

ECO481H1 F

Special Topics in Economics with Data Analytics

Fall 2025 Syllabus

Course Meetings

ECO481H1 F

Section	Day & Time	Delivery Mode & Location
LEC0101 Climate Economics	Monday, 10:00 AM - 1:00 PM	In Person: FE 213

Refer to ACORN for the most up-to-date information about the location of the course meetings.

This course contains an Empirical Bridging Module which is delivered separately from the usual lectures. It will take place Thursday, September 11, 9:00am - 11am (up to noon), with weight 3% of the course grade. Please see the end of this syllabus for details.

Course Contacts

Course Website: <https://q.utoronto.ca/courses/398595>

Instructor: Jeffrey Sun

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Office Hours and Location: TBD

Teaching Assistant: Derek Thiele

Email: d.thiele@mail.utoronto.ca

Office Hours and Location: TBD

Course Overview

Seminars or workshops in economics with a data analytics component may be offered in one or more topics each year. Note: hands-on analysis of real-world data using computer programs is a course requirement. The course is open to all students who meet the prerequisites and necessary support for applicable software is provided.

We study how the causes and consequences of climate change interact with the economic sphere. We use economic theory to study the impact of climatic factors (such as heat, sea level rise, groundwater depletion, and precipitation) on agriculture, industry, trade, health, and more. We study how market failures and knock-on effects can exacerbate these impacts, how

adaptation and policy can ease them, and how these can all be understood through the lens of equilibrium.

Building on economic and econometric theory, we use real-world economic and geospatial datasets to understand how climate impacts can be measured, how cause and effect can be disentangled, how theories can be tested, how inequalities in impacts can be uncovered, and what the limits are of measurement and prediction.

We cover some aspects of regulation and compliance which are currently gaining rapidly in importance, such as carbon accounting, carbon markets, and institutional climate risk management.

This is a developing field, and few predictions can be made with great certainty. This course will attempt, throughout, to delineate what is currently known; explore uncertainties, challenges, and tail risks; and attempt to reveal how and where progress can be made.

In a final project, students will apply real-world data and modern modeling tools to a climate question of their choice.

Prerequisites: ECO200Y1/ ECO204Y1/ ECO206Y1, ECO202Y1/ ECO208Y1/ ECO209Y1, ECO220Y1/ ECO227Y1/ (STA237H1, STA238H1)/ (STA247H1, STA248H1)/ (STA257H1, STA261H1), at least 1.0 credit in ECO at the 300+ level. Further prerequisites (e.g. ECO225H1/GGR272H1) may be required and may vary from year to year, consult the Department of Economics website/current Timetable for more information.

Credit Value: 0.5

Marking Scheme

Assessment	Percent	Details	Due Date
Empirical Bridging Module	3%	Empirical Bridging Module (EBM): Thursday, September 11, 9:00am - 11am (up to noon), weight 3% of the course grade. See end of syllabus for details.	2025-09-11
Problem Set 1	10%		2025-09-22
Problem Set 2	10%		2025-10-06
Problem Set 3	10%		2025-10-26
Midterm	27%		2025-11-03
Problem Set 4	10%		2025-11-24
Final Project: First Draft	10%		2025-12-07
Final Project: Final Draft	20%		2025-12-20

Late Assessment Submissions Policy

Please inform me ahead of time if you require an extension. If an extension is granted and the assignment is submitted within the extended deadline, there is no penalty. Without an extension, late assignments will receive a 20% penalty if submitted less than a week late and a 100% penalty if more than a week late.

Course Schedule

Week	Description
Week 1 Sept 8	Introduction. Housekeeping. Overview of course and final project. Causes of Global Warming. The greenhouse effect. The carbon cycle. Fossil energy. Decarbonization.
Empirical Bridging Module Sept 11	Empirical Bridging Module (EBM): Thursday, September 11, 9:00am - 11am (up to noon), weight 3% of the course grade.
Week 2 Sept 15	Consequences of Global Warming. Climate changes. The global distribution of heat and water, now and in the future. Impacts on ecosystems, humans, markets, and infrastructure. Damages and damage functions.
Week 3 Sept 22	Economics of Climate Change. Adaptation and mitigation. The concept of equilibrium. Economic fields: agriculture, housing, energy, consumer behavior, production, trade, health. Economic concepts: scarce resources, decision making, expectations, information, (ir)rationality.
Week 4 Sept 29	Impact in Equilibrium: Theory I. Elasticity, substitution, and equilibrium. The example of agriculture. Inference from real-world price and quantity data.
Week 5 Oct 6	Impact in Equilibrium: Theory II. Housing, migration, and defense. Regional inequality, climate exposures, and urban structure in real-world geospatial data. Optional Reading: Hsiao, Allan, (2025), Sea Level Rise and Urban Adaptation in Jakarta, <i>Working Paper</i> .
Week 6 Oct 20	Impact in Equilibrium: Measurement. Instrumental variables and identification. The example of palm oil. Quantifying the impacts of taxes in equilibrium. Optional Reading: Hultgren, A., Carleton, T., Delgado, M. <i>et al.</i> Impacts of climate change on global agriculture accounting for adaptation. <i>Nature</i> 642 , 644–652 (2025).

