



Faculty of Science: Department of Economics

Course Syllabus

ECON2216.03: The Economics of Global Warming

Winter, 2025

Dalhousie University acknowledges that we are in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq People and pays respect to Indigenous knowledge held by the Mi'kmaq People, and to the wisdom of their Elders past and present. The Mi'kmaq People signed Peace and Friendship Treaties with the Crown, and section 35 of the Constitution Act, 1982 recognizes and affirms Aboriginal and Treaty rights. We are all Treaty people.

Dalhousie University also acknowledges the histories, contributions, and legacies of African Nova Scotians, who have been here for over 400 years.

Instructor: Ruth Forsdyke, Ruth.Forsdyke@Dal.ca,

Lectures: Tues, Thurs 10:05 - 11:25 (LSC-Common Area, room C236)

Office Hours (Professor):

Tues, Thurs 12:00 pm - 1:30 pm, room C12, Economics Department, 6220 University Ave.

Teaching Assistant (TA): Alexa Mucyo Kayonga, al666176@dal.ca, Office Hours (TBA)

If you have questions and are unable to attend these office hours, please email us to set up an appointment. Appointments may be online via "[Collaborate](#)" under "[Brightspace](#)">> "[Content](#)".

Course Delivery: In person, lectures not recorded.

Part A: Course Information

Course Description:

This course uses economic principles to investigate such questions as: What are the benefits and costs of various time paths for abating emissions? How do we value the well-being of future generations? How do we balance helping the poor with environmental sustainability? What policies can align incentives with environmental sustainability?

Course Prerequisites and Exclusions:

PREREQUISITES: ECON 1101.03 with minimum grade of C.

EXCLUSIONS: ECON2850.06, PHYC2850.06

Note: “[PHYC2800: Climate Change](#)” is a course on climate change science which complements ECON2216. **ECON2216.03** provides knowledge and skills that will be built upon or complement **upper level environmental stream** Economics courses including: **Econ3335: Environmental Economics**, **ECON3332: Resource Economics**, and **ECON3350: Social Cost Benefit Analysis**.

Course Objectives/Learning Outcomes:

1. Understand basic science of greenhouse gases (GHGs