Subject Description Form

Subject Code	CSE574
Subject Title	Drainage Design
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Recommended background knowledge: Students should have a basic study background of fluid mechanics, hydrology and/or hydraulics at the undergraduate level.
Objectives	To provide students the knowledge of the theory and practice of the design of surface and subsurface drainage systems. The application of basic engineering principles to the solution of drainage problems is also emphasized.
Intended Learning Outcomes	Upon completion of the subject, students will be able: a. to grasp the knowledge of the hydraulics of drainage systems and skills to design simple drainage structures; b. to identify potential drainage problems and suggest remedial measures for rehabilitating/designing drainage systems; c. to function in a team project, write technically sound reports and work independently in solving engineering problems; and d. to have critical and creative thinking.
Subject Synopsis/ Indicative Syllabus	**Keyword Syllabus** i) Urban storm drainage Urban hydrological cycle. Empirical flood formulae; Flood probability. Runoff on paved and unpaved surfaces. Design of groundwater level. Design of storm sewers. Gutters, inlets, manholes and outlets. Design of road drainage - longitudinal and cross drainage, culverts. Runoff control. ii) Subsurface drainage Under drains and their layout. Design of closed underdrains. Design of open underdrains. Design for leaching requirement. Excavation dewatering - pumping methods; exclusion methods. iii) Flood mitigation River training; Design of dike and embankment; Channel improvement; Floodways. Polder scheme.

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<tr><td></td><td>iv) <u>Pumped Drainage</u>

Cost-benefit analysis; Design considerations; Pumping head; Selection of pump; Pumping station; Maintenance and control; Tidal outlet.

v) <u>Outfall Design</u>

Mixing phenomena – initial dilution, advection and dispersion processes. Outfall hydraulics.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Fundamental knowledge will be covered in the lectures. Tutorials will provide opportunities for discussion of lecture materials and will also be conducted in the form of example class and problem-solving session to supplement understanding from lectures. Computer laboratory work will help students appreciate the basic principles and familiarize themselves with basic computer tools.</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="4">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></tr>
<tr><td>1. Continuous Assessment</td><td>40%</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Written Examination</td><td>60%</td><td>√</td><td>√</td><td></td><td>√</td></tr>
<tr><td>Total</td><td>100%</td><td colspan="4"></td></tr>
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Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

The continuous assessment will be based on laboratory/project reports (20%) and assignments/quizzes (20%).

Written examination is evaluated by final examination (60%).

Students must pass the final examination and achieve a passing overall score / grade to pass the subject.</td></tr>
<tr><td>Reading List and References</td><td><u>Textbooks and Manuals</u>

D. Butler, C.J. Digman, C. Makropoulos, and J.W. Davies, Urban Drainage, CRC Press, 2018.

Drainage Service Department (DSD), Hong Kong Government, Stormwater Drainage Manual, Planning, Design and Management (5th Edition), 2018.</td></tr>
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	Fischer, H.B. et al., *Mixing in Inland and Coastal Waters*, Academic Press, 1979. Haestad Methods Engineering Staff, et al. *Computer Applications in Hydraulic Engineering*, Haestad Methods Inc, 2002. P. Smart & J.G. Herbertson, *Drainage Design*, Van Nostrand Reinhold, 1992. D. Chin, *Water-Resources Engineering (3rd Edition)*, Pearson, 2012. R.K. Linsley, M.A. Kohler, and J.L.H. Paulhus, *Hydrology for Engineers*, McGraw Hill, 1982. J.E. Gribbin, *Introduction to Hydraulics & Hydrology: With Applications for Stormwater Management (4th Edition)*, Cengage Learning, 2013 S.N. Ghosh, *Flood Control and Drainage Engineering (4th Edition)*, Oxford & IBH Publishing Company Pvt. Limited, , 2014. **Technical Journals** IAHR Journal of Hydraulic Research ASCE Journal of Hydraulic Engineering; and Journal of Irrigation and Drainage Engineering Proceedings of the Institution of Civil Engineers