Week 7 Nov 3	Midterm. Covers all material from weeks 1-6.
Week 8 Nov 10	Policy I. Market failures, their consequences, and their potential remedies. Beliefs, externalities, inequality, moral hazard.
Week 9 Nov 17	Policy II. Carbon accounting, carbon markets, regulation in practice, compliance.
Week 10 Nov 24	Final Project. Data and Climate Science in Practice. Fields of climate science. Their models, approaches, and data sources. International collaborations and agreements: IPCC, CMIP, and Paris.
Week 11 Dec 1	Uncertainty and the Frontiers of Knowledge. Tail risks: disease, conflict, and climate tipping points. Risk management.

Policies & Statements

Late/Missed Assignments

Please inform the instructor ahead of time if you require an extension. If an extension is granted and the assignment is submitted within the extended deadline, there is no penalty.

Assignments submitted less than a week late without prior permission will receive a 20 point penalty out of 100.

Assignments submitted more than a week late without prior permission will receive a 100% penalty.

Please do not think of these penalties as punishments. They are merely necessary incentives to make sure that the course operates smoothly. If you are overburdened with work at some point, or are facing other personal or academic difficulties, please let me know and I will do what I can to make sure that this course does not add to those difficulties unnecessarily.

Recording Lectures (by Student)

Students wishing to record lectures or other course material in any way are required to ask the instructor's explicit permission and may not do so unless permission is granted. This includes audio and video recording and photographing slides or other course materials.

Granting permission to record applies only for that individual student's own study purposes and does not include permission to "publish" or distribute them in any way. It is forbidden for a

student to publish an instructor's notes on a website or to sell them in other form without formal permission.

Re-marking Policy - Timeline and Protocol

A&S policy on re-mark requests for term work specifies that students have two weeks from when the work was returned to make such a request. These requests should be made in person to the instructor or by email to the course email address.

Assignment Submission Method

Assignments will be distributed and collected through Quercus.

Group Work

Students are encouraged to work in groups, but each submission must be completed individually. For the final project, all students will work on their own projects, but are encouraged to work together to help and support each other with these projects.

Use of Generative Artificial Intelligence

Generative AI may NOT be used to generate submitted written work, including short and long answers. All written work must be written by the student themselves. Furthermore, typical hallmarks of bad AI writing will be graded especially negatively: repetitive sentences devoid of content, unnecessary and subjective commentary, and inappropriate formatting and informality.

Students who wish to use AI in this course, as learning aids or to help produce assignments, must ask permission before using these tools, and must document their use of the tools in an appendix for each assignment. The documentation should indicate which tools were used, how they were used, and how the results from the AI were incorporated into the submitted work.

Religious Accommodations

As a student at the University of Toronto, you are part of a diverse community that welcomes and includes students and faculty from a wide range of cultural and religious traditions. For my part, I will make every reasonable effort to avoid scheduling tests, examinations, or other compulsory activities on religious holy days not captured by statutory holidays. Further to University Policy, if you anticipate being absent from class or missing a major course activity (such as a test or in-class assignment) due to a religious observance, please let me know as early in the course as possible, and with sufficient notice (at least two to three weeks), so that we can work together to make alternate arrangements.

Students with Disabilities or Accommodation Requirements

Students with diverse learning styles and needs are welcome in this course. If you have an acute or ongoing disability issue or accommodation need, you should register with Accessibility Services (AS) at the beginning of the academic year by visiting <https://studentlife.utoronto.ca/departments/accessibility-services/>. Without registration, you will not be able to verify your situation with your instructors, and instructors will not be advised about your accommodation needs. AS will assess your situation, develop an accommodation plan with

you, and support you in requesting accommodation for your course work. Remember that the process of accommodation is private: AS will not share details of your needs or condition with any instructor, and your instructors will not reveal that you are registered with AS.

