



GL 199 Hydrogeology
Spring 2013
M/W/F: 8:00 to 8:50 a.m. Room U 095

Instructor Contact Information:	Tara Kulkarni, Ph.D., P.E. Assistant Professor Office: U224 Phone: (802) 485-2268 Email: tkulkarn@norwich.edu Office Hours: Mon: 2 pm to 3 pm; Tue/Thu: 9:20 -11:20 am; or by appointment
Course Description:	A course that covers the basic principles of groundwater flow, including its development and protection as a natural resource, and the assessment and remediation of groundwater contamination.
Credit Hours	3
Pre/Co-requisite:	MA107, and EG109 or GL110
Required Textbook	Fetter, C.W. (2001). Applied Hydrogeology, Fourth Edition, Prentice Hall. ISBN – 0-13-088239-9
Course Learning Outcomes:	By the end of the course you should be able to achieve the following learning outcomes: <ol style="list-style-type: none">1. Demonstrate knowledge of the hydrologic cycle in the specific context of groundwater, its flow and local and regional distribution, as a natural resource2. Use analytical knowledge of mathematics, physics and chemistry to calculate basic aquifer properties and describe the interactive processes between the aquifer and groundwater3. Develop basic mapping and modeling skills to track groundwater flow and movement as well as contaminant plumes that will flow with groundwater4. Formulate techniques to develop groundwater as a water source.5. Create strategies to assess groundwater contamination by studying field methods.6. Gain an understanding of some basic remediation methods that are used to clean up subsurface contamination.7. Communicate using written and oral tools and engage peers in a scientific dialogue

Course Topics and Tentative Schedule (subject to change)		
Week/ Dates	Activity	Additional Information
M 1/14	Introductions Syllabus Ch. 1: Water	
W 1/16	Ch. 1: Water	Assignment 1 out.
F 1/18	Ch. 2: Elements of the hydrologic cycle	
M 1/21	Ch. 2: Elements of the hydrologic cycle	<i>Drop/Add period ends.</i>
W 1/23	Ch. 2: Elements of the hydrologic cycle	Assignment 1 due. Assignment 2 out.
F 1/25	Ch. 3: Properties of aquifers	Paper part 1 due: Topic submission and appointment to discuss the topic with me.
M 1/28	Ch. 3: Properties of aquifers	
W 1/30	Ch. 3: Properties of aquifers	Assignment 2 due. Assignment 3 out.
F 2/1	Ch. 4: Principles of groundwater flow	
M 2/4	Ch. 4: Principles of groundwater flow	
W 2/6	Ch. 4: Principles of groundwater flow	Assignment 3 due. Assignment 4 out.
F 2/8	Ch. 4: Principles of groundwater flow	
M 2/11	Ch 5: Groundwater flow to wells	
W 2/13	Ch 5: Groundwater flow to wells	Assignment 4 due.
F 2/15	Exam 1 review	
M 2/18	Exam 1	
W 2/20	Ch 5: Groundwater flow to wells	Paper part 2 due. Detailed outline and 3 references. Assignment 5 out.
F 2/22	Ch 5: Groundwater flow to wells	
M 2/25	Ch 6: Soil moisture and groundwater recharge	
W 2/27	Ch 6: Soil moisture and groundwater recharge	Assignment 5 due. Assignment 6 out.
F 3/1	Ch 7: Regional GW Flow	
M 3/4	Ch 7: Regional GW Flow	<i>Mid semester grades due</i>
W 3/6	Ch 9: Water chemistry	Assignment 6 due. Assignment 7 out.
F 3/8	Ch 9: Water chemistry	
March 9 – March 17	<i>Enjoy your Spring Break!!!</i>	
M 3/18	Ch 9: Water chemistry	
W 3/20	Ch 9: Water chemistry	Assignment 7 due. Assignment 8 out.
F 3/22	Ch 8: Geology of GW occurrence	<i>Last day to withdraw from</i>

		<i>class with a grade of W</i>
M 3/25	Ch 8: Geology of GW occurrence	
W 3/27	Ch 8: Geology of GW occurrence	Assignment 8 due. Assignment 9 out.
F 3/29	Ch 10: GW contamination	
M 4/1	Ch 10: GW contamination	
W 4/3	Ch 10: GW contamination	Assignment 9 due.
F 4/5	Exam 2 review	
M 4/8	Exam 2	
W 4/10	Ch 10: GW restoration	Paper part 3 due – Draft paper and meeting appointment Assignment 10 out.
F 4/12	Ch 10: GW restoration	
M 4/15	Ch 11: GW development	
W 4/17	Ch 11: GW development	Assignment 10 due.
F 4/19	Ch 12: Field Methods	
M 4/22	Ch 12: Field Methods	
W 4/24	Paper presentations	Final paper and PowerPoint presentation due.
F 4/26	Paper presentations	
M 4/29	Final exam review	
W 5/1	Guest Lecture	
F 5/3	Guest Lecture	
Tuesday 5/7	Final Exam	8:00 am in U095

**Student Learning
Tasks
(SLTs)/Responsibilities**

Your semester grades will be determined by your performance on the Student Learning Tasks summarized below:

<i>SLT</i>	<i>Percentage</i>	<i>Points</i>
Homework Assignments	20	200 (10-20 points each)
Research Paper	20	200
Exam 1	15	150
Exam 2	15	150
Final Exam	20	200
Attendance and in class participation	10	100
TOTAL	100	1000

The following grading scale will be used to determine semester grades:

90-100% - A	85-89.9 – B+
80-84.99 – B	75-79.99 – C+
70-74.99 – C	69.99-65 – D
<65 - F	

Course Policies:

Attendance:

You attendance is required during all class periods. It is entirely your

responsibility to study any material covered during any class periods that you may miss. Missing any more than 5 class periods in a row (without prior notification and approval of instructor) will result in an F grade. Missing any more than 6 class periods during the entire semester (without prior notification and approval of instructor) will result in a semester grade that is one lower than that achieved by you based on your performance in the class. Please note that any notification to the instructor has to be made by email (tkulkarn@norwich.edu). Any verbal notification will not be considered sufficient.

