

Syllabus

Course Title: Sustainable Resilient Water Governance

Credits: 3

Format: Seminar; Tuesdays, 5:00 – 7:30pm online via Webex unless otherwise noted

Prerequisites/Requirements: Junior or Senior Undergraduates and Graduate Students

Professor: Christine Kirchhoff Ph.D., P.E., Assistant Professor

Email: christine.kirchhoff@uconn.edu; office hours by appointment (via webex)

Course Materials

No textbook is required. The course draws on book chapters and journal articles chosen to highlight both fundamental concepts and applications of those concepts. All course readings will be available on HuskyCT.

Course Description

Course will provide an overview and assessment of water institutions and management approaches that contribute to (or impede) sustainable and resilient water resources and infrastructure under changing conditions (e.g., climate change, migration, economic downturns, technology change). The purpose is to expose students to the human dimensions of engineering including policy, organization, individual behavior, institutional frameworks, information, capacities, etc. at the federal, state and local level that influence how we manage water resources and water infrastructure to be more resilient to a changing world. We will also explore what we mean by “sustainable” and “resilient”, how resilience has been measured in the past, different options for measuring human dimensions of resilience, and how sustainability and resilience are understood and applied in practice. We will examine sustainability/resilience in different contexts including water resources and in drinking water and wastewater systems.

This course is offered as a seminar-type course. To function effectively and to maximize learning potential, students are expected to do the assigned reading and preparation before class and to participate actively and thoughtfully during each class meeting.

I expect this course to draw a fair number of engineering students. The reading, writing and class participation will feel different than traditional engineering courses. While engineers (and others) may find the course challenging and outside their comfort zone, my hope is that by exploring human dimensions of engineering you will better understand these issues and be better prepared to navigate them in your own work. In my personal and professional experience, it is the human dimensions issues that are often not only the source of the engineering problem that must be solved but also essential to their solution.

Course Objectives

After completing this course students will be able to:

1. Explain the concepts of sustainability and resilience in the context of water resources and water infrastructure.
2. Understand the range of vulnerabilities and risks posed by global change to water resources and water infrastructure.
3. Explain how sustainability and resilience are measured, strengths and weaknesses in measurement approaches as well as gaps in measurement.
4. Identify different ways in which theory and practice align and are at odds and generate ideas on how to resolve them and/or to advance theory and/or practice.
5. Write and think critically about sustainability and resilience and identify research frontiers.
6. Participate effectively and lead seminar discussions on topical readings.
7. Participate effectively in a write-shop including both as a peer-reviewer and as an author.

Course Requirements and Grading

Classroom Environment and Course Expectations

We will foster a discussion environment that is professional, supportive, and respectful. Differences of opinion are welcome as are challenges to prevailing thinking. We want to push ourselves and challenge assumptions. However, we must do so in a professional, supportive, and respectful way. Additional expectations:

- All communications relating to this course and all work turned in for this course should reflect professional standards in tone, presentation, formatting, and spelling.
- The classroom is a place of focused learning. This requires that students arrive on time, stay until the end of the class period, and refrain from non-learning activities. Students who fail to adhere to these guidelines will be asked to leave for the remainder of the class session.
- No hand written assignments unless explicitly directed to do so!

Course Workload

A general rule of thumb for the expected workload for a graduate level class is 4 hours/week per credit hour. Therefore, on average you should expect to spend ~12 hours per week for this 3 credit course in addition to the 2.5 hours of class time.

