

ENVI194/GEOL194: Water Science and Policy

Tues and Thurs 9:40-11:10 am OLRI Room 241

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Course Overview: Many scientists and political leaders argue that the world is in desperate need of a “blue revolution” to provide safe, clean and accessible water for human and ecosystem services. Drawing from the fields of hydrology, political science, geography, and history, this course will introduce students to the basic analytical tools necessary to understand surface and groundwater processes. This interdisciplinary course is team taught by two professors affiliated with the Environmental Studies department.

Through a focus on large river basins, we will examine historical and emerging challenges to the sustainable use of water. The course begins with an overview of scientific concepts, water laws and institutions, and development challenges such as flood prevention, hydroelectric energy generation and groundwater contamination. In the second half of the course, we will shift our attention to the application of these concepts to major world water systems. Students will choose a domestic or international river system to examine for their final poster and paper project.

Our fieldtrips will introduce students to the “Three Rivers” region of Minnesota. Students will measure water discharge during a fieldtrip to the Sunrise River, a tributary of the St. Croix River. We will discuss the effects of dams and riverfront development on the urban corridors of the Mississippi River. We will also learn about the impacts of industrial agriculture on the Minnesota River. Through exercises, homeworks, and fieldtrips, students will also be introduced to the plethora of government agencies and NGOs that are involved with river related concerns.

This course can be used to fulfill requirements for the Geology and Environmental Studies majors and will be listed as a Q1 course, satisfying one of the Quantitative Thinking course requirements at Macalester.

Readings/Assignments: <http://moodle.macalester.edu> is where you will find readings, assignments, helpful weblinks and announcements. This is also a place where you can post questions and comments of your own. You will also be able to share data with each other here. Check it frequently!

There are no required textbooks for this course, outside of the summer reading assignment. Most of the readings are available at the through the library ERES system. A few of the required readings can be downloaded from the course Moodle page. We reserve the right to add/change the reading assignments during the course.

All assigned readings must be completed prior to the class meeting. You will be required to complete assigned 'reading reflections' by 9 am the morning of class. No late reading reflections will be accepted.

Student Evaluation:

Students will be evaluated (i.e., your final grade will be calculated) on the basis of class participation (10%), submission of reading responses and homework assignments in advance of class meetings (20%), three quizzes (40%), and the river poster & paper project (30%).

We will assign a **final** grade by taking the following percentages into account:

90-100% = A

80-89% = B

70-79% = C

60-69% = D

The top 2% of each category will typically receive a "+" (i.e., a score of 88-89% will receive a B+), and the lower 3% of each category will receive a "-" (91% is an A-).

There is no limit on the number of students who can get any grade. If 50% of the class achieves an overall score of 95%, then 50% of the class will get an A. We DO have high expectations of your work in this course. It is important to know up front that we think an A means OUTSTANDING – in terms of effort, discipline, comprehension, and skills.

Class/Field Trips/Assignments:

We need everyone to be on time to class, and to our field trip departures! You will NOT be able to make up field exercises.

Part of your class participation grade includes attending any three EnviroThursday seminars throughout the semester that relate to water resources issues. These seminars meet at 12pm in Olin Rice 250. They are listed on the Environmental Studies website and will be routinely announced in class. You will need to compose a brief summary (~250 words) of the presentation and explain how the seminar relates to the course. This should be completed within a week after the seminar, and can be done on the course Moodle page.

Collaboration on the homework questions and on assignments is encouraged, but we expect each person to turn in their own work. We strongly advise you to consult us or each other once you have already attempted to figure something out; i.e., do not lean too heavily on others to get you through the assignments, or you will find yourself having a tough time on the quizzes.

We expect all of the assignments to be turned in on time, unless you have talked with one of us in advance. Late assignments will be docked 10% each day it is late (an assignment worth 100 points will be worth a maximum of 90 points if it is one day late). An assignment is considered a

day late if it is between 1 minute and 24 hours late. If you think you have a good reason your work is late, please talk to us in advance. Assignments are worth 0 points if they are more than 1 week late.

Please turn in neat work. If you need to type or re-copy handwritten work, please do so.

Quizzes:

In this course, you will have three quizzes/exams. These written exams will be primarily short answer and essay questions. We try to write exams that will allow you to show us your understanding of the presented concepts and not simply your ability to memorize an answer. The final exam will test your knowledge, reasoning and explanatory skills of the course material.

We do not allow students to take exams at times other than those posted. This is because it is not fair to the students in the class who take the exam on time. Some reasons WE WILL reschedule: 1) You will be out of town on a Macalester-related event (sports, music, etc.), 2) You are genuinely ill, 3) You must leave town for a family emergency. If you are dealing with a long-term crisis or illness (either you or a family member), we encourage you to come and talk to one of us so we can better support your work in class and accommodate you.

River paper and project:

The final project will involve preparing a “Biography of a River”. For this assignment, you will prepare a 10 page paper and a poster formatted using Powerpoint software. The poster will be presented in class at the end of semester and will be peer evaluated. The final project grade breakdown is: River Proposal (10%), Draft (20%), Poster (30%), Final paper (50%). More details on this project to come.

Success in this course:

There are several things that you can do to be successful in this course. They include:

- Please do the required reading before class. It will not only help you understand the lectures, but you may be expected to discuss readings in class with your colleagues.
- Please attend class. If you can't be there, please let one of us know in advance, if possible. You will be responsible for getting notes from your colleagues.
- Do not get behind in your reading and studying. You will find that it is almost impossible to cram for a course that meets only twice a week, and you will learn much more if you can ask questions along the way!
- Working in groups is incredibly useful – talk with your colleagues about the material you are learning! You will learn a lot of vocabulary in this class, and you need to adopt some language skills to be successful. In addition, you can help each other – one person's weakness is another's strength. Group work also allows you to find out what you don't know. Steps to ‘enlightenment’: 1) read about it 2) attend class and hear about it 3) work with a group to discuss it and 4) try to explain it to someone else!

Other details:

We are available to talk with you about the class material and assignment questions during office hours or by appointment. You are welcome to stop by our offices, but we can't guarantee an 'on the spot' meeting. Calling in and emailing questions works as well. We do not necessarily answer phone calls or emails outside of the typical work day (M-F 9-5 pm), so please do not expect an immediate reply if you email us at 10 pm! We will also use Moodle as a tool for answering questions and disseminating information – please check this regularly!

Cheating is obviously not allowed. As per the Academic Honesty statement (which will be passed out in class and is also in the student handbook), a first offense will cause you to get a failing grade on the assignment, and a second offense means you fail the class. If in doubt about what constitutes cheating or plagiarism, or if stress is causing you to consider this route, please speak to one of us.

We are committed to providing assistance to help you be successful in this course. Reasonable accommodations are available for students with documented disabilities. Please meet with the Associate Dean of Students, Lisa Landreman, who will serve as the coordinator for services for students with disabilities. It is important to meet with her at the beginning of the semester to ensure that your accommodations are approved and in place to begin the semester successfully. The Associate Dean can be reached in the Office of Student Affairs, 119 Weyerhaeuser, by phone at 651-696-6220, or email llandrem@macalester.edu.

Water Science and Policy Course: Preliminary course outline

Saturday Sept 5: Course Introduction

PART I: Water availability and demand

Thurs Sept 10: World water crisis and scarcity concerns
- F. Rijsberman. 2004. "Water Scarcity: Fact or Fiction" Colombo: IWMI.
Reading reflection is due on Moodle by 9am.

Tues Sept 15: Groundwater vs surface water availability

Thurs Sept 17: Water, agriculture and energy

Tues Sept 22: Water laws, agencies and commissions

Thurs Sept 24: **Blue Lake wastewater treatment plant fieldtrip (8:15-11:45 am)**

Tues Sept 29: Bottled water controversies

Thurs Oct 1: Quiz #1 (9:40-10:30) and *Library Session (10:30-11:30)*

Tues Oct 6: **Nobel Conference fieldtrip to Gustavus Adolphus College (8:15am - 1pm)**

PART II: Surface and Ground Water – with focus on the Three Rivers

Thurs Oct 8: Introduction to River science

Friday Oct 9: *Poster Fair in Olin Rice 3:30-5:30 pm*

Sunday Oct 11: ***Sunrise River field trip 9 am - 4 pm (required)***

Tues Oct 13: Sediment transport and flooding

Thurs Oct 15: Library session #2; *Mayor's forum at noon*
Tues Oct 20: Dams and river engineering (Jemma Brown - student guest speaker)
Thurs Oct 22: Introduction to groundwater resources
Tues Oct 27: Quiz #2
Thurs Oct 29: No class FALL BREAK
Tues Nov 3: Ginny Yingling, MDH (guest speaker) - Groundwater contamination and public health issues
 * *River biography proposal due in class*
Thurs Nov 5: Field Trip to St. Anthony Falls lab (9:30-12pm)

PART III: International water conflicts and scenarios

Tues Nov 10: India and anti-dam social movements
Thurs Nov 12: Chris Sneddon (guest speaker) – Mekong River basin, Thailand
Tues Nov 17: South African water privatization debates
Thurs Nov 19: Restoring the Iraqi Marshlands
 * *Paper draft due in class*
Tues Nov 24: Desalinization and the Middle East -- Israeli/Palestine conflict
Tues Dec 1: Australia drought and climate change
Thurs Dec 3: Water as international commodity or human right
Tues Dec 8: Poster sessions
Thurs Dec 10: Poster sessions
Tues Dec 15: Quiz #3 and course evaluations
 * *Final paper due Thursday December 17 by noon in Roopali's office*