Academic Integrity

All suspected cases of academic dishonesty will be investigated following procedures outlined in the [Code of Behaviour on Academic Matters](https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019) (<https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019>). If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, please reach out to me. Note that you are expected to seek out additional information on academic integrity from me or from other institutional resources. For example, to learn more about how to cite and use source material appropriately and for other writing support, see the U of T writing support website at <http://www.writing.utoronto.ca>. Consult the Code of Behaviour on Academic Matters for a complete outline of the University's policy and expectations. For more information, please see [A&S Student Academic Integrity](https://www.artsci.utoronto.ca/current/academic-advising-and-support/student-academic-integrity) (<https://www.artsci.utoronto.ca/current/academic-advising-and-support/student-academic-integrity>) and the [University of Toronto Website on Academic Integrity](https://www.academicintegrity.utoronto.ca) (<https://www.academicintegrity.utoronto.ca>).

Specific Medical Circumstances

If you become ill and it affects your ability to do your academic work, consult me right away. Normally, I will ask you for documentation in support of your specific medical circumstances. This documentation can be an Absence Declaration (via ACORN) or the University's Verification of Student Illness or Injury (VOI) form. The VOI indicates the impact and severity of the illness, while protecting your privacy about the details of the nature of the illness. If you cannot submit a VOI due to limits on terms of use, you can submit a different form (like a letter from a doctor), as long as it is an original document, and it contains the same information as the VOI (including dates, academic impact, practitioner's signature, phone and registration number). For more information on the VOI, please see <http://www.illnessverification.utoronto.ca>. For information on Absence Declaration Tool for A&S students, please see <https://www.artsci.utoronto.ca/absence>. If you get a concussion, break your hand, or suffer some other acute injury, you should register with Accessibility Services as soon as possible.

Accommodation for Personal Reasons

There may be times when you are unable to complete course work on time due to non-medical reasons. If you have concerns, speak to me or to an advisor in your College Registrar's office; they can help you to decide if you want to request an extension or other forms of academic consideration. They may be able to email your instructors directly to provide a College Registrar's letter of support and connect you with other helpful resources on campus.

Attendance

Attendance is mandatory. Accommodations will be made for personal, religious, or academic exceptions, but only with prior permission. There is no grade for participation directly, but material introduced in class may be testable even if it is not included in the posted materials.

Mental Health and Well-Being

Your mental health is important. Throughout university life, there are many experiences that can impact your mental health and well-being. As a University of Toronto student, you can access free mental health and wellbeing services at Health & Wellness (<https://studentlife.utoronto.ca/departments/health-wellness/>) such as same day counselling, brief counselling, medical care, skill-building workshops, and drop-in peer support. You can also meet with a Wellness Navigation Advisor who can connect you with other campus and community services and support. Call the mental health clinic at 416-978-8030 ext. 5 to book an appointment or visit <https://uoft.me/mentalhealthcare> to learn about the services available to you.

You can also visit your College Registrar to learn about the resources and supports available: <https://www.artsci.utoronto.ca/current/academic-advising-and-support/college-registrars-offices>

If you're in distress, you can access immediate support: <https://uoft.me/feelingdistressed>

Equity, Diversity and Inclusion

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.

Additional Content

Empirical Bridging Module

Our course is one of the upper-level ECO courses where students complete an Empirical Bridging Module (EBM) during a two-hour session early in the Fall term. In this session, you practice applying your prerequisite skills to empirical research drawn from academic journals and working paper series by economists. These cases challenge you to *apply* the empirical tools that you studied in your second-year prerequisite courses and help prepare you for our upper-level empirical course. Your mark is based on demonstrated effort: the goal is active learning, including helping you notice where your prerequisite skills may need some review so that you are set up for your best work in our course. We expect about two hours of your effort, but for those who wish for more time for any reason, including but not limited to accessibility reasons, you may keep working for up to three hours and the EBM support team will continue to be available until noon to help with your questions. (Note: The EBM is an activity, not a test, so Accommodated Testing Services is not relevant.) If you are enrolled in more than one course doing the EBM, credit automatically applies to all relevant courses. For makeup requests for the EBM please complete <https://forms.office.com/r/AtqMrkCfGw>, which is an MS Form, as soon as possible. For any EBM related questions, please contact us directly at: ebm.economics@utoronto.ca. Please read all e-mails from that address, which is how the EBM team communicates with students across many courses, including telling you the room number in the Examination Centre (EX) to report to for the EBM.

