## Subject Description Form

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| Subject Code | **BSE4417** |
| Subject Title | **Energy Efficient Buildings and Assessment** |
| Credit Value | 3 |
| Level | 4 |
| Pre-requisite<br>Co-requisite<br>Exclusion | Nil<br>Nil<br>Nil |
| Objectives | 1. To provide students with an overall view of energy use patterns in buildings, taking into account of environmental and economic factors;<br>2. To enable students to understand the processes of energy audit and survey, including the use of appropriate instrumentation, in order to identify opportunities for energy conservation and management in buildings;<br>3. To enable students to master various building performance assessment methods, taking into consideration of pros and cons of each method;<br>4. To introduce students with the knowledge of building energy management with respect to its process and organisation;<br>5. To enable students to efficiently carry out building energy performance upgrading programmes. |
| Intended Learning Outcomes | Upon completion of the subject, students will be able to:<br>a. understand the energy use patterns in various types of buildings and the major energy end-uses, and the impacts to environment of building energy uses;<br>b. carry out energy audits and surveys based on established guideline, identifying and implementing energy management opportunities (EMO) and effectively use suitable instrumentations;<br>c. apply building energy management principle to achieving the highest possible building energy use performance;<br>d. use an appropriate method for building energy performance assessment in various buildings so as to establish energy performance benchmarks<br>e. carry out energy performance upgrading projects with respect to project planning, organizations and management |
| Subject Synopsis/ Indicative Syllabus | **Overall building energy use:** overall view of energy use, energy source, supply and distribution; energy requirement and consumption in buildings, source, energy tariffs, usage pattern, maximum demand, seasonal variation; Hong Kong energy use data and statistics in building sector;<br>**Building energy audit and survey:** Objectives and methodologies, types of audit and site survey, analysis of utility records, identification of areas for potential energy saving, detailed auditing and monitoring, instrumentation for energy audit in buildings and for major plant, building energy performance line;<br>**Building energy performance assessment:** factors affecting building energy use, introduction and comparison of existing methods, measured performance VS simulated performance, attributes for a good assessment method simulation;<br>**Building energy management**: Energy management approaches, good housekeeping practice, plan for energy conservation programme, barriers to achieving building energy efficient operation, energy policies, demand side management and its strategies, attributes of an energy manager. |
| Teaching/Learning Methodology | Lectures will be supplemented with workshops and group projects for introducing the course. Industrial speakers who are experienced in improving energy efficiency in buildings will be invited to deliver special talks, presenting case studies and highlighting both the technical and managerial |

<table>
<tr><td></td><td>approaches to solving a practical problem.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="6">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a.</td><td>b.</td><td>c.</td><td>d.</td><td>e.</td><td></td></tr>
<tr><td>Course work*</td><td>100</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>Total</td><td>100</td><td colspan="6"></td></tr>
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* For details, refer to the 2020/21 Semester 1 Subject teaching scheme/schedule.<br><br>
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:<br><br>
▪ The intended learning outcomes will be embedded in setting examination questions.<br><br>
▪ Course work will be assessed via student presentation during seminar sessions and report submission. Students will have to go through Q and A sessions to test their understandings of fundamentals and demonstrate their understanding of the intended learning outcomes.
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<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures + workshops</td><td>30 Hrs.</td></tr>
<tr><td>▪ Presentation</td><td>9 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Self-study</td><td>51 Hrs.</td></tr>
<tr><td>▪ Group project</td><td>30 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>120 Hrs.</td></tr>
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<tr><td>Reading List and References</td><td>

A World Energy Council (1993). *Energy for Tomorrow's World*, A World Energy Council, St. Martins Press.<br><br>
Census and Statistics Department (*1991 – 2010). Hong Kong Energy Statistics,* Census and Statistics Department, Hong Kong.<br><br>
CIBSE (1991). *Energy Audits and Surveys*, CIBSE Application Manual AM5.<br><br>
CIBSE Guide F: Energy efficiency in buildings, 2004<br><br>
Eastop, T. D. & Croft, D. R. (1990). *Energy Efficiency for Engineers and Technologists*, Longman Scientific & Technical.<br><br>
Kreider, J. & Rabl, A. (1994). *Heating and Cooling of Buildings -- Design for Efficiency*, McGraw-Hill, Inc.<br><br>
Meckler, M. (1994). *Retrofitting Buildings for Energy Conservation*, The Fairmont Press Inc.<br><br>
Roaf, S & Hancock, M. (1992). *Energy Efficient Buildings*, Blackwell Scientific Publication Ltd.<br><br>
Selected papers from international research journals such as Buildings and Environment, Energy and Buildings, Applied Energy, Energy Conversion and Management, ASHRAE Transactions, etc.

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