Geology 4418/5404 – Hydrology

Spring, 2016
Class: MWF 11-11:50, WSB 101
Lab M 2-5, ACR 104 (or WSB 310?)

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Office Hours: MW 10-11; TR 9:00-10:30

Course description: This course is designed to present a comprehensive introduction to hydrogeology and to provide the student with a knowledge of the hydrogeologic aspects of the Trans-Pecos region.

Texts: Applied Hydrogeology, 4th edition, by C.W. Fetter (ISBN 0-13-088239-9);
Hydrogeology Laboratory Manual, 2nd edition by Lee et al. (ISBN 0-13-046549-6)

Grading: Grading will be based upon:

	Points each	Number	Total	%
Lab Projects	20	12	240	29%
Homework	10	15	150	18%
EX1	100	1	100	12%
EX2	100	1	100	12%
EX3	150	1	150	18%
Term project			100	12%

Lab projects will consist of work taken from the lab manual (Lee et al.) with additional material assigned as needed. Each assigned chapter in the lab manual (and occasional additional material) will be given one week of lab time to complete.

Homework will be assigned on a weekly basis. This work will be pertinent to the current lecture material. These assignments are designed to encourage the student to read the course material in advance.

2 Midterms and a Final exam will be given to assess the student's progress towards understanding the concepts of the class.

The **Term Project** will include an analysis of a hydrologic system. The undergrads will complete labs 16-18 (in the lab manual) for this project. The grad students will complete an analysis similar to that described in chapters 19-21 in the lab manual.

Field trips are scheduled to provide the student with basic field experience. Three trips are scheduled. Students are required to attend at least two of the three trips. The trips will all be weekend camping expeditions. The trip destinations are:

- February 26 - 28: Entrance bar on the Rio Grande at Big Bend National Park. Here, we will measure discharge using various types of equipment and we will complete a topographic survey of the bar and the river channel.

- March 25 – 27: Alamito creek. Here, we will assist with a fluvial assessment of Alamito creek, determine fluvial aquifer hydrogeologic parameters and assist with a topographic survey.
- April 15 – 17: Terlingua creek at O2 ranch. Here we will contribute to a topographic survey for geomorphic change detection analysis and determine fluvial aquifer hydrogeologic parameters to compare to the Alamito creek system.

These will require a written summary and analysis that will be incorporated into the lab.

Assignment submission: Most assignments (homework, labs …) are to be submitted via Blackboard in *.pdf format. A placeholder will be created in Blackboard for these submissions. Students can either create their lab or homework reports in a word processor and print to pdf, or handwritten labs or homework assignments can be scanned to pdf and submitted in that fashion. Photographs of a hardcopy page will not be accepted. Submissions must be in *.pdf format.

Attendance: Attendance will be tracked and will be factored into the final grade. I follow the "first one is free" philosophy for this: you can miss a class or a lab and it will not count against you, but beyond that missing a lab or class (for unexcused reasons) will result in a loss of your total point count of 7% for a missed lab and 2.3% for a missed class (out of 100% for the final class grade).

Upon successful completion of this course, **the student will be able to**:

- Understand the basic principles of hydrology including the hydrologic cycle, recharge, groundwater flow and discharge
- Measure stream discharge using modern equipment including: Marsh McBirney, Sontek Flow Tracker ADV and Teledyne ADCP
- Collect topographic data necessary to assess temporal changes in a river/stream system
- Design a pumping test to assess the quality of an aquifer, and to interpret the results of this test
- Interpret water chemistry data and determine aquifer inputs to water chemistry; and to understand water quality standards and concerns associated with water pollution
- Interpret lab and field data in order to propose a development plan for an aquifer for a water supply; understand water law and implications toward developing the aquifer
- Intepret model (MODFLOW for example) data for an aquifer assessment

Undergraduate students will be given fewer test questions and will complete a different term project.

Conduct: Students are expected to observe the University's Code of Student Conduct (see Student Handbook, http://www.sulross.edu/pages/4521.asp).
Please turn OFF all cellular phones, IPODs, MP3s, etc.

Disability: It is Sul Ross State University policy to provide reasonable accommodation to students with disabilities. If you would like to request such accommodations because of a physical, mental, or learning disability, please contact the Disabilities Services Coordinator in the University Center, Room 211, or call (432) 837-8178.

week	date	Topic	Lecture Reading	Lab	Lab # /Chapter	Field Trip	HW	Grad Term Project schedule
1	1/20	Introduction	1	None				
	1/22	Water	1				1	
2	1/25	Hydrologic cycle	2	Intro to lab, hardware, software, field equipment	1/1			
	1/27	Hydrologic cycle	2				2	
	1/29	Hydrologic cycle	2					
3	2/1	Properties of Aquifers	3	Water Budget of Mono Lake: Precipitation and Evaporation	2/2			pick a problem
	2/3	Properties of Aquifers	3				3	
	2/5	Properties of Aquifers	3					
4	2/8	Groundwater Flow	4	Water Budget of Mono Lake: Runoff, Storage, and Groundwater Flow	3/3			compile literature
	2/10	Groundwater Flow	4				4	
	2/12		**EX 1**					
5	2/15	Groundwater Flow	4	Regional Aquifer Study	4/4			
	2/17	Groundwater Flow	4				5	
	2/19	Flow to wells	5					
6	2/22	Flow to wells	5	Porosity, Specific Yield, and Specific Retention	5/6			map of wells or flow data
	2/24	Flow to wells	5				6	
	2/26	Flow to wells	5			FT - Boq		
7	2/29	Recharge	6	FT - Boquillas trip data processing	6/FT			
	3/2						7	
	3/4	Recharge	6					
8	3/7	Recharge	6	Darcy's Law and Hydraulic Conductivity	7/7			tables of level and chemistry data
	3/9	Regional Flow	7				8	
	3/11	Regional Flow	7					
	3/14	Spring Break						
9	3/21	Regional Flow	7	Modeling Groundwater Flow with Flownets	8/8			
	3/23	Geology and groundwater	8				9	
	3/25	Geology and groundwater	8			FT - Alamito		
10	3/28	Geology and groundwater	8	Methods for analyzing aquifer test data	9/9			potentiometric surface map
	3/30	Geology and groundwater	8				10	
	4/1	Water Chemistry	9					
11	**4/4**		**EX 2**	Water Chemistry and Water Quality	10/5			document recharge / discharge
	4/6	Water Chemistry	9				11	
	4/8	Water Chemistry	9					
12	4/11	Water Chemistry	9	Aquifer testing II: Nonideal aquifers	11/10			construct topo and geologic cross sections
	4/13	Water Quality	10				12	
	4/15	Water Quality	10			FT - O2		
13	4/18	Water Quality	10	Process field trip data	12/FT			analyze temporal and spatial variations
	4/20	Groundwater Development	11				13	
	4/22	Groundwater Development	11					
14	4/25	Groundwater Development	11	Aquifer testing III: Slug-Test Data Evaluation	13/11			continue analysis
	4/27	Field Methods	12				14	
15	4/29	Field Methods	12					
	5/2	TBD		Project presentation	14/Proj			Project Presentation
	5/4	TBD		**10:15 AM**		last class	15	
	5/11	**Final Exam Wednesday at 10:15**	**EX 3**					