Class participation:

You will be expected to actively participate in classroom activities and discussions. Please bring your textbooks and calculators to every class as we will be using these frequently.

I will use NUoodle periodically to make announcements, post assignments, solutions, instructions for research papers and supplementary material throughout this class. You should use your Norwich login information to access NUoodle. Once in NUoodle, you are welcome to revise your profile to include a non-Norwich email address that you may be using predominantly.

If you come across any trouble using NUoodle anytime during the semester, please contact me right away. No allowances will be made for not knowing how to use NUoodle or navigate in and around it.

Homework:

A total of 10 assignments worth 10-20 points each will be handed out on most Wednesdays of the semester and will typically be due the following Wednesday, giving you a week to complete the assignment.

Submission Guidelines:

1. The cover page must include your name, your team members' names, and the pledge (see "Pledge" below).
2. You may work in groups to complete your homework assignments as long as all members in your group are mentioned on the cover page. However, you are expected to completely understand and have actively participated in all assignments. If computer programs, such as spreadsheets and data visualization programs, are used, each student must prepare his/her own computer files and output (spreadsheets, graphs, etc.). Turning in duplicates of a single computer file/output is not acceptable.
3. ***Pledge:*** All assignments must be pledged. Please write "I have abided by the Norwich University honor code" and sign your name.
4. ***Due Dates:*** Due dates will be specified on the assignment. All assignments must be turned in as you walk into the classroom on the due date. No late homework will be accepted.

Study Buddy:

There are a LOT of terms and definitions to memorize in this class and it may be useful to have a designated in class study buddy throughout the semester. Additional details will be provided in class.

Research Project:

You will write an individual research paper, on a topic of hydrogeological importance. The Norwich library, museum and archives will be used extensively for this project. Additional details will be provided in class.

Extra Credit:

Extra credit opportunities will be made available throughout the semester as pertinent. Any points earned during the semester will be added to your homework scores.

Honor Code and Policy on Cheating**Norwich University Academic Honor Policy:**

The Students Rules and Regulations clearly state that all Norwich University students are bound by the Honor Code “A cadet will not lie, cheat, steal or tolerate those that do”. Please refer to the www.norwich.edu website for additional guidelines.

Cheating or taking credit for somebody else’s work in assignments, projects, quizzes, exams or other aspects of this course will not be tolerated and will be dealt with at the instructor’s discretion. Severe violations may be punished with a failing grade in the course.

Students with Disabilities

The Academic Achievement Center (4th Floor Kreitzberg, Suite 408) determines eligibility for accommodations for all students with disabilities. You must provide documentation to the AAC if you desire accommodations. If you used any special services, such as tutoring, in high school, if you know that you have a condition that requires accommodation, or you believe that you might have, you must contact the AAC. Conversations with faculty and staff are confidential. The phone number is x2130.

Syllabus Change Policy

This syllabus is a guide for the course and is subject to change with advance notice.

Prepared by:

Dr. Tara Kulkarni; Last modified on 1.13.2013

Research Paper:

For this class, you will write a research paper/develop a case study or technology review on a topic of hydrogeologic importance that may be of interest to you.

Logistics:

Length: The paper should not be more than 10 pages long, double spaced, Times New Roman font size 12 (excluding the title page and references).

Sections of the paper:

- Title page, your name, date
- Abstract – A one-two paragraph summary of the paper, which explains the topic of your choice and your findings based on the available research.
- Introduction – Make a case for why you selected the topic you did, its relevance and relevant literature reviewed.
- Main content – Should follow a logical thought process and be easy to read and understand. Include any relevant figures and tables, remembering to label these and reference them within the text of you paper.
- References – Be consistent in the use of your selected reference style.

Style Guide:

There are several web resources for writing good research papers. One of the most commonly used reference source is <http://owl.english.purdue.edu/owl/resource/658/1/> In addition, the Kreitzburg Library at Norwich has excellent resources for conducting research.

Due Dates:

1. Topic selection and approval: Friday, January 25, 2013
2. Outline and 3 references: Wednesday, February 20, 2013
3. Draft paper and progress meeting: Wednesday, April 10, 2013
4. Final paper: Wednesday, April 24, 2013

Grading:

The paper will be graded as follows:

- Topic selection and approval – 10 points
- Detailed outline and references – 30 points
- Paper draft – 30 points
- Final paper – 80 points
- PowerPoint and Presentation – 50 points

Total = 200 points

Final paper: Wednesday, April 24, 2013. A hard copy should be submitted in class. In addition, an electronic copy of your file should be submitted. It should be named as LASTNAME_Papertitle and submitted by email to me at tkulkarn@norwich.edu. Files without this naming convention will not be graded.

Presentation: The presentation is worth 50 points and the assignments and the schedule is as follows:

<u><i>Student Name</i></u>	<u><i>Day/Date</i></u>