Grade Components		Weight
I.	Discussions	
A.	Discussion Forums (questions submitted for each reading)	5%
B.	Discussion Co-Lead (once per semester)	20%
C.	"Write-shop" Research Paper Peer-Review Comments	15%
II.	Reading Journal (with Co-Lead assignment and at end of semester)	20%
III.	Research Paper and Presentation	
A.	Abstract and Preliminary Lit Review	10%
B.	Presentation during write-shop	5%
C.	Final paper	25%

Description of Course Grade Components

I. Discussions

As noted in the syllabus, discussions take place weekly (or bi-weekly). All students are required to keep a *Reading Journal* to help absorb, synthesize, critique, and distill the reading material assigned in the course. The *Reading Journal* (see II below) will help you prepare for substantive discussions on course topics. In addition to a *Journal*, each student is required to read all assigned readings and submit one insightful question per assigned article in the *Discussion Forum* (see I.A below). The only exception to this requirement is for discussion co-leads. Each discussion will be co-lead by two students (see *Co-Leading the Discussion*, I.B below). If you are the assigned co-leads for a weekly (or bi-weekly) discussion, you do not need to submit to the *Discussion Forum* for that week. Finally, you will participate in a *Write-shop Research Paper Peer-Review* (see I.C below).

A. Discussion Forum

Each student is required to read all assigned readings and submit one insightful question **per** assigned article in the *Discussion Forum*. The only exception to this requirement is for discussion co-leads who should not post to the *Discussion Forum* when they are assigned to lead discussion.

Each assigned reading should have its own forum thread. If a thread hasn't been initiated when you are ready to submit your question, then start a new thread and write your question. If a thread for a particular article/reading already exists, then reply to that thread with your question. All questions must be submitted by 9:00pm the Monday before discussion on Tuesday.

We will have a number of guest lectures for which readings have not yet been assigned. As readings are assigned, I will post a *Discussion Forum* and you will be required to complete your *Reading Journal* as usual. In the event, the guest lecturer does not share assigned readings in advance, then *Reading Journals* and *Discussion Forum* will not be required for that week. However, each student is expected to be an active listener to the guest lecture and to ask cogent, thoughtful questions (clarifying questions are okay too!). These are high level professionals with many years of experience who are volunteering to share their experience and knowledge with us! We want them to feel welcome and that their time is well spent on campus!

B. Co-Leading the Discussion – see syllabus for dates and co-lead assignment

Two students are assigned to each discussion as co-leads. Discussion co-leads will do the following:

1. First, provide an overview of the topic of the day by summarizing the main points of the readings – what did you learn from each reading but more so, what did you learn across the totality of assigned readings? Point out if there particular readings you liked better or you felt were lacking for some reason? If so, identify those readings and explain what stood out or the weaknesses you identified. *Query other students to find points of convergence/divergence in opinion about the readings, as appropriate.*
2. Second, help the class think about the readings as they relate to each other and to other readings in the course, as appropriate. How do these readings inform our conceptualization of sustainability/resilience? How has your thinking about these concepts (or focus on one or the other) evolved over time? How do these particular readings inform that evolution? *Query other students to contribute to the discussion on relating readings to each other and to how their thinking has evolved, as appropriate.*

3. Third, discuss key weaknesses or key strengths in how sustainability/resilience are conceptualized in the readings. What is included? What is left out? How might the conceptualization be improved? *Query other students to contribute to the discussion on key strengths/weaknesses/improvements.*
4. Fourth, discuss key weaknesses or key strengths in how sustainability/resilience are measured in the readings. Again, what is included? What is left out? How are measures constructed? Are these measures robust? Could they be improved? *Query other students to contribute to the discussion on key strengths/weaknesses/improvements.*
5. Fifth, review the discussion forum and questions submitted by others. Select your own questions or other student questions for additional discussion.

Co-leads will submit a copy of their reading journal for the week's materials by 5pm Tuesday, on their assigned discussion co-lead day.

