

School of The Environment, Winter 2025

ENV 360F, Is the Internet Green?

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Virtual Office Hours: Please make an appointment through Quercus

Class Meetings: In-person, Wednesday's 10:00-12:00 Room _____

Tutorial Meeting Time: _____

Teaching Assistants: Yunhong (Doris) Tian, yh.tian@mail.utoronto.ca

Course information is posted on Quercus. Please contact Professor Bass and/or TA through Quercus Inbox.

Course Description

We are still emerging from the forced two-year plus withdrawal from in-person classes and face-to-face interactions which plunged us, willing or not, into the digital world. It is almost impossible to consider how society would have coped with the COVID-19 pandemic without ICT. And even before the pandemic, ICT was so deeply embedded in our day-to-day lives that many could not cope without it. We were and continue to be reliant on Internet and Communication Technologies (ICT) to connect with our friends, family, school, work, entertainment, food shopping and Libraries. It changed us as younger people were learning to live off their phones, even using their phones to access the Internet when a larger monitor was accessible. The number of devices that connect us to the Internet is no longer restricted to a computer and mobile phone but could include every appliance in our homes. This profound dependence on ICT has happened during the past ~30 years – a very short time for such changes to have taken place.

Although we are very familiar with and use ICT extensively, few of us understand the hardware and software that keeps ICT functioning, how we got to this stage in our use of ICT, and importantly, the growing control and commodification of our ICT activities. Further, words such as “cloud computing” and “cyberspace” give ICT an ethereal sense – that ICT has few physical structures. That is not the case! ICT, and all its offshoots, very much have a physical “materiality” that comes along with very real environmental impacts in terms of how we use energy, land and water.

As citizens and students in this course, our task is to first, become acquainted with the environmental impacts of ICT. Second, all of us, as a society, need to think critically about the choices and the trade-offs that we must make as we expand the use of ICT. This course intends to help us make informed decisions

and choices, and to be active participants rather than passive consumers and objects of ICT. We will see that some of the problems that have emerged with the increasing use of ICT are solvable while other trajectories will be much more difficult to alter without a radical change in our approach to this technology.

Course Objectives

This course examines and debates the environmental consequences of ICT in the context of environmental sustainability. The course will introduce you to disciplinary and interdisciplinary modes of inquiry and engagement. While most of this course builds on information from the physical, social, decision and health sciences, the course will offer opportunities for other types of creativity in the different areas of design.

Course Evaluation

Assignment	Due Date	Weight (%)
Assignment 1: Measure the carbon footprint, waste impact and information content of your ICT devices and screen time	Due January 31	25
Bonus Question Request: Random assignment of a question	Request periods open January 20, February 18 OR March 18 (limited to 30 students)	
Should access to the Internet be expanded to/improved in remote areas?		
Assignment 2: (Partner Assignment) Compare “unintended consequences” of the Internet in simulated environment including a short literature review based on assigned readings	Due February 28	30
Participation Exercise Assessing Expansion of Broadband with Integrated Thinking		
The Ethical and environmental implications of owning a smart phone		
Assignment 3 Infographic, Systems Diagram or Brief Literature Review - What is in my phone, where does it come from, who is involved and what is the impact	Due March 28	25
Participation	Weekly attendance, in-class exercises ¹ & participation in classes ² & tutorials	20

¹ Pass / Fail (5% of participation grade): must be completed and handed in at end of class.

² Although participation is continuously assessed, it will be more actively assessed in certain classes marked on the lecture and assignment schedule of lectures and exercises

Note: if an unexpected technical issue occurs with a university system (e.g., Quercus services, network outage) that affects availability or functionality, it may be necessary to revise the timing or weighting of the assessments.

Coursework Assignments (100% overall)

Each assignment will be discussed in class and then completed outside of class time.

Assignment 1

Assignment 1 is completed individually. It involves taking an inventory of ICT devices owned and used by yourself and your family. You will then calculate the embodied carbon emissions contained in those devices.

