion of the subject, students will be:</p> <ol style="list-style-type: none"> a) able to set design aims, objectives and criteria for the design of building services systems; b) able to foresee future operation and maintenance problems and prepare solutions for these problems; c) able to set aims, objectives and criteria for building services system operation, diagnosis, maintenance and management; and d) able to solicit support for system operation and performance management.
Subject Synopsis/ Indicative Syllabus	<p>Purpose of a building in use: purpose of development, building as a long term investment, concept of continuous engineering of building services systems, concept of operational systems, ease of inspection and testing.</p> <p>Design for operations and flexibility: integration of building services systems with building fabric and structure, internal layout, space utilisation, access for maintenance, change of usage, strategic response to malfunctions and disasters.</p> <p>Reliability of facilities: safety systems, failure modes and effects, availability, reliability, maintainability, back up and standby strategy.</p> <p>Operation and maintenance: information and database for building services systems, computerized data recording and mining, vendor support, operation and maintenance contracts, inventory control, maintenance strategy, contingency and disasters management.</p> <p>Commissioning and retrofit: statutory requirements on facilities in use, energy/carbon audits, retro-commissioning, renovation, rehabilitation and modernization.</p> <p>Performance assessment and benchmarking: condition monitoring, performance assessment tools and methods, types and principles of benchmarking, systematic evaluations.</p>
Teaching/Learning Methodology	<p>Delivery of the subject entails a combination of lectures, seminars, tutorials and mini-projects:</p> <ul style="list-style-type: none"> • Lectures cover introduction of the key subject elements and explanation of the relevant concepts, principles, cases and examples. • Seminars involve in-class discussions over questions which are purposely set based on the contents of some selected reading materials. • Tutorials allow students to raise any questions they may have in relation to any areas of the subject. • Mini-projects require students to demonstrate their ability of applying knowledge to accomplish

	tasks or tackle problems of the given projects.						
Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
			a	b	c	d	
	Project	20		✓	✓	✓	
	Test	20	✓	✓	✓		
	End-of-semester examination	60	✓	✓	✓	✓	
Total	100						
	<p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p>Based on examination (60%), test (20%) and project work (20%).</p>						
Student Study Effort Expected	Class contact:						
	▪ Lectures						27 Hrs.
	▪ Seminars						6 Hrs.
	▪ Tutorials						4 Hrs.
	▪ In class assessment						2 Hrs.
	Other student study effort:						
	▪ Self study						81 Hrs.
	Total student study effort						120 Hrs.
Reading List and References	<p>Hensen, J.L.M. and Lamberts, R., Building performance simulation for design and operation, Abingdon: Spon Press.</p> <p>Dhillon, B.S., Maintainability, maintenance and reliability for engineers. Taylor & Francis.</p> <p>Duffuaa, S.O., Raouf, A. and Campbell, J.D., Planning and Control of Maintenance Systems: Modelling and Analysis, John Wiley & Sons.</p> <p>Williams, B., An introduction to benchmarking facilities & justifying the investment in facilities, Building Economics Bureau Ltd.</p> <p>Seaman, A., Condition Based Maintenance – An evaluation guide for building services, Application Guide AG 5/2001, BSRIA.</p> <p>CIBSE Guide M: Maintenance Engineering and Management, The Chartered Institution of Building Services Engineers.</p> <p>Preiser, W. and Vischer, J., Assessing Building Performance, Routledge.</p>						