C. Write-shop Research Paper Peer-Review

Over the course of two class days at the end of the semester, we will hold a "write-shop". Write-shops are great for giving and receiving feedback on manuscripts and are often organized around a special issue for a journal. We will adopt this approach for the purpose of giving each student the opportunity to provide constructive, thoughtful feedback on two papers one as lead and another as a second peer-reviewer. Each paper will be write-shopped for 30 minutes. The Write-Shop will be organized with task assignments as follows:

1. The author of the paper provides a brief overview of the paper and the main points/arguments (~5 minutes).
2. The student assigned as lead peer-reviewer will provide comments on the paper (~10 minutes). You should think about the strength of the argument, organization of the paper, areas where there might be too much or too little attention/gaps, references cited, etc.
3. The student assigned as second peer-reviewer will provide additional feedback on the paper (5-10 minutes). No need to repeat in detail points made by the lead reviewer, but it can be helpful to summarize where your comments align and then point out any additional feedback you have.
4. Open discussion (5-10 minutes). Anyone can comment on the paper draft at this point to provide additional feedback for the author.

Lead and second peer-reviewers submit a summary of their paper comments by 5pm Tuesday.

II. Reading Journal

Your ability to learn about sustainability and resilience depends in part on your ability to read, absorb, synthesize, critique, and distill the reading material assigned in the course. To help you hone these critical reading skills and to help you prepare for substantive discussions on course topics, you will be required to keep and submit a *Reading Journal*. Your *Reading Journal* feeds into weekly *Discussion Forum* (see Item II.3 below), provides the basis for your submission when you are *Discussion Co-Lead* (see I.B above), and should help prepare you for your final *Research Paper* (see III below).

For each assigned reading, you will write in your *Reading Journal*:

1. A brief paragraph summarizing:
 - a. the main points with relevant caveats (e.g., are methods robust? Are the main points generalizable or more narrowly applicable? Does the author have a particular agenda that might make you skeptical of the findings?)
 - b. what you find most interesting
 - c. how this article relates to other readings in the course
 - d. any “A-ha” moments
2. A separate brief paragraph (or few sentences) summarizing:
 - a. Any key weaknesses or key strengths in how sustainability/resilience are conceptualized? What is included? What is left out?
 - b. Any key weaknesses or key strengths in how sustainability/resilience is measured?
3. A bulleted list of questions from the reading? Submit one of these questions for the *Discussion Forum*

I expect some journal entries will be longer than others – you may have more to say for one article than another or you might find a particular article more or less stimulating than another. I expect your writing on *Co-Lead* day may be longer than normal. On average, I expect a half to one page of writing for each article. *Discussion Co-Leads* will submit a copy of their *Reading Journal* for the week’s materials by 5pm Tuesday, on their assigned discussion co-lead day (bring copy to class). You will receive feedback on your journal entry. All students will submit their *Reading Journal* by the last day of the semester.

III. Research Paper and Presentation

The purpose of this assignment is to provide each student with the opportunity to think critically about the concept of sustainability and/or resilience and its measurement. Through the course of the semester in your *Reading Journal*, you’ve been required to summarize readings including weaknesses and strengths of these key concepts and their measurement. You’ve also been asked to note “ah-ha” moments and during discussion you’re asked to dig deeper by noting how our thinking evolves, by critically assessing concepts and measures, by thinking about how readings relate to each other and what more we might want/need to know. With guest lectures you also get a glimpse at how state regulatory agencies, engineers, and water/wastewater utilities think about these ideas and implement them in practice. This paper is a chance for you to take what you learn in class as a starting point and then to dive in and uncover something new.

You have a choice about what specifically you want to do with the research paper but it should be focused on some aspect of the concept of sustainability and/or resilience and/or their measurement in the context of sustainable/resilient water resources or water/wastewater infrastructure. The syllabus includes important milestones and due dates for the paper. Each student will also participate in a *Write-shop Research Paper Peer-Review* (see I.C) where you will receive peer and instructor feedback on an advanced draft.

A. Abstract and Preliminary Lit Review

Your abstract and preliminary lit review should include a descriptive title, ~ 500 word abstract, and a minimum of 12-15 new (in addition to any you use from class) annotated references. By annotated reference, I mean each reference includes a short paragraph summarizing the reference and what you expect to draw from that reference for your paper (think similar to your entries for your *Reading Journal* but with the additional consideration for what it adds to the argument you are making for your paper). Aim for the bulk of your references to be within the past 10 years, preferably within the past 5.

