

Environmental Systems Analysis at the Food, Energy, Water Nexus
Course Syllabus for PA 5761, Spring 2022



01/18/2022 - 05/02/2022

Tue 06:00PM - 08:45PM

UMTC, West Bank, Hubert H Humphrey Center room 30

Instructor: [Bonnie Keeler](#)

E-mail/Phone: keel0041@umn.edu, 612-625-8905

Office Hours: Room 158 HHH

Teaching Assistant: Madeline Lydon, lydon023@umn.edu

Course description: Agricultural lands, water resources, and energy production and transport are interconnected systems with implications for policy and management at local to global scales. This course will explore contemporary issues at the nexus of food, energy, and water with a focus on the Mississippi River Basin. Specific topics include farm policy, permitting of pipelines and energy production, mitigation of air and water pollution, and strategies to incentivize the conservation and restoration of landscapes. Students will develop professional skills in systems thinking, scenario analysis, science communication, facilitation, and collective leadership.

Course objectives and learning goals:

- Appreciate the historical contexts that gave rise to contemporary social-ecological systems.
- Develop skills in systems thinking and science communication in order to understand, diagnose, and communicate tradeoffs associated with complex environmental issues.

- Cultivate an awareness of the diverse viewpoints and perspectives of key stakeholders and how different audiences perceive food-water-energy issues.
- Identify social, ecological, and technological dimensions of environmental systems and how they are interlinked over time and space.
- Analyze policy and governance aspects of food, energy, and water challenges, including the roles and capabilities of the market, the state, and civil society in solving these challenges.

Required Texts:

[This Blessed Earth: A Year in the Life of an American Family Farm](#), by Ted Genoways

[Thinking in Systems: A Primer](#), by Donella Meadows (available as a free e-book via UMNLibraries)

Additional readings and resources will be provided on Canvas, including excerpts or examples from several texts related to the Mississippi River, including:

[The River We Have Wrought: A History of the Upper Mississippi](#) by J. Anfinson (available as a free e-book via UMNLibraries)

[The Source: How Rivers Made America and America Remade its Rivers](#), by Martin Doyle

[Under a White Sky: The Nature of the Future](#), by Elizabeth Kolbert

[The Big Muddy: An Environmental History of the Mississippi and its Peoples](#), by Christopher Morris

Class Schedule:

Subject to change with notice. Consult Canvas for updated schedule and assignments

Date	Topic	Skill/Activity	Readings
1/18	Overview of the food-energy-water nexus. Intro to systems thinking.	Science Communication Part I: Assertion-Evidence slide design	Hanlon et al. 2013 Food - Water - Energy: Know the Nexus Video: Donella Meadows Institute - In a World of Systems
1/25	The global perspective: feeding the world without destroying the planet.	Finding and visualizing data	The Economist 2011 Welcome to the Anthropocene Steffen et al. 2015 The trajectory of the anthropocene: The great acceleration Foley TED talk: The other inconvenient truth
2/1	Food systems: How we got here and where are we going?	Intro to modeling	The American Conservative: 2019 To revive rural America we must fix our broken food system

	The U.S. Farm Bill 101		<p>Bittman- 2019. Iowa's crop looks like food, but no one is eating</p> <p>Star Tribune: 2019. Millions of unplanted acres means billions in farm payouts</p> <p>Field Work Podcast: Generational perspectives on farming</p> <p>Uprooted Podcast: A Citizen's Guide to the Farm Bill</p>
2/8	Food systems: Standards, diets, and consumer choice	Life cycle assessment	<p>Hillborne et al. 2018. Frontiers in Ecology and the Environment. The environmental cost of animal sourced foods.</p> <p>Poore et al. 2018. Science. Reducing foods environmental impacts.</p> <p>Spring 2016 There's no such thing as a green product</p> <p>Eschel 2019 Science Advances. Alternatives to meat consumption.</p>
2/15	Food systems: Interactions with water and energy	Greenhouse gas accounting	<p>One Tonne Life: Final Report</p> <p>Chavez 2013 Energy Policy. Articulating a trans-boundary infrastructure supply chain greenhouse gas emission footprint for cities</p> <p>Generation Energy Act</p> <p>Hillman 2009 ES&T.Greenhouse Gas Emission Footprints and Energy Use Benchmarks for Eight U.S. Cities</p>
2/22	Environmental Justice	Social network analysis	<p>Agyeman 2016 Environmental justice and just sustainabilities</p> <p>Learning from the Dakota:Water and Place</p> <p>So close, yet so costly. APM Reports on water infrastructure in the Great Lakes Region</p> <p>Switzer 2017. The color of drinking water: Class, race, ethnicity and the safe drinking water act</p>

3/1	Hydropower	Scenario Analysis	<p>Grafton. 2018. The paradox of irrigation efficiency. Science</p> <p>Inside/Out- Powerline Podcast: 4 part series</p> <p>Moran 2018. Sustainable hydropower in the 21st century. PNAS</p> <p>What if? The art of scenario thinking for non-profits.</p>
3/8	Spring Break		
3/15	Pipelines	How to write an executive memo	<p>Klass Future proofing energy transport law. Washington Law Review.</p> <p>Wood 2018 Social License to Operate</p> <p>MPR Podcast: Rivers of Oil</p>
3/22	Mississippi River Part 1: The contemporary Food, Water, Energy System	Science communication part II - Editorial Writing	<p>MPR Flyover Podcast: Voices from the Bayou</p> <p>PRI: Mississippi River Pushed to the Brink</p> <p>NYT The Great Flood of 2019</p> <p>Mississippi River Delta Report 2012</p> <p>Five myths about flooding</p> <p>Time magazine on Mississippi River flooding</p> <p>WSJ: The world's appetites threaten the Mississippi River</p>
3/29	Mississippi River Part 2: Levees and floods		<p>Podcast: One Mississippi. Episode: May nature be with you.</p> <p>Big Muddy - Chapter 8-10</p>
4/5	Mississippi River Part 3: Dams and transportation	Facilitation and the art of hosting	The River We Have Wrought - Chapters
4/12	Mississippi River Part 4: Transformation, Resilience, Sustainability	System Thinking - Leverage Points	<p>Editorials from the NYT, Star Tribune, and The Advocate on proposed solutions to Mississippi River</p> <p>Draft bill MRRRI</p>

			Big Muddy Chapter 11 Meadows - Leverage Points: Places to intervene in a system
4/19	Mining: The local to global footprint of food, energy, water issues	Academics and Advocacy	Minnesota legislative issue guide: Mining Baker 2018. Science. Mining Q&A Washington Post. 2019. The drive for greener cars threatens a new toxic tide
4/26	Bright spots in the Anthropocene	Collective Leadership	Seeding change by visioning good anthropocene Six transformations needed to achieve the SDGs The dawn of systems leadership Seven principles to apply resilience thinking
	FEW nexus lesson plans due for grading		

Evaluation and Assignments:

- I. Blog post on NASS data, 10% (G)
- II. This Blessed Earth reflection, 10% (G)
- III. Civics DIY Field Trip, memo to an executive, 15% (G)
- IV. Mississippi River editorial, 15% (G)
- V. Mini-explainers, 10% (G)
- VI. In-class assignments, discussion posts, and concept quizzes, 20% (NG, G)
- VII. FEW lesson plan, 20% (G)

Canvas

All of our class readings, resources and assignments are available on the course Canvas site. Find the site at canvas.umn.edu, or go to “Key Links” on [MyU.umn.edu](https://myu.umn.edu) and scroll down to Canvas. For help with Canvas, go to <https://z.umn.edu/CanvasHelpandSetup> or click the “Canvas Help” link on our course Canvas site.

Set Your Canvas Notification Preferences

This course depends upon your ability to receive communications from your instructor about the class. It's important that you set up your Canvas “notification preferences” to choose how and when you'd like to receive messages via text, email, or both. Find easy-to-follow instructions at “How do I set my Canvas notification preferences as a student?:

<https://community.canvaslms.com/docs/DOC-10624-4212710344>. I **strongly recommend** that you opt to receive notification of Announcements, Conversation Messages, and Added to Conversation so that you don't risk missing important class communication.

Name and Pronoun Usage

I will happily honor your request at any point to address you by your correct name, gender pronoun, or any other manner you would like to be referred. If you like, I will also instruct class members to do the same. Please advise me of how you would like to be referred to in class.

Use of Personal Electronic Devices in the Classroom

Using personal electronic devices in the classroom setting can hinder instruction and learning, not only for the student using the device but also for other students in the class. My preference is for students to take notes in a notebook, instead of on a laptop to minimize the temptation to browse the internet during class. It is quite apparent when students are using their laptop, phone, or tablet to view non-course content as surrounding classmates can't help but register their interest. Do not create distractions that negatively affect the learning experience of your peers.

Missing class and coursework extensions

Students will not be penalized for absence during the semester due to unavoidable or legitimate circumstances. Such circumstances include verified illness, participation in intercollegiate athletic events, subpoenas, jury duty, military service, bereavement, and religious observances.

There are situations that may arise where you need to request an extension for a class assignment. If this occurs, email me with your request in advance of the due date and include a proposed timeline for completion of the assignment. I do my best to grant extensions to all reasonable requests.

Mental Health and Stress Management Services

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce your ability to participate in daily activities. There are advisors in the Humphrey Student Services office who are trained and experienced counselors. They are available at short notice to address any concerns you have and provide further resources within the University - Humphrey Student Services, HHH 280, (612) 624-8162. You can learn more about the broad range of confidential mental health services available on campus at: <http://www.mentalhealth.umn.edu>.

Disability Accommodations:

The University of Minnesota views disability as an important aspect of diversity, and is committed to providing equitable access to learning opportunities for all students. The Disability

Resource Center (DRC) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations. If you have, or think you have, a disability in any area such as, mental health, attention, learning, chronic health, sensory, or physical, please contact the DRC office on your campus (UM Twin Cities - 612.626.1333) to arrange a confidential discussion regarding equitable access and reasonable accommodations.

Students with short-term disabilities, such as a broken arm, can often work with instructors to minimize classroom barriers. In situations where additional assistance is needed, students should contact the DRC as noted above. If you are registered with the DRC and have a disability accommodation letter dated for this semester or this year, please contact me early in the semester to review how the accommodations will be applied in the course.

Access to readings and materials after semester

Students may lose access to Canvas sites and course reserves at the end of the semester. If you'd like to download class material (depending on copyright) or your own work for personal use, please do so during the semester.

University and School policies

For links to University of Minnesota and Humphrey School policies, please click the "U of M Policies" link on our course Canvas site, or see <https://z.umn.edu/PolicyStatements>. Policies include information on student conduct, scholastic dishonesty, sexual harassment, equal opportunity, disability accommodations, and more.