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 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 principle of water supply and sewerage engineering; b. formulate effective solutions to environmental 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; hydrology and climatology. 3. <u>Water Transportation and Distribution</u> Aquaduct types; aquaduct selection and design. Full flow hydraulic; the layout of water distribution systems; analysis of flows in distribution networks; pumping station layout and design; the siting and sizing of service reservoirs; water supply to user. 4. <u>Design and Construction of Sewerage Systems</u> 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. <u>Effluent Disposal</u> 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 will provide fundamental knowledge relating to the theoretical processing operations, and techniques of water supply and sewerage systems. Students will be required to undertake various coursework activities, which will enable them to thoroughly digest the taught contents. Tutorials will provide opportunities for students and lecturer to communicate and discuss any difficulties related to the course. It will also provide a forum for students and lecturer to discuss the ongoing coursework and laboratory activities. Laboratory will provide students with opportunities to carry out real experimental tests in order to facilitate their ability as civil and environmental engineers. After a briefing of Laboratory Safety Regulations, three laboratories will be conducted 1) Basic water quality parameters (pH, Colour, Turbidity and Conductivity); 2) BOD/COD (the 5th day Biochemical Oxygen Demand, and Chemical Oxygen Demand using potassium dichromate with Reflux method); and 3) Solids (total suspended, dissolved and volatile solid concentrations, etc.). Independent study and associated reading will require students to conduct some problem-solving exercises individually, analyze the experimental data obtained from laboratory sessions and prepare integrated laboratory reports.
Assessment Methods in Alignment with Intended Learning Outcomes	

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		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.

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.	
Student Study Effort Expected		**Average hours per week**
	Class contact:	
	▪ Lectures/ Tutorials/ Laboratory	3 Hrs.
	Other student study effort:	
	▪ Reading and study	4 Hrs.
	▪ Assignments and laboratory reports	2 Hrs.
	Total student study effort	9 Hrs.
Reading List and References	Essential Texts Water Supply and Sewerage; McGhee, Steel, McGraw-Hill, 6th ed, 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.	