Research Paper abstract & preliminary lit review due by 5pm, Friday, March 13.

B. Presentation during write-shop

You will present your paper during the *Write-shop* (See I.C above). You will have ~5 minutes to present a brief overview of your paper, the main research question, and the main points/arguments you make. Grades are assessed based on effectiveness and clarity of communication and keeping to the time limit.

C. Final paper

Your paper is intended to uncover new knowledge and thinking through a review and critique of the literature on the theory/concept of sustainability/resilience and/or how these concepts are measured. You also have the advantage of using what you learn about how these concepts are implemented in practice to guide your thinking.

Aim for 2,500 words excluding references, table/figure captions, if any. This should be a concise, critical review. Research Paper draft due by 5pm, Tuesday, April 14. Your draft should be nearly complete to permit an effective write-shop. Your final paper is due two weeks after your write shop presentation.

Due Dates and Late Policy

All course due dates are identified in the syllabus. *The instructor reserves the right to change dates accordingly as the semester progresses. All changes will be communicated in an appropriate manner.*

Assignments should be submitted via HuskyCT, unless otherwise noted or arranged. Assignments submitted after the due date will receive a 5% point deduction for each 24-hour period beyond the deadline (e.g., 1 day late = -5%, 2 days late = -10%, etc.). Note: Students experiencing family emergencies, personal emergencies, severe illness, or other extenuating circumstances should notify the Instructor **prior to the deadline** (or, if documentable emergency, promptly thereafter) to make arrangements for late work and to avoid late penalties.

Student Responsibilities and Resources

As a member of the University of Connecticut student community, you are held to certain standards and academic policies. In addition, there are numerous resources available to help you succeed in your academic work. This section provides a brief overview to important standards, policies and resources.

Student Code

As members of the University community, students have an obligation to uphold The Student Code (<https://community.uconn.edu/the-student-code-part-iii/>) including adhering to the highest standards of academic integrity and personal and interpersonal conduct. I expect all students will refrain from engaging in behaviors (e.g., disruptive, harming, endangering, etc.) that violate The Student Code or the Academic Integrity in Undergraduate Education and Research policy (<https://community.uconn.edu/the-student-code-appendix-a/>).

Plagiarism

Cheating and plagiarism are taken very seriously at the University of Connecticut. As a student, it is

your responsibility to avoid plagiarism. All work that students present in this course must be their own. It is permissible to use arguments made by others or available data to support a position; however, this should be limited to short passages and proper credit must be given to the original author. Presenting others work as your own violates the University of Connecticut code on plagiarism and requires that actions be taken which may include dismissal from the university. More information about plagiarism can be found at: <https://lib.uconn.edu/services/ask/get-help/writing/plagiarism-resources/>. The University of Connecticut policy on Academic Misconduct is contained within the Student Code: <https://community.uconn.edu/the-student-code-appendix-a/>.

Copyright

Copyrighted materials within the course are only for the use of students enrolled in the course for purposes associated with this course and may not be retained or further disseminated.

Communication

At all times, course communication with fellow students and the instructor are to be professional and courteous. It is expected that you proofread all your written communication, including discussion posts, assignment submissions, and mail messages.

Students with Disabilities

Students needing special accommodations should work with the University's Center for Students with Disabilities (CSD) (<https://csd.uconn.edu>). You may contact CSD by calling (860) 486-2020 or by emailing csd@uconn.edu. If your request for accommodation is approved, CSD will send an accommodation letter directly to your instructor(s) so that special arrangements can be made. Note: Student requests for accommodation must be filed each semester.

