Carleton University

RESILIENT INFRASTRUCTURE AND SUSTAINABLE URBAN FUTURES
Course Syllabus for ENVE 5701 – Fall 2021

INSTRUCTOR

Prof. Yeowon Kim
Email: yeowon.kim@carleton.ca
Office hours: Fridays, 10:00 am – 11:00 am on Zoom

CLASS TIME

Wednesdays, 6:05 pm – 8:55 pm Online

COURSE WEBSITE

We will use Brightspace for the course. The syllabus, assignments, reading materials, and announcements will be posted to Brightspace.

COURSE BACKGROUND AND OBJECTIVES

This course will offer an overview of key properties and trends likely to drive the evolution of cities and infrastructure in the coming decades such as climate change, demographic shifts, and technological innovation. This course will expose students to interdisciplinary theories and perspectives for understanding cities as complex social-ecological-technological systems through lectures and student-led discussions. In addition, students will gain analytic skills to build upon fundamental research practices in engineering design, urban sustainability, and infrastructure resilience such as scenario analysis, risk and vulnerability analyses, system dynamics model, and decision-making models.

TOPICS COVERED

Resilience; Sustainability; Infrastructure; Urban systems; Climate change adaptation; Climate risks; Vulnerability; Social-ecological-technological systems dynamics; Infrastructure interdependencies; Urban hydrological risks; Interdisciplinary engineering research design and methods; Participatory research methods; Scenario planning; Institutional governance

WEEKLY SCHEDULE AND ASSIGNMENTS

(Subject to change, assignments are due 30-mins before the class)

Week	Date	Topic, readings, and assignments
1	Sep 8	**Course overview** Assignment due - Review syllabus and familiarize with Brightspace

2	Sep 15	**Urban infrastructure: Evolution of infrastructure systems and technologies in cities** Readings - Carse, A. (2016). Keyword: Infrastructure. How a humble French engineering term shaped the modern world. In P. Harvey, C. Jensen, & A. Morita (Eds.), Infrastructures and Social Complexity: A companion (pp. 27–39). Routledge. - Slota, S. C., & Bowker, G. C. (2007). Chapter 18. How Infrastructures Matter. In The Handbook of Science and Technology Studies (pp. 529–554). MIT Press. Assignment due - Reading summary including discussion questions
3	Sep 22	**Climate change: Sustainability and resilience** Readings - Redman, C. L. (2014). Should sustainability and resilience be combined or remain distinct pursuits? Ecology and Society, 19(2). - Meerow, S., & Newell, J. P. (2019). Urban resilience for whom, what, when, where, and why? Urban Geography, 40(3), 309–329. Assignment due - Reading summary including discussion questions
4	Sep 29	**Infrastructure vulnerability and interdependency** Readings - Kim, Y., Eisenberg, D. A., Bondank, E. N., Chester, M. V., Mascaro, G., & Underwood, B. S. (2017). Fail-safe and safe-to-fail adaptation: decision-making for urban flooding under climate change. Climatic Change, 1–16. Assignment due - Reading summary including discussion questions
5	Oct 6	**Resilient infrastructure in the Anthropocene** Readings - Chester, M., Underwood, B. S., Allenby, B., Garcia, M., Samaras, C., Markolf, S., Sanders, K., Preston, B., & Miller, T. R. (2021). Infrastructure resilience to navigate increasingly uncertain and complex conditions in the Anthropocene. Npj Urban Sustainability, 1(1), 4. Assignment due - Reading summary including discussion questions
6	Oct 13	**Infrastructure as SETS (Social-ecological-technological systems)** – Guest lecture by Dr. Samuel Markolf, University of California Merced Readings

