## Subject Description Form

| | |
|---|---|
| Subject Code | **BSE4312** |
| Subject Title | **Water System Engineering in Built Environments** |
| Credit Value | 3 |
| Level | 4 |
| Pre-requisite<br>Co-requisite<br>Exclusion | BSE3312 Piped Services, or equivalent.<br>Nil<br>Nil |
| Objectives | This subject aims at:<br>1. equipping students with the abilities required in designing advanced water supply and drainage systems in buildings, taking into consideration the updated research for demand and performance characteristics of the systems; and<br>2. developing student competence in making relevant decision that complies to engineering requirements on the systems. |
| Intended Learning Outcomes | a) Able to design, operate and maintain advanced systems for water supply and drainage systems in buildings<br>b) Able to evaluate the system performance and provide solutions for system improvements<br>c) Able to link fundamental knowledge with practical design and make rational system choices related material and equipment selection. |
| Subject Synopsis/ Indicative Syllabus | **Modelling for water systems:** Water demand models, simulation methods, time domain demand, multi-storey network modelling, pressure surges in air and water networks, air pressure transients, flow noise, vent-less drainage systems, provisions and facilities.<br>**Sustainability, resources and systems management:** water efficiency and water conservation measures, water and energy efficiency, water saving fixture and sustainable designs, user influences, adaptive and humanization designs, water reclaim, storage and reuse, stagnant storage, rainwater, grey water and wastewater potential, food waste drainage, policy requirement, impact of system loadings, climate change related designs, siphonic drainage systems, environment impact and assessment methods, standardization and certification, indicative applications for buildings.<br>**Diagnosis and risk management:** water system failures, defects, detection and modelling, probabilistic approach and risk based analysis, treatments of system records, parametric distributions and models, Monte-Carlo simulations, Bayesian updating, fuzzy models, estimates and uncertainty, decision of standby and reliability, decision for inspection, replacement, valuation and economic, management systems. |
| Teaching/Learning Methodology | The realisation of the learning outcomes will be based on lectures, assignments, tutorials, mini-workshop, case study and directed reading.<br>Lectures will be used to introduce topics and the necessary fundamentals, design criteria backed up by multimedia aids. Assignments at appropriate intervals will emphasise and practice choice of solutions and the factors of performance and economic; much of the directed reading will be encompassed at this theme.<br>Tutorials will provide the opportunity for questions and discussions on any problems related to lectures, assignments and case studies.<br>Seminar will provide students opportunity to explore current technology via a small scale literature investigation on a related topic of student choice.<br>Mini-workshop includes case studies in which students work in groups to present real life applications of the advanced systems for buildings. |

<table>
<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></td><td></td><td></td></tr>
<tr><td>Continuous Assessment</td><td>40</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td>End-of-semester examination</td><td>60</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>
</table>
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:<br><br>
Based on examination mark 60% and coursework assessment mark 40%. The coursework assessment is made up of in-class test(s) and student-based seminars and mini-workshop with oral presentations and written report. Written assessments bias to evaluate the learning outcomes (a) and (b). Students are expected to apply the delivered subject contents to solve for designed questions. Student-based seminars and mini-workshop are used to evaluate the learning outcomes (c). Each student will work for assigned topics in terms of reports and presentations where appropriate. Written examination is used to evaluate all the specified learning outcomes.
</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture</td><td>18 Hrs.</td></tr>
<tr><td>▪ Tutorial</td><td>6 Hrs.</td></tr>
<tr><td>▪ Seminar</td><td>9 Hrs.</td></tr>
<tr><td>▪ Workshop</td><td>3 Hrs.</td></tr>
<tr><td>▪ Assessment</td><td>3 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Review subject content</td><td>39 Hrs.</td></tr>
<tr><td>▪ Additional reading, preparation for assessments</td><td>39 Hrs.</td></tr>
<tr><td>▪ End-of-semester Examination</td><td>3 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>120 Hrs.</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td>
Introduction to statistical quality control, D C Montgomery (2008).<br><br>
Maintenance, replacement and reliability, A K S Jardine, A H C Tsang (2006).<br><br>
Annual proceedings of CIBW062, Water supply and drainage in buildings. Online Access: http://www.cibworld.nl/site/databases/publications.html
</td></tr>
</table>