



مرکز تحقیقات آبهای زیرزمینی (متآب)

Groundwater Research Center (GRC)

قابل توجه دانشجویان درس هیدروژئولوژی پیشرفته

COURSE OUTLINE – Advanced Hydrogeology (32143876)

NOTE: This course outline and schedule is tentative and it may be modified depending on the student needs and the time available.

Course Description:

This is a course for MSc. students in Hydrogeology. We will explore important themes such as:

- Review (basic definitions, principles, aquifer characteristics and water balance)
- GW storage, GW as a resources and GW exploitation
- GW flow equations and solutions to these equations (analytical and numerical solutions)
- Contaminant hydrogeology, solute transport and equations of mass transport

Lab 1 GW storage (Confined case and unconfined case)

Lab 2 Basic properties and Darcy's Law (Aquifer model, constant head and falling head permeameters)

Lab 3 Finite difference solutions to the GW flow equations (Constructing flow nets and potentiometric profile using Excel)

Lab 4 Aquifer test techniques (Lab and field techniques to estimating K, T & S)

Lab 5 The great Mashhad water tasting event (Bring available brand of spring water, tap water, and rain water to test for EC/TDS and comparing major elements)

Lab 6 Contaminant transport

Course Format

Lecture series will be based on selected topics from text books.

Lab demonstrations and assignments will be assigned based on discussed material in lecture series

Coordinator

Hossein Mohammadzadeh

Assistant professors,

Groundwater Research Center (GRC)

E-mail: mohammadzadeh@um.ac.ir OR hm@uottawa.ca

Course website: www.um.ac.ir/~mohammadzadeh/ OR www.science.uottawa.ca/~hm/

Course Schedule (Lectures)

All lectures and labs: Faculty of Science, Dept of Geology : *to be announced*)

Time *to be announced*

Office hours *to be announced*

Course Evaluation

- Assignments and lab reports 20%
- Project presentation & report 20%
- Midterm Exam 25%
- Final Exam 35%

Policy regarding assignments:

All assignments and reports have to be handed in on the due date. Late and/or sloppy assignments will be penalized: 10% will be deducted for each day that an assignment is late. An assignment that is late by more than 5 days will not be marked.

Suggested Textbooks:

1. LaMoreaux P.E., (2008). *Environmental Hydrogeology, Second Edition*. CRC Press
2. Goldscheider N., Drew D., (2007). *Methods in karst Hydrogeology*. Taylor & Francis
3. Witkowski, A. J., Kowalczyk, A., Vrba, (2007). *Groundwater Vulnerability Assessment and Mapping*. Taylor & Francis
4. Nielsen D.M., (2006). *Practical Handbook of Environmental Site Characterization and Groundwater Monitoring – Second Edition*. Taylor & Francis
5. Nonner Johannes C., (2006). *Introduction to Hydrogeology*. Taylor & Francis
6. Bair E.S., Lahm T.D., (2006). *Practical Problems in Groundwater Hydrology*. Pearson Education, Inc.
7. Hudak Paul F., (2005). *Principles of Hydrogeology 3rd Edition*. CRC Press.
8. Schwarts F.W. Domenico P.A. (2001). *Physical and Chemical Hydrogeology*. John Wiley and Sons, 824p.
9. Fitts, Charles R., (2002). *Groundwater Science*. Academic Press, 450p.
10. Schwartz F.W., Zhang (2002). *Fundamentals of Ground Water*. Wiley.
11. Fetter C.W., (2001). *Applied Hydrogeology*. Prentice Hall, 691p.
12. Freeze R.A., Cherry J.A., (1979). *Groundwater*. Prentice Hall, 604p.