Other Helpful Sources of Information UPDATED:

Division of Student Affairs - <https://studentaffairs.uconn.edu>

Center for Students with Disabilities to arrange academic accommodations – <https://csd.uconn.edu>

Counseling and Mental Health Services - 234 Glenbrook Road, 860-486-4705

For immediate help, request an “on-call therapist”

<http://counseling.uconn.edu/> Beginning Monday 3/23/20 through the end of the semester, SHAW-Mental Health will be moving to exclusively telehealth (online) or phone platforms for providing services to students. We ask that students call our office at 860-486-4705 before walking to the office.

<https://suicideprevention.uconn.edu>

Sexual violence, domestic violence and stalking awareness support - <http://titleix.uconn.edu/>

COVID-19 RESOURCES

UConn Health has opened a COVID-19 Call Center to address [questions and concerns related to coronavirus](#). It is open from 8 a.m. to 5 p.m. weekdays and is available to UConn employees, patients, students, and the community. Questions and concerns can be directed to 860-679-3199.

The university has a webpage for COVID-19 Updates. <https://uconn.edu/public-notification/coronavirus/>

Course Calendar

Note: Please be advised the schedule (and readings) may be adjusted during the semester. The Instructor will give advanced notice of any changes in class or via announcement in HuskyCT.

Week #	Class Topics and Readings (see HuskyCT)	Assignments	Due Dates
Week 1 Class, 1/21	Watch introductory video on HuskyCT. We will NOT meet in class today. <i>Readings on overall challenge and context:</i> Milly, et al. 2008 (Stationarity is dead); Lubchenco et al. 2015 (new social contract); Chang 2016 (socioeconomic impacts infrastructure disruption) <i>Readings on sustainability and its measurement:</i> Russo et al. 2014 (overview and dimensions); Jacobs et al. 2016 (knowledge-action for sustainability); Aspen/Nicols 2009 and 2014; Akimov and Schinhouer 2019 (benchmarking); USEPA Climate Ready Water Utilities	Read assigned readings; complete <i>Reading Journal</i> ; contribute to Week 1-2 <i>Discussion Forum</i> .	
Week 2 Class, 1/28	Sustainability Discussion	Discussion Co-leads: Julia Czarnecki Cody Exley	<i>Discussion Forum</i> questions due by 9pm on 1/27 <i>Co-lead Reading Journal</i> due 5pm on 1/28
Week 3 Class, 2/4	We will NOT meet in class today. <i>Readings on resilience and its measurement:</i> Van der Merwe et al. 2018 (resilience STS); Comfort et al. 2010 (resilience revisited); Tierney and Bruneau (conceptualizing and measuring resilience community scale); Hill and Kakenmaster 2018 (term resilience use); Beunen et al. 2017 (resilient governance); Boin and Van Eeten 2013 (org resilience); Water/Wastewater Resilience 2014; Risk Governance 2013; Duit 2015 (resilience thinking PA)	Read assigned readings; complete <i>Reading Journal</i> ; contribute to Week 3-4 <i>Discussion Forum</i> .	
Week 4 Class, 2/11	Resilience Discussion	Discussion Co-leads: Aaron Golab Genevieve Rigler	<i>Discussion Forum</i> questions due by 9pm on 2/10 <i>Co-lead Reading Journal</i> due 5pm on 2/11
Week 5 Class, 2/18	Resilient Water Systems Discussion <i>Readings on Resilient Water Resources & Infrastructure:</i> Kirchhoff and Dilling 2016 (states and water governance); Baehler and Biddle 2018 (sustainable/resilient water systems); Kohlitz et al. 2019 (response capacity); Bereskie et al. 2017 (performance metrics); EPA 2018 (sustainable water Utilities)	Read assigned readings; complete <i>Reading Journal</i> ; contribute to Week 5 <i>Discussion Forum</i> . Discussion Co-leads: Christina Feng Chang Volunteer (Bonus)	<i>Discussion Forum</i> questions due by 9pm on 2/17 <i>Co-lead Reading Journal</i> due 5pm on 2/18