		- Markolf, S. A., Chester, M. V., Eisenberg, D. A., Iwaniec, D. M., Davidson, C. I., Zimmerman, R., Miller, T. R., Ruddell, B. L., & Chang, H. (2018). Interdependent Infrastructure as Linked Social, Ecological, and Technological Systems (SETSs) to Address Lock-in and Enhance Resilience. Earth's Future, 6(12), 1638–1659. Assignment due - Reading summary including discussion questions - Project work plan
7	Oct 20	**Proposal presentations**
-	Oct 27	**No class** (Fall break)
8	Nov 3	**Infrastructure failures and safe-to-fail infrastructure** Readings - Kim, Y., Chester, M. V., Eisenberg, D. A., & Redman, C. L. (2019). The Infrastructure Trolley Problem: Positioning Safe-to-fail Infrastructure for Climate Change Adaptation. Earth's Future, 7(7), 704–717. Assignment due - Reading summary including discussion questions
9	Nov 10	**Nature-based solutions** Readings - Hobbie, S. E., & Grimm, N. B. (2020). Nature-based approaches to managing climate change impacts in cities. Philosophical Transactions of the Royal Society B: Biological Sciences, 375(1794). Assignment due - Reading summary including discussion questions - Summary of preliminary results for the proposed project
10	Nov 17	**Envisioning urban futures** – Guest lecture by Dr. Lelani Mannetti, Georgia State University Readings - TBD Assignment due - Reading summary including discussion questions
11	Nov 24	**Infrastructure planning and governance** Readings - Chester, M. V., Miller, T., & Muñoz-Erickson, T. A. (2020). Infrastructure governance for the Anthropocene. Elementa: Science of the Anthropocene, 8(1), 1–14. Assignment due - Reading summary including discussion questions
12	Dec 1	**Final presentations** - End of class -
13	Dec 8	**Final report due**

EVALUATION

Total = 1) + 2) +3) = 100%

1) In-class discussion lead and participation: 35%
2) Assignments: 15%
3) Project deliverables: 50%
   - Work plan, data sources, and methods: 15%
   - Proposal presentation: 5%
   - Summary of preliminary results: 5%
   - Final presentation: 10%
   - Final report: 15%

GRADING

Letter grades will follow the University percentage rubric:

A+: 90-100%	A: 85-89%	A-: 80-84%
B+: 77-79%	B: 73-76%	B-: 70-72%
C+: 67-69&	C: 63-66%	C-: 60-62%
D+: 57-59%	D: 53-56%	D-: 50-52%
F: 0-49%		

To receive credit for the class, students must attend all classes (unless the absence is approved by the instructor), participate as an active and contributing group member in the project, complete all assignments, and complete the final project.

Late assignments will be assessed a 10% reduction of the initial grade for each 24 hours that it is past due. After 72 hours the assignment will no longer be accepted.

All assignments should be prepared for submission as if you are in a professional environment. Appropriate writing should be used to introduce the problems you are assessing and discuss/describe results, regardless of whether the assignment asks for a writeup. Your name and the name of the assignment should appear at the top of your assignments. Points will be deducted for poor grammar and spelling.

Standing in a course is determined by the course instructor subject to the approval of the Faculty Dean. This means that grades submitted by the instructor may be subject to revision. No grades are final until they have been approved by the Dean.

COURSE COPYRIGHT

Classroom teaching and learning activities, including lectures, discussions, presentations, etc., by both instructors and students, are copyright protected and remain the intellectual property of their respective author(s). All course materials, including PowerPoint presentations, outlines, and other materials, are also protected by copyright and remain the intellectual property of their respective author(s).

Students registered in the course may take notes and make copies of course materials for their own educational use only. Students are not permitted to reproduce or distribute lecture notes and course materials publicly for commercial or non-commercial purposes without express written consent from the copyright holder(s).

COURSE MODALITY

This course is a real-time, online course where the instructor and students meet via web conferencing tools, at scheduled days and times. Instructors and students share information, ideas and learning experiences in a virtual course environment. Participation in synchronous courses requires students to have reliable, high-speed internet access, a computer (ideally with a webcam), and a headset with a microphone.

Session Recording

Web conferencing sessions in this course may be recorded and made available only to those within the class. Sessions may be recorded to enable access to students with internet connectivity problems, who are based in different time zone, and/or who have conflicting commitments. If students wish not to be recorded, they need to leave your camera and microphone turned off.

You will be notified at the start of the session when the recording will start, and Zoom will always notify meeting participants that a meeting is being recorded. It is not possible to disable this notification.

Please note that recordings are protected by copyright. The recordings are for your own educational use, but you are not permitted to publish to third party sites, such as social media sites and course materials sites.

You may be expected to use the video and/or audio and/or chat during web conferencing sessions for participation and collaboration. If you have concerns about being recorded, please email me directly so we can discuss these.

TERMS OF ENGAGEMENT

Carleton University is committed to providing a living and learning environment that promotes student success inside and outside of the classroom. The Office of Student Affairs would like to remind all students that Carleton's conduct policies and students' rights and responsibilities also apply to online communication. We are committed to ensuring a respectful and engaging online community.

