GEOS-4430: Introduction to Hydrogeology [1]

Fall, 2013

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This course introduces the principles of fluid migration in the earth's crust. Topics include observation and quantification of the water cycle, including ground and surface water flow; regional flow, flow nets, Darcy's Law, well testing, water quality and contaminant transport. The course is intended to provide the basic background required for study of or employment in hydrogeology, and in particular much of the background currently needed for the ASBOG Professional Geologist Licensing Exam. GEOS 4430 fulfills one of the breadth requirements for the B.S. Geology degree.

Class meets T 10am-12:45pm in ROC 2.103 (see campus map) beginning Aug. 27th, 10:00am, UTD Call Number 86576 (GEOS 4430) and 89913(GEOS 5V08-015).

See also Gambling on Water in Las Vegas.

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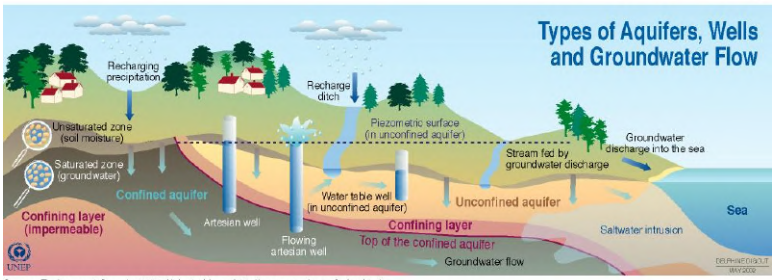

Source: Environment Canada, 2001 (Adapted from: http://www.ec.ca/water/index.htm).

Figure 1: A graphical overview of many of the topics covered in GEOS 4430. The groundwater cycle, after UNEP[3]

1 Course Organization

1.1 Syllabus

1.2 Textbook

The course textbook will be Todd and Mays (2005). A copy of the 2nd edition will be on reserve at the UTD Library. Previously the course used Fetter (2001) which has a still-useful supplementary website with problem solutions and example material.

1.3 Grading

Course grades will be determined using the following weights: 40% exercises/homework, 30% midterm, 30% final.

1.4 Graduate Section

The graduate section (GEOS 5310) will meet in concert with the undergraduate section (including field trips), but will be required to complete additional problems in exercises and homework.

[1] see this document online at `http://www.utdallas.edu/~brikowi/Teaching/Hydrogeology`

Table 1: Course Syllabus.

Week	Date	Text Chapters	Topic
1	Aug. 27	1	The Importance of Hydrogeology
2	Sept. 3	2	Hydrologic Cycle: Measurement & Quantification
3	Sept. 10	2	Hydrologic Cycle (cont.)
4	Sept. 17	3, 6	Streamflow/Baseflow
5	Sept. 24	3, 6	Streamflow (cont.)
FT1	Sat. Sept. 28		Field Trip: Surface Water Measurements
6	Oct. 1	2	Aquifer Properties
7	Oct. 8	3	Darcy's Law, Principles of Flow
8	Oct. 15	3	Regional Groundwater Flow
9	Oct. 22	3	Flow Nets
10	Oct. 29		No class (GSA-Denver)
11	Nov. 5	4-5	Well Hydraulics
FT2	Sat. Nov. 9		Field Trip: Groundwater Measurements
12	Nov. 12	2	Unsaturated Flow
13	Nov. 19	7-8	Water Quality/Water Chemistry
14	Nov. 26		No class (Fall break)
15	Dec. 3	10, 13–14	Climate Change & Petroleum Hydrology
16	Dec. 10		Final Exam

2 Online Resources

2.1 Lecture Notes

PDF versions of the lecture notes are available online via the following links. In general these will only be accessible from a UTD IP address, install VPN to access from off campus.

Set	**Topic**
1	Introduction to Hydrogeology
2	Quantification of the Hydrologic Cycle
3	Precipitation
4	Streamflow
5	Aquifer Properties
6	Darcy's Law
6.5	Flow Nets
7	Regional Flow/Flow Nets
8	Well Hydraulics
9	Unsaturated Flow
10	Water Chemistry
11	Chemical Transport

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2.2 Exercises

The second half of most lectures will be devoted to completing an exercise, usually on the Geosciences lab computers. PDF versions of the exercises are available online through the following links. Note the online solutions to the odd-numbered problems in the textbook have moved[4]:

Week	Topic
1	Consequences of Global Warming
2	Global Water Balance
3	Baseflow Index
4	Flownets
	Sample Midterm
5	Well Tests
6	Soil Moisture
7	Piper Diagrams
	Sample Final

2.3 Lab Notes

Find the lab notes here. You should bring a copy of the notes with you, I'd recommend printing them 2 or 4 pages/sheet using Acroread "Page Setup" or "Printer Properties" dialog.

2.4 Textbook Software

For students who bought used textbooks, the software from the textbook CD-ROM is temporarily available online[5]. Download the appropriate ZIPfile, unpack it, move to the newly created subdirectory, and run `setup.exe`. This should start the InstallShield setup for that software package.

Note that update versions of the software are available at the following links:

- Aqtesolv[6]

2.5 Hydrology Employment

- information on Texas Professional Geologist registration[7]

[4] http://www.appliedhydrogeology.info/
[5] ./Homework/Software/
[6] `http://www.aqtesolv.com/demo.htm`
[7] `http://www.utdallas.edu/~brikowi/EnvironProgram/Licensure/tx_licensure.html`

References

Fetter, C. W., 2001, Applied Hydrogeology. Prentice Hall, Upper Saddle River, NJ, fourth edn., ISBN 0-13-088239-9. URL http://vig.prenhall.com/catalog/academic/product/0,1144,0130882399,00.html

Todd, D. K., Mays, L. W., 2005, Groundwater Hydrology. John Wiley & Sons, Hoboken, NJ, third edn., ISBN 978-0-471-05937-0. URL http://www.wiley.com/WileyCDA/WileyTitle/productCd-EHEP000351.html