Week #	Class Topics and Readings (readings posted to HuskyCT)	Assignments	Due Dates
Week 6 Class, 2/25	Guest Lecture – David Murphy, P.E., CFM, Manager of Water Resources Planning, Milone & MacBroom Inc. - confirmed <i>Readings:</i> SECOG 2004 (Regional EM Plan); USEPA Understanding SDWA; DWVARP; CT State Water Plan; Guilford Coastal Resilience Plan; Fact Sheet FEMA Hazard Mitigation Planning; Fact Sheet AWIA	If appropriate, complete <i>Reading Journal</i> ; contribute to Week 6 <i>Discussion Forum</i> .	If appropriate, <i>Discussion Forum</i> questions due by 9pm on 2/24
Week 7 Class, 3/3	Guest Lecture – Craig J. Patla, P.E., Vice President – Service Delivery - confirmed <i>Readings:</i> No new readings	If appropriate, complete <i>Reading Journal</i> ; contribute to Week 7 <i>Discussion Forum</i> .	If appropriate, <i>Discussion Forum</i> questions due by 9pm on 3/2
Week 8 Class, 3/10	Guest Lecture – Lori Mathieu and Steven Wallet Confirmed <i>Readings:</i> Barclays Report; Levine et al. 2016; Two storm report; Coproducing Actionable Science for Water Utilities Workshop Final Report	If appropriate, complete <i>Reading Journal</i> ; contribute to Week 8 <i>Discussion Forum</i> .	If appropriate, <i>Discussion Forum</i> questions due by 9pm on 3/9 Research Paper abstract & prelim. lit rev. due by 5pm, Friday, March 13
Week 9 3/16-20	Spring Break NO CLASS		
Week 10 Class, 3/24	Resilient Wastewater Systems Discussion No class discussion – submit questions to discussion board and complete reading journals <i>Readings</i> Wastewater System Resilience: Hummel et al. 2018; Kirchhoff and Watson 2019; Langeveld et al. 2013; Juan-Garcia et al. 2017; Rudberg et al. 2012; Gemar et al. 2018		<i>Discussion Forum</i> questions due by 9pm on 3/23
Week 11 Class, 3/31	BILL PATENAUDE GUEST LECTURE Confirmed – VIA WEBEX <i>Readings:</i> Rulseh_2011; WoodwardCurran2017Report; NEIWPCC Extreme Weather Guide; Kirchhoff_etal_2019_Building WW System Resilience; NEIWPCC TR-16 Storm Resilience Design Consideration; RIDEM WWTP Design Guide; RIDEM website	If appropriate, complete <i>Reading Journal</i> ; contribute to Week 11 <i>Discussion Forum</i> .	If appropriate, <i>Discussion Forum</i> questions due by 9pm on 3/30
Week 12 Class, 4/7	CARLOS ESQUERA GUEST LECTURE – 5:30pm start time – VIA WEBEX Re-Confirmed <i>Readings:</i> CWF Memo; WaterfordCT Pump Station VA; #####	If appropriate, complete <i>Reading Journal</i> ; contribute to Week 12 <i>Discussion Forum</i> .	If appropriate, <i>Discussion Forum</i> questions due by 9pm on 4/6
Week 13 Class, 4/14	Tour Groton WPCF – cancelled Kevin Cini hosts		<i>Research Paper</i> draft due by 5pm, Tuesday, April 14
Week 14 Class,	Research Paper Peer-review Write-Shop – option to skip Week 15 final class if all papers are write-shopped today VIA WEBEX		Final papers due by 5pm, 2 weeks after

4/21			write shop presentation
Week 15 Class, 4/28	Research Paper Peer-review Write-Shop (or skip if all papers write-shopped Week 14) VIA WEBEX		Reading Journal Due Friday, May 1 by 5pm Final papers due by 5pm, 2 weeks after write shop presentation