Appropriate Online Behaviour in Discussion Forums

Online discussion groups are most commonly used to develop critical thinking skills, foster innovation, and facilitate learning. To realize those benefits, everyone in the group must feel respected and safe.

- Think before you post: Would you say this to someone if you were having this conversation face to face? How would you react if someone else posted this

comment? Commenting online can give a false sense of security. If you wouldn't say it in person, it's best to reword, and rethink your comment.
- Check your tone of voice: Read your comment out loud and be mindful of how it may sound to others who are reading it. If possible, get someone else to read it before you post it to ensure it comes across how you mean it to.
- Stay on topic: Stick to the discussion topic and avoid going off on tangents.
- Be mindful that others may have a difference of opinion: If you disagree with something that was posted, remember to be respectful in your reply. Think in terms of "my opinion vs. the issue," and not "me vs them;" in other words, focus on the idea(s), not the person communicating the idea.

Live-Stream Lecture Etiquette

- Make sure you are in a quiet space for the live class, so that you and others can listen without being distracted by background noises.
- Mute your microphone when you aren't speaking to the class, so that others aren't distracted by outside noises.
- If comfortable, consider turning on your webcam for face-to-face interactions: so much of communication is seeing and responding to people's faces.
- Ensure that you don't have any posters, drawings, or writing in the background of your screen that could be offensive to others.
- If you are using a platform where you are asked to create a username, it is good practice to use your preferred name or the name you would use in a professional setting. Do not create a username that might be considered offensive.
- For synchronous sessions, follow whatever 'terms of engagement' your instructor sets: some instructors will want you to use the chat feature to indicate that you want to get involved; others will use the hand raising feature, or ask you to raise your hand with your webcam on. Whatever process your instructor uses, follow it. It can be disruptive and confusing for a moderator to have a participant free-for-all on this issue.
- Lastly, behave as you would if you were taking the class on campus.

ACADEMIC INTEGRITY

The University Academic Integrity Policy defines plagiarism as "presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one's own." This includes reproducing or paraphrasing portions of someone else's published or unpublished material, regardless of the source, and presenting these as one's own without proper citation or reference to the original source. Examples of sources from which the ideas, expressions of ideas or works of others may be drawn from include but are not limited to: books, articles, papers, literary compositions and phrases, performance compositions, chemical compounds, art works, laboratory reports, research results, calculations and the results of calculations, diagrams, constructions, computer reports, computer code/software, material on the internet and/or conversations.

Examples of plagiarism include, but are not limited to:
any submission prepared in whole or in part, by someone else; using ideas or direct, verbatim quotations, paraphrased material, algorithms, formulae, scientific or mathematical concepts, or ideas without appropriate acknowledgment in any academic assignment; using another's data or research findings without appropriate acknowledgement; submitting a computer program developed in whole or in part by someone else, with or without modifications, as one's own; and
failing to acknowledge sources through the use of proper citations when using another's work and/or failing to use quotations marks.

Plagiarism is a serious offence that cannot be resolved directly by the course's instructor. The Associate Dean of the Faculty conducts a rigorous investigation, including an interview with the student, when an instructor suspects a piece of work has been plagiarized. Penalties are not trivial. They can include a final grade of "F" for the course or even suspension or expulsion from the University.

ACADEMIC ACCOMODATION

Carleton University is committed to providing access to the educational experience in order to promote academic accessibility for all individuals. Academic accommodation refers to educational practices, systems and support mechanisms designed to accommodate diversity and difference. The purpose of accommodation is to enable students to perform the essential requirements of their academic programs. At no time does academic accommodation undermine or compromise the learning objectives that are established by the academic authorities of the University.

Addressing Human Rights Concerns

The University and all members of the University community share responsibility for ensuring that the University's educational, work and living environments are free from discrimination and harassment. Should you have concerns about harassment or discrimination relating to your age, ancestry, citizenship, colour, creed (religion), disability, ethnic origin, family status, gender expression, gender identity, marital status, place of origin, race, sex (including pregnancy), or sexual orientation, please contact the Department of Equity and Inclusive Communities at equity@carleton.ca.

Requests for Academic Accommodation

You may need special arrangements to meet your academic obligations during the term. For an accommodation request, see the following page for the specific processes: https://students.carleton.ca/course-outline/#academic-accommodations-for-students-with-disabilities