Assignment 2

Assignment 2 is a small research report, similar to what you might have done with the Research Opportunity Program. You will be conducting an experiment and producing original results. For Assignment 2, you will assess the impact of introducing the Internet into a community using the COBWEB simulation model (Complexity and self-Organized Behaviour Within Environmental Bounds). You will be working with a partner on this assignment. Assignment 2 may be discussed in groups of 2-4 students. You can include the results that were obtained by the other two students in their simulation, or you can base your write up only on your own simulation. You will have the option of submitting one assignment with a partner or your own individual assignment. Should you choose to submit with a partner, you will both receive the same grade for the assignment. Your simulation will be completed in one lab session, but you will have the option to run additional experiments should you need or want to repeat your experiment. You will introduce your assignment with a brief literature review.

Assignment 3

Assignment 3 gives you the most flexibility and creativity, and you can choose a mode of presentation that best fits your talents, skills and experience. If you are skilled in the visual arts/graphic design, you might choose an infographic to present your material (or some other visual representation of the material). You can even set up a website for the presentation as long as you can recognize the irony of doing so (and the environmental impact of doing so) within the presentation.

Marking rubrics

Marking rubrics for each assignment will be available one week before the submission date for peer review, i.e., Jan. 29 and Feb. 28. The criteria in the rubrics include research depth, depth of critical analysis, coverage of the literature, and coherence and comprehensibility of the written report.

Assignment Submissions

All assignment submissions are through Quercus and must include the following information:

- Your name
- Title of assignment
- Course title and number
- Name of Professor and TA
- Double or 1.5 line spacing using 12- point type in black with 2.5 cm (1 inch) margins
- Include page numbers

Requests for Re-evaluation

Requests for re-evaluation must be submitted in writing to Professor Bass with a clear reason to justify your request. Professor Bass will respond within a week as to whether your assignment will be remarked. Your assignment will be remarked by the TA.

Back-up your work!!!

Save your document often and back-up your work! Hard drive crashes are not an acceptable reason for requesting an extension.

Late Penalty for Assignments

Late assignments will be accepted up to **ONE week after the due date with a penalty levied**. You report your absence through the “online absence declaration” available on ACORN; look under Profile and Setting menu. Notes from a physician are required to verify an illness or an injury that prevents you from completing work. Should you need a “physician’s note” to verify that you have been ill or injured, you will need to complete the [Verification of Student Illness or Injury Form](#). For more information please visit [Getting a Doctor’s Note](#) and [Verification of Illness or Injury](#). Without a declaration form filed, the late penalty is a lowering of the grade by 4% per day with 4% applying to the weekend. You might also need to request an extension due to a personal or family emergency or a bereavement. You can find the policy for these situations at [Family Emergencies and Bereavement](#).

Requests for Extensions

Requests for extensions will be considered on a case-by-case basis. No request will be considered because of your workload in other courses. Should you require an extension for health reasons (physical or mental) you must provide the appropriate documentation from a physician. If you are unable to complete your assignments on time due to other chronic conditions, you must register with Accessibility Services. Should you need to access mental health support, you can do so at [Access to Mental Health Support](#). You can also request an extension to cope with personal emergencies, family emergencies and bereavements. Should you be experiencing an unexpected situation (e.g. loss of housing, severe illness or injury, family emergency, bereavement) please contact the instructor as soon as possible. You can reveal as much or as little information about your immediate needs as suits your comfort level at the time. We are here to support you.

Participation Grade (20%)

There are several ways to ensure that you maximize your participation grade.

- Visit office hours, tutorials or research lab hours.
- Participate in class exercises and discussions and tutorial discussions.
- Participate in the two Lab exercises using computer simulations and integrative thinking.
- Volunteer for presentations of work when those options are made available.
- Organize small discussions online and invite Professor Bass or Yunhong, or you can ask Professor Bass about other opportunities to join discussions.
- Volunteer to keep a journal.*

How do you know that your efforts at participation are succeeding? The Instructor begins addressing you by name instead of asking for your name.

*Details for the journal will be provided in the first class. You must begin the journal in week 2 of the course.

Optional Bonus Question for each Assignment

It is possible to achieve a grade of A+ on any assignment, but for a student who would like to improve their overall grade, you can opt for a bonus question. These optional questions are available for each assignment or 3 times during the semester. You must register with the instructor to receive your bonus question. Should you register to submit a bonus question, you have one day to change your mind. After this one-day grace period, should you fail to submit the question, you will be penalized with a one-day late penalty on the course assignment. You will not be penalized for illness, injury, personal or family emergencies or bereavement. There are no extensions available for these questions and no option to request an alternative question.

Your Tutorial Assistant (TA)

This year your TA, Yunhong Tian will be available prior to assignments to answer questions during office hours, through email or through Quercus Inbox. Your TA will assist with marking assignments.

What you will learn in the course

- How to probe the breadth, depth and interconnectedness of a system as complex as ICT; how complex phenomena defy simple explanations, and why it's important to think and solve problems with the help of multiple disciplines and systems thinking.
- How to think critically, use both sides of an argument to solve a problem, and use tools for creative and effective problem solving as individuals and in groups.
- To improve your scientific literacy and communication skills, through
 1. a deeper understanding of how ICT works;
 2. how to assess environmental and societal and personal benefits and costs of ICT; and
 3. how to clearly communicate your ideas.

Course Policies

Communication with Professor Bass and the TA

Communication with Professor Bass and the TA is through Quercus Inbox or email ([Email the Professor](#)). We will respond within 1 to 2 days on weekdays. Do not expect immediate responses over weekends and evenings. Do not expect responses to questions about assignments within 24 hours of the due date.

We all need to communicate respectfully.

“The University of Toronto is committed to equity, human rights and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect where all members of our community can express themselves, engage with each other, and respect one another’s differences. U of T does not condone discrimination or harassment against any persons or communities.”

Privacy rights and appropriate use of course material

This course, including your participation, may be recorded on video and will be available to students in the course for viewing remotely and after each session.

Course videos and materials belong to your instructor, the University, and/or other sources depending on the specific facts of each situation, and are protected by copyright. In this course, you are permitted to download session videos and materials for your own academic use, but you should not copy, share, or use them for any other purpose without the explicit permission of the instructor.

Technology Requirements

Please refer to the [Recommended Technology Requirements for Remote/Online Learning](#).

Academic Integrity

This course offers you opportunities to work with your own original research (through simulation and integrative thinking) as well as the work of others through literature reviews. In working with published work, very few of us have truly original ideas but we almost always build on the ideas and information provided by others. We need to re-emphasize that plagiarism — representing someone else’s words as your own or submitting work that you have previously submitted for marks in another class or program — is a serious offence. **Assignments, reading summaries and exams** are reviewed for evidence of these infractions. Penalties for these offences can be severe and can be recorded on your transcript.

Trust your own ability to think and write and make use of the resources available at U of T that can help you do so (e.g. professors, TA, writing centres). See the U of T writing website, especially the [“How Not To Plagiarize” document](#). More information is available at the [Arts & Science Student Academic Integrity webpage](#).

The following is a list of examples (not complete) of what constitutes an academic offence:

- Using someone else’s ideas or words without appropriate acknowledgement.
- Copying material word-for-word from a source (including lecture and study group notes) and not placing the words within quotation marks and not citing the author/source.
- Submitting your own work in more than one course without the permission of the instructor.
- Making up sources or facts, including references to sources that you did not use.
- Obtaining or providing unauthorized assistance on any assignment including:
 - Working in groups on assignments that are supposed to be individual work
 - Having someone rewrite or add material to your work while “editing”.
 - Lending your work to a classmate who submits it as his/her own without your permission.
 - Paying for information and/or writing.
- Misrepresentation:
 - Falsifying or altering any documentation required by the University, including doctor’s notes
 - Falsifying institutional documents or grades

Accommodation

The University of Toronto is committed to accessibility. If you require accommodations for a disability, or have any accessibility concerns about the course, the classroom or course materials, please contact Accessibility Services as soon as possible: accessibility.services@utoronto.ca or via the [Accessibility Services website](#).

Additional Services and Support

The following are some important links to help you with academic and/or technical service and support:

- General student services and resources at [Student Life](#)
- Full library service through [University of Toronto Libraries](#)
- Resources on conducting online research through [University Libraries Research](#)
- Resources on academic support from the [Centre for Learning Strategy Support](#)
- Learner support at the [Writing Centre](#)
- Information for [Technical Support/Quercus Support](#)

Lecture Schedule

Week	Date	Lecture Topic	Tutorials	Assignments
1	Jan 8	Introduction: Why is this course about the ICT and why the question “is it green”?	Optional: Writing tutorial	Introduction to Assignments
2	Jan 15	Environmental problem solving, systems thinking In-class exercise: Systems Diagrams & Ladder of Inference (hand-written, submitted during class) Introduction to Assignment 1	Foot-printing and information analysis of web habits	Introduction to Assignment 1 Participation
3	Jan 22	How did we overlook the environmental impact of ICT – the history of information and technologies leading to “what is the Internet”? Part 1 How did we overlook the environmental impact of ICT – the history of information and technologies leading to “what is the Internet”? Part 2	Introduction to literature reviews. Review 3 articles from the reading list	Introduction to Assignment 2
4	Jan 29	Resource Implications and Conflict Minerals Sign-up for Optional Assignment	1 COBWEB intro; Group 1 2 COBWEB intro; Group 2 Participation	Assign 1 due (Jan 31) Introduction to Assignment 3 Participation
5	Feb 5	Is ICT “green”? An energy analysis	Supply Chains (required for Assignment 3) Participation	Optional Assignment: Annotated Bibliography & Literature Review OR Ladder of Inference
6	Feb 12	ICT use to help humanity Dr. Cagdas Dedeoglu Guest TBA		Participation
		Reading Week		
7	Feb 26	Beyond the carbon footprint: ICT’s resource use (water and land)	Integrative Thinking Review	Assign 2 due Group 2

		Sign-up for Optional Assignment		(Feb 28) Introduction to Assignment 3
8	Mar 5	Beyond the carbon footprint: ICT's resource use (water and land)	Integrative Thinking Exercise Part 1	
9	Mar 12	Resources in and e-waste out	Integrative Thinking Exercise Part 2	Optional Assignment: Same as Feb 05
10	Mar 19	Individual energy use of digital life: <ul style="list-style-type: none"> • Energy to prepare presentation • Energy in using websites 		Sign-up for Optional Presentations Participation
11	Mar 26	Health impacts of digital life		Assign 3 due (Mar 31) Participation
12	Apr 2	Future decisions on ITC. Special Topics: Optional presentations In-class exercise: Ladder of Inference (hand-written, submitted during class)		Participation

Reading/Viewing/Listening Hints

1. **Identify the key terms in the reading.** Think about how the author(s) defines these terms and uses them in the broader argument.
2. **Note key concepts that relate to other readings/lectures** in the course and that help you to understand the main themes in the course and their interrelationships, i.e., build bridges between the readings and lectures.
3. **Note methods used** to investigate the topic or solve the problem. How could you use this method?
4. **Write down any questions** that arise when in lecture and reading (no question is stupid!).
5. **Look up words/concepts** in the reading that you do not understand. Reading with a dictionary at your side is the best way to expand your vocabulary!
6. **Explore the context for the reading.** As you know, the Internet is moving fast! How recently was it published? At what stage in the development of the Internet was it written? What type of publication did it appear in? How does it relate to other readings you have met?

Remember, when writing down a quote, **always put quotation marks around the author's words** and note the page number from which you are quoting. This will provide you with a good basis of quotes for later writing assignments and will help you to develop responsible practices of note-taking in line with the requirements of academic integrity.