

Water in Society (SCIL/NRES/AECN 109)
Spring, 2017

Instructors:

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Course Information:

Lecture - Monday and Wednesday, 1:00-1:50 Animal Science 222

Recitation/Discussion Sections (students enroll in one of the following)

- Wednesday 3:00-3:50 228 Hardin Hall
- Friday 1:00-1:50 228 Hardin Hall
- Friday 2:00-2:20 163 Hardin Hall

Office Hours: Wednesday 2:00-3:00 (alternating locations TBD)

About the Course:

Societies today face an array of global challenges, such as population growth, food production, natural resource use, and environmental degradation. A crucial element shared by each of these challenges is water. As recognized by the National Science Foundation (NSF, 2005), “All human and natural systems are influenced by the distribution, abundance, quality, and accessibility of water” (pg. 6). In turn, humans are increasingly viewed as a core component of hydrologic systems, exemplified by increasing reference to our current geological epoch as the human-dominated “Anthropocene” and the advent of *socio-hydrology* as a new science of people and water (Sivapalan et al., 2012). Water resource use and management is an undeniably critical issue in the twenty-first century, sometimes referred to as the ‘Water Century’, in which “ensuring an adequate quantity and quality of freshwater for sustaining all forms of life is a growing challenge” (NSF, 2005, pg. 6). As King and colleagues (2012) note, “the truth of the matter is that we *do not know* how to resolve the greatest hydrological challenges in the world... to simultaneously ensure hydrological, economic, social and environmental sustainability” (pg. 4030). Ultimately, scientists, policymakers, and members of the public must work together to find solutions to these significant challenges and pave the way to a sustainable future. This course is designed to introduce undergraduate students – tomorrow’s global citizens - to the scientific and non-scientific dimensions of historical and contemporary socio-hydrological systems and support them to learn to effectively analyze and

make decisions about complex challenges and issues associated with water use. It will explore critical questions about water resources, such as the following:

- Where is water found on Earth? How does its cycle at a global scale?
- What makes water a resource? How do humans use water?
- How do economics and science influence patterns of water resource use?
- How is 'value' attributed to water?
- What governance modes and policies lead to equitable water management?

Course Objectives:

This course focuses on two primary objectives. Upon successful completion of the course, students should be able to:

1. Explain fundamental hydrologic concepts and use this knowledge to engage in scientific practices, including posing and answering scientific questions, exploring hydrologic phenomena, analyzing and making inferences from data, and determining validity of conclusions
2. Engage effectively in principled analysis of and reasoning about socio-hydrologic systems, including their scientific, ethical, social, economic, cultural, and civic dimensions, to make informed decisions about water resource use in Nebraska and around the world

ACE Learning Outcomes and Assessment:

This course may be used to satisfy one of the following ACE Learning Outcomes: #4 or #8

ACE #4 - Use scientific methods and knowledge of the natural and physical world to address problems through inquiry, interpretation, analysis, and the making of inferences from data, to determine whether conclusions or solutions are reasonable.

Opportunities for students to acquire knowledge of ACE Learning Outcome #4

One of two primary course objectives is for students to “explain fundamental hydrologic concepts and use this knowledge to engage in scientific practices, including posing and answering scientific questions, exploring hydrologic phenomena, analyzing and making inferences from data, and determining validity of conclusions” (objective #1). In order to understand and propose solutions to water-related challenges, students must possess a working knowledge of hydrologic concepts. Through and in support of analysis of real-world socio-hydrological challenges, this course enables students to develop and apply introductory-level, functional knowledge of core hydroscience concepts. These include:

- The hydrologic cycle, including precipitation, evaporation, transpiration, and evapotranspiration
- Groundwater, including infiltration, subsurface flow, percolation, soil moisture, and aquifers
- Surface water, including stream flow, runoff, erosion, sediment transport, and nutrient cycling
- Watersheds and water resource management

Disciplinary concepts are presented and reinforced throughout the course as part of in-class work, team-based case assignments, and student-directed research in which students:

- Interpret and analyze hydrologic data
- Articulate and support data-based claims about hydrologic phenomena
- Interrogate strength and validity of claims based on underlying knowledge and available data
- Translate scientific knowledge into decision-making heuristics through which they collaboratively analyze options, mobilize information and resources, and weigh tradeoffs associated with options.

Graded Assignments used to assess student achievement of Learning Outcome #4

Through a variety of course assignments, students will be afforded opportunities to *use scientific methods and knowledge of the natural and physical world to address problems through inquiry, interpretation, analysis, and the making of inferences from data, to determine whether conclusions or solutions are reasonable.* These include:

- Quizzes and a final exam, in which students respond to a combination of forced-response, open-ended, and task-oriented items to interpret, analyze, and make inferences from hydrologic data
- In-class, small-group-based ‘daily work’ in which students interpret, analyze, and make claims from hydrologic data
- A final project in which students analyze hydrologic data and published scientific research to define the natural and physical dimensions of a local, regional, or global socio-hydrological issue of their choosing

ACE #8 - *Explain ethical principles, civics, and stewardship, and their importance to society.*

Opportunities for students to acquire knowledge of ACE Learning Outcome #8

One of two primary course objectives is for students to “engage effectively in principled analysis of and reasoning about socio-hydrologic systems, including their scientific, ethical, social, economic, cultural, and civic dimensions, to make informed decisions about water resource use in Nebraska and around the world” (objective #2). Students are asked to draw upon diverse and multifaceted factors to explore, reason about, and propose solutions to contemporary water-related challenges and issues. These include ethical and civic principles in social contexts with an emphasis on the ‘common good’ as a defining characteristic of workable solutions. Since the course focuses on human perspectives on water (i.e., socio-hydrology), it is premised on the assumption that water is a resource to be stewarded through human decisions, behaviors, and policies. It enables students to identify principles underlying ethics, civics, and stewardship in local, regional, and global contexts related to water-related issues through and in support of analysis of real-world, case-based socio-hydrological challenges, in which students:

- Develop a theoretical understanding of the nature of principles of ethic, civics, and stewardship
- Explore non-scientific dimensions of multiple local, regional, and global socio-hydrological issues, including ethical and civic considerations

- Expand awareness of the diverse principles underlying various systems of ethics and civics
- Compare and contrast diverse and varying stakeholder perspectives in relation to socio-hydrological issues
- Translate understanding of non-scientific principles into decision-making heuristics through which they collaboratively analyze options, mobilize information and resources, and weigh tradeoffs associated with options.
- Develop an understanding of the importance of collective decision-making as a process of negotiating varying perspectives for the ‘common good’

Graded Assignments used to assess student achievement of ACE Learning Outcome #8

Through a variety of course assignments, students will be afforded opportunities to *explain ethical principles, civics, and stewardship, and their importance to society*. These include:

- Iterative, in-class, small-group-based assignments and discussions through which students identify, communicate, develop, and demonstrate understanding of values, ethics, priorities, and perspectives of diverse stakeholders around case-based socio-hydrological issues
- A final project in which students identify stakeholders associated with specific, real-world, case-based socio-hydrological issues, thoroughly analyze and articulate the ethical, civic, and other non-scientific dimensions of their perspectives and positions, use critical thinking to analyze how these perspectives impact socio-hydrological issues, use these principles to identify and assign priority to decision-making criteria, and pose solutions to water-related challenges

Required Texts: none

Prerequisites: none

Course Activities:

The course meets 3 times/week for 50 minutes, including 2 whole-group lecture sessions and one smaller-group discussion section. In the course, students explore the scientific, ethical, social, economic, cultural, and civic dimensions of contemporary, real-world socio-hydrological issues. The course will involve a variety of methods and activities, including individual and team research, individual and team class presentations by students, readings, lecture, and guest speakers. Students will be organized into small groups to simulate diverse community task force involving multiple stakeholders. Student groups will form the fundamental organizational unit for course experiences, through which students will identify critical components of water-related challenges and problems, determine information they need to seek out, independently seek out this information, and use it to make decisions about water-related challenges and problems. Students will draw from information presented in lecture, readings, and other resources to develop more robust understanding of water science concepts, but also to engage in iterative cycles of purposeful, heuristic-based decision-making about case-specific socio-hydrological issues. These course activities are designed to directly address the two course objectives.

Course Evaluation:

Due to the nature of this course, attendance and participation is very important. Individual participation will be assessed based upon regular, short, 'daily work' assignments before, during, and/or after class meetings. Daily work may include tasks such as discussion board posts, written responses, in-class clicker responses, etc.

Quizzes will be administered periodically throughout the semester. Quizzes will focus on students' understanding and application of hydroscience concepts to real-world issues. Each quiz will involve a combination of forced-response, open-ended, and task-oriented items to address both content mastery AND scientific practices. Quizzes will each be approximately 15 minutes in length and be open-note.

The final project is a capstone experience that builds upon other course activities to provide students an opportunity to demonstrate their developing proficiencies with both hydroscience (obj #1) and principled problem-solving and decision-making (obj #2). Students will work in groups to identify a socio-hydrological issue of interest to them, gather information about the topic, and present an ethical and consensus-oriented policy recommendation supported by empirical evidence and strong reasoning. They will also produce an infographic to summarize their work and share their thinking and recommendations with peers, instructors, and stakeholders. The final project builds upon work completed throughout the semester.

A final exam will be administered at the end of the semester during the assigned time per the UNL Final Exam Schedule. The final exam will be scheduled for two hours and will NOT be open-note.

Assessment Plan:

Students will be evaluated on the basis of the quality of their:

Daily work	40%
Final project	30% (final copy of course products)
Quizzes	15%
Final exam	15%

Letter grades will be assigned based on straight percentages of 100 - 90% A range, 89 - 80% B ranges, etc.

SCALE

100 – 98 A+	89 - 87 B+	79 - 77 C+	69 – 67 D+	Below 59 F
97 – 94 A	86 - 83 B	76 - 73 C	66 – 63 D	
93 – 90 A-	82 - 80 B-	70 - 72 C-	62 – 60 D-	

Grade Discrepancies:

If you think there was an error in the recording or scoring of an assessment item, FIRST check rubrics or other feedback that has been given to see how an item was graded, THEN if you still think there was an error in the recording or scoring of an item, you may submit a Grade

Discrepancy Form (found on Canvas) to your graduate student learning assistant within 2 weeks of your graded assessment item being returned. Discrepancies issued by e-mail and grades contested after 2 weeks will not be considered for re-grade. Please note that a “re-grade” is exactly that, and could potentially result in a lower score. A clear and warranted argument that appropriately justifies the need for a re-grade is essential for a favorable outcome. Please note that the instructors scan into pdf all homework, module final assignments, quizzes and exams before they are returned to you. Please consider the policy on academic dishonesty before altering your work and submitting a re-grade.

Missing Class:

Can I make up work for this class?

There is no make-up work allowed in the class. If you miss in-class points, homework, assignments, or quizzes there will **not** be a way to re-coup those points. However, see the clauses below (scores dropped and half credit) for a generous built-in cushion that will allow you to miss some class without affecting your grade. There are several reasons for this: 1) much of the in-class work is discussion with your peers which is impossible to make-up or recreate, and 2) there are many assignments/quizzes/homeworks in the class and many students with busy lives making it too difficult to keep track of missed classes. Therefore, no make-up work will occur for any reason* which includes:

- | | | |
|---------------------|----------------------|-------------------------------|
| - an illness | - family emergencies | - funerals |
| - an athletic event | - a job interview | - a club or competitive event |
| - travel | - oversleeping | - missing the bus |

*If you anticipate missing more than a week of class for an extreme circumstance (major surgery, family crisis, etc), please do come and talk with us and we can consider a plan that will prevent major negative impact on your grade.

If I miss class, should I e-mail the instructor?

Instructors will always be interested in what’s going on in your life and welcome communication from you, but, because you have built in cushion for missed classes, assignments and quizzes (see below), it is NOT necessary for you to e-mail the instructors about this.

If I know in advance that I will miss class, can I turn in a homework or module assessments early that is due for that day?

Yes. Assignments will always be posted to the schedule at least 48 hours prior to the due date. Students are responsible for ensuring that homework is turned in **before class time** on the date due to receive full credit. If homework is turned in late (including at the end of class), students will receive half of the assigned points.

What is the built-in cushion for graded assignments?

Missing class will mean forfeiting the points for in-class work for that day, possibly missing homework or a quiz. However, it is understandable that occasionally, things happen that are out of our control. To account for this, the course includes the following “cushions” for your grade:

- In-class points: the two lowest scores are dropped

- Quizzes: the lowest quiz will be dropped
- Other assignments: can be turned in up to 3 days late for half-credit

Contact:

Always daily check your email that you use to sign into Canvas. The instructor and LA's will frequently post class updates, instructions or other important information to the class email list via Canvas. Please be aware of which email account receives these emails and check it at least once a day. You are responsible for receiving these communications in a timely manner.

How should I contact the instructors and/or LAs?

E-mail is the preferred method of communication for everyone working in this course (instructor and LAs). Here are a few suggestions to ensure successful communication:

Only e-mail from your UNL e-mail. If you e-mail from g-mail, hotmail, yahoo, etc., there is a chance your mail will be detected as spam and not appear in our inbox.

Use an informative description in the Subject line of your e-mail. Subject lines help us to organize and coordinate e-mails from students. It's hard to know what the e-mail will be about if "hello" is the only item in the Subject line - unless you really are e-mailing to say, "Hello!"

Sign your email with your name and be sure your name is associated with your account. I will not reply to emails that I cannot identify by name.

Include previous messages in your "replies." If you are replying to e-mail from instructor/LAs, include the original message in your reply. This provides a reminder of what our conversation was about and to what your reply is regarding.

Emails are not regularly checked in the evening. If you send an email in the evening, you may not get a response until the next day or later.

Who should I contact?

Please know that you may contact us for any issue arising from any aspect of the course, however consider contacting your LAs before your instructor as often LAs are more available especially right before or after class. Please consider copying (in the CC line of your email) both your LA and your instructor about course issues so we are all notified and can communicate more clearly.

Course Evaluation and Feedback:

Multiple opportunities will be provided during the semester to provide constructive feedback on the course. It is the responsibility of the student to utilize these opportunities to evaluate the course and provide feedback. All forms of course evaluation are anonymous and faculty will not receive responses until after grades are submitted for the semester.

Students with Disabilities:

Students with disabilities are encouraged to contact the instructor for a confidential discussion of their individual needs for academic accommodation. It is the policy of the University of Nebraska-Lincoln to provide flexible and individualized accommodation to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered

with the Services for Students with Disabilities (SSD) office, 132 Canfield Administration, 402-472-3737 voice or TTY.

CASNR Policy on Academic Dishonesty:

All students and faculty should be familiar with the UNL Policy regarding Academic Dishonesty that may be found in the Student Code of Conduct (<http://stuafs.unl.edu/ja/code/three.shtml>).

When a student is notified by an instructor of an alleged act of Academic Dishonesty, they should discuss the matter with the instructor to determine if redress is possible. If the instructor decides to move forward with the allegation of Academic Dishonesty and the result is a lower grade, the instructor shall make a report in writing of the facts of the case and the academic sanction imposed against the student to the instructor's Academic Unit Chair, Head or Director and to the UNL Judicial Officer. Both the instructor and academic unit should maintain copies of the relevant documents on file for at least two years.

If the student feels that the allegations of the instructor regarding Academic Dishonesty, or the proposed penalty to be imposed, are unjust or not warranted, the student should contact their academic advisor and the Unit/Program Chair/Head/Director to discuss the matter. This process must be initiated within one month of the class grade assignment. The Unit/Program should then initiate a review of the matter consistent with its written policy. If the Unit/Program agrees with the Instructor that the evidence indicates that the student has violated the Academic Dishonesty policy, they should forward the documentation and paperwork to the CASNR Associate Dean for Student Affairs for review by the College. If the Unit/Program determines that there is not sufficient evidence of Academic Dishonesty to warrant action against the student, the paperwork should be forwarded to the CASNR Dean with the student's name deleted so that there is a record of the incident, but no potential future bias toward the student.

Once received by the CASNR Associate Dean for Student Affairs, the file alleging student Academic Dishonesty should be considered by a Panel consisting of the CASNR Associate Deans. If the Panel decides that there is sufficient evidence to support the allegation of Academic Dishonesty made by the instructor, the student will be notified. If the student desires to appeal this decision, the file will be forwarded to the CASNR Dean for transfer to the UNL Judicial Officer.

Emergency Response

- **Fire Alarm (or other evacuation):** In the event of a fire alarm: Gather belongings (Purse, keys, cellphone, N-Card, etc.) and use the nearest exit to leave the building. Do not use the elevators. After exiting notify emergency personnel of the location of persons unable to exit the building. Do not return to building unless told to do so by emergency personnel.
- **Tornado Warning:** When sirens sound, move to the lowest interior area of building or designated shelter. Stay away from windows and stay near an inside wall when possible.
- **Active Shooter:**
 - Evacuate: if there is a safe escape path, leave belongings behind, keep hands visible and follow police officer instructions.

Hide out: If evacuation is impossible secure yourself in your space by turning out lights, closing blinds and barricading doors if possible.

Take action: As a last resort, and only when your life is in imminent danger, attempt to disrupt and/or incapacitate the active shooter.

- **UNL Alert:** Notifications about serious incidents on campus are sent via text message, email, unl.edu website, and social media. For more information go to: <http://unlalert.unl.edu>.
- Additional Emergency Procedures can be found here:
http://emergency.unl.edu/doc/Emergency_Procedures_Quicklist.pdf

Water in Society (SCIL/NRES/AECN 109)
Spring, 2017 Course Calendar

	Monday Lecture	Tuesday Lecture	Recitation	Assignments
Week 1: Water as a resource Jan 9	Introduction - our connections with water	What is water? The molecular life of water	Course intro, establish groups, and pre-assessment	Pre-course survey due
Week 2: Water as a resource Jan 16	NO CLASS Martin Luther King Day	Relationship between humans and water	Project topics, decision-making framework, and policy briefs	
Week 3: Water as a resource Jan 23	How do we use water? Historical perspectives.	How do we use water today? How will we use water in the future? Growing pressures on water resources	Infographics	Problem definition and decision-making outline due
Week 4: Water on Earth Jan 30	The global water cycle	Distribution of water on Earth	Infographics	
Week 5: Water on Earth Feb 6	Watersheds and aquatic ecosystems	Groundwater	Infographics	Infographic due
Week 6: Water for Agriculture Feb 13	Introduction to water for food: How is water used in agriculture?	Historical cases and origins of irrigation	Hydrogeology Challenge	
Week 7: Water for Agriculture Feb 20	Irrigation today: Center pivot technology	Interactions between climate, weather, and water	Hydrogeology Challenge	
Week 8: Water for Agriculture Feb 27	The water balance concept	The water balance concept	Water balance models	Hydrogeology Challenge assignment due

Week 9: Water Policy Mar 6	Water law: Who does water belong to?	U.S. Clean Water Act	Water balance models	
Week 10: Water Policy Mar 13	Current Nebraska water policy	Nebraska Cooperative Republican Platte Enhancement project (N-CORPE)	Water for Food Conference Posters	Water balance models/reports due
Week 11: Mar 20	NO CLASS Spring Break			
Week 12: Municipal Water Mar 27	Introduction to municipal water use: How is water used in cities?	Historical cases and development of municipal water systems	Water for Food Conference Posters	Policy brief due
Week 13: Municipal Water April 3	Municipal water treatment today	Stormwater management in cities – Lincoln case study	Water for Food Conference Posters	Water for Food Conference Poster due
Week 14: Water for Food Conference April 10	Students attend and present at conference “Water for Food Security: From Local Lessons to Global Impacts” April 10-12, 2017 Nebraska Innovation Campus Lincoln, Nebraska http://waterforfood.nebraska.edu/2017-water-for-food-global-conference			
Week 15: Water Security and Economics April 17	Water security/insecurity	Handpumps	Wastewater treatment plant field trip	Final completed project due
Week 16: Water Security and Economics April 24	Protecting disadvantaged communities and environments	The true value and cost of water	Final exam review, course wrap-up	
Finals Week May 1	FINAL EXAM Thursday, May 4, 1:00 to 3:00 p.m. http://registrar.unl.edu/final-exam-schedule-spring			