

ESSC 3320 – Hydrogeology

Fall 2023

Mondays 13:30 - 14:15, Wednesdays 13:30 - 15:15 (LHC G03)

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Office Hours: Yen Joe Tan, **Mon** 14:15 – 15:15 (MMW 317), or by appointment

Required Text: None

Recommended Reading: (These titles are on reserve in the University Library reference desk. E-copies are also available.)

- a. **Fetter, C. W., *Applied Hydrogeology* (4th edition), Pearson, 612 pp., 2014.**
- b. Hornberger, G.M., Wiberg, P.L., Raffensperger, J.P. and P. D'Odorico, *Elements of Physical Hydrology*, 2nd edition, John Hopkins UP, 378 pp., 2014.

Course Grade: Weekly quizzes (20%)
Homework assignments (35%)
Final exam (25%)
Final project (20%)

Sept 4, 6	Hydrogeology and water resources. The hydrologic cycle. Water budget.
Sept 11, 13	Properties of water. Precipitation and evapotranspiration.
Sept 18, 20	Open channel hydraulics. Catchment hydrology: streams and floods. Hydrograph separation. Basic statistics and flood frequency analysis.
Sept 25, 27	Underground water resources. Properties of porous medium.
Oct 2	No class (The day following National Day)
Oct 4, 9	Darcy's law: hydraulic conductivity, hydraulic head, specific discharge and seepage velocity. Aquifer characteristics, anisotropy and heterogeneity.
Oct 11, 16	Principles of fluid dynamics. Laminar and turbulent flows. Compressibility and effective stress, storage properties. Conservation of mass and governing equations for groundwater flow.
Oct 18	Steady flow in confined and unconfined aquifers, flow net.
Oct 23	No class (Chung Yeung Festival)
Oct 25	Regional groundwater flow.
Oct 30, Nov 1	Introduction to numerical simulation techniques.
Nov 6, 8	Transient flow and well hydraulics. Pumping and slug tests.
Nov 13, 15	Water in the unsaturated zone. Infiltration. Groundwater in geologic and engineering processes. Saltwater intrusion.
Nov 20, 22	Surface water pollution and groundwater contamination. Contaminant hydrogeology.
Nov 27, 29	Final project presentations
Dec 6-22	Centralized final examination (exact schedule will be announced by CUHK)

*exact syllabus subject to change

Academic Honesty and Plagiarism

Attention is drawn to University policy and regulations on honesty in academic work, and to the disciplinary guidelines and procedures applicable to breaches of such policy and regulations. Details may be found at <http://www.cuhk.edu.hk/policy/academichonesty/>. With each assignment, students will be required to submit a signed declaration that they are aware of these policies, regulations, guidelines and procedures.
