

ESSC 3320 – Hydrogeology

Fall 2021

Tu Th 12:30 - 14:15 (Wu Ho Man Yuen 407)

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Office Hours: Yen Joe Tan, **Tue** 14:30 – 15:30 (MMW 317), or by appointment
Hui Liu, **Wed** 16:30 – 17:30 (MMW 309), 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.
- c. Fitts, C.R., *Groundwater Science*, 2nd edition, Academic Press, 672 pp., 2013.
- d. Mays, L. W., *Ground and Surface Water Hydrology*, John Wiley & Sons, 640 pp., 2011
- e. Schwartz, F. W. and H. Zhang, *Fundamentals of Ground Water*, John Wiley & Sons, 583 pp., 2003

Course Grade: Weekly quizzes (30%)
Homework assignments (30%)
Project (40%)

Sept 7, 9	Hydrogeology and water resources. The hydrologic cycle. Water budget.
Sept 14, 16	Properties of water. Precipitation and evapotranspiration.
Sept 21, 23	Open channel hydraulics. Catchment hydrology: streams and floods. Hydrograph separation. Basic statistics and flood frequency analysis.
Sept 28	Underground water resources. Properties of porous medium.
Sept 30, Oct 5, 7	Darcy's law: hydraulic conductivity, hydraulic head, specific discharge and seepage velocity. Aquifer characteristics, anisotropy and heterogeneity.
Oct 12	Principles of fluid dynamics. Laminar and turbulent flows.
Oct 14	No class (Chung Yeung Festival)
Oct 19	Compressibility and effective stress, storage properties. Conservation of mass and governing equations for groundwater flow.
Oct 21, 26	Steady flow in confined and unconfined aquifers, flow net. Regional groundwater flow.
Oct 28, Nov 2	Introduction to numerical simulation techniques. The finite difference method.
Nov 4	No class (Congregation)
Nov 9, 11	Transient flow and well hydraulics. Pumping and slug tests.
Nov 16	Water in the unsaturated zone. Infiltration.
Nov 17	Groundwater in geologic and engineering processes. Saltwater intrusion.
Nov 23	Surface water pollution and groundwater contamination. Contaminant hydrogeology.
Nov 25	Project Presentations I
Nov 30	Project Presentations II
Dec 2	Project Presentations III

Final paper due December 15th, 2021

*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. For group projects, all students of the same group should be asked to sign the declaration. For assignments in the form of a computer-generated document that is principally text-based and submitted via VeriGuide, the statement, in the form of a receipt, will be issued by the system upon students' uploading of the soft copy of the assignment. Assignments without the receipt will not be graded by teachers. Only the final version of the assignment should be submitted via VeriGuide.
