Subject Description Form

Subject Code	CSE30438
Subject Title	Water Supply and Sewerage Engineering
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To develop an understanding of the practical and theoretical aspects of water supply systems to exploit raw water sources, to transport water and to distribute potable waters within the community. Similarly, the collection, transportation and control of foul and storm wastewaters are investigated together with the provision of effluent disposal facilities and an assessment of the pollution which these may cause. Students are required to undertake design work pertinent to the systems identified.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. obtain the basic knowledge and ideas relating to the analysis and design of water supply and sewerage engineering; b. formulate effective solutions to engineering problems relevant to water supply, and sewerage in Hong Kong; c. work with others in group work and take responsibility for shared activities; and d. recognize the need for, and to engage in life-long learning.
Subject Synopsis/ Indicative Syllabus	1. <u>The Availability of Raw Water</u> The nature of rainfall; the availability of ground and surface water sources; population estimation; water demands. 2. <u>Water Resources Exploitation</u> Impounding and river regulating reservoirs; wells and boreholes; constructional and operational details; water quality examination and assessment; catchment runoff/rainfall relationships. 3. <u>Analysis and Design of Water Supply systems</u> Basic principles of pipe flow, typical pipe flow problems, full flow hydraulic; the layout of water distribution systems; analysis of flows in branched and looped distribution networks; pump affinity laws and NPSH, pumping station layout and design; the siting and sizing of service

reservoirs; water supply design parameters; water hammer and surge suppression.

4. Analysis, Design and Construction of Sewerage Systems
   Wastewater flows; rainfall intensity/duration/frequency relationships; surface water sewer design by the rational, tangent and TRRL methods. Open channel flow hydraulic; the design of foul sewerage systems; design of inverted syphons. Manhole and pipeline construction; crown corrosion.

5. Effluent Disposal
   Natural processes of aeration and deoxygenation; oxygen balance in stream; the kinetics of oxygen supply and demand; the oxygen sag curve. Estimation of pollution transport in river, lake, estuarial and marine environments; the significance of dilution, dispersion, decay and advection. River and ocean outfall design.

Teaching/Learning Methodology

Lectures are delivered to cover the commonly adopted transport management techniques, their efficiencies and applications.

Assignments are provided to cover hot transport management topics which are currently proposed or have been adopted by the government. Students need to collect data, information and debates among the public. Reports have to be presented based on the applicability, effectiveness, pros and cons and concluded with self suggestions/ideas based on the result of the findings and analyses.

Presentations and discussions in tutorials provide students opportunities to improve their presentation and communication skills.

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
1. Continuous Assessment	30	✓	✓	✓	✓
2. Examination	70	✓	✓		
Total	100				

Students must attain at least grade D in both coursework and final examination (whenever applicable) in order to attain a passing grade in the overall result.

<table>
<tr><td></td><td>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

(1) Tutorials/assignments to exercise and strengthen understanding of the principle of water supply and sewerage design;

(2) Laboratory work and report writing to work in group with critical thinking and shared activity;
(3) Seminar Report to enable life-long learning; and

(4) End-of-semester examination to work independently to analyze diverse problems arising from various environmental engineering problems with respect to water supply and sewerage in Hong Kong.</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><th></th><th>Average hours per week</th></tr>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures/ Tutorials/ Laboratory</td><td>3 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Reading and study</td><td>4 Hrs.</td></tr>
<tr><td>▪ Assignments and laboratory reports</td><td>2 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>9 Hrs.</td></tr>
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</td></tr>
<tr><td>Reading List and References</td><td>Essential Texts
Swamee, Prabhata K. (Prabhata Kumar), Ashok K. Sharma, and Ashok K. (Ashok Kumar) Sharma. Design of Water Supply Pipe Networks. Hoboken, Wiley-Interscience, First edition, 2008.
Water Supply and Sewerage; McGhee, Steel, McGraw-Hill, 6th ed, 2007.
Advanced Water Distribution Modeling and Management, T. Walski, D.V. Chase , D. Savic , W. M. Greyman and S.Beckwith, E.koelle,
Bentley Institute Press, First edition 2007
Wastewater Engineering: Collection and Pumping of Wastewater, McGraw Hill, 1981.
Water Resources Engineering; Linsley, McGraw Hill, 1991.
Wastewater Engineering: treatment disposal reuse, Metcalf and Eddy, McGraw Hill, 3rd ed, 1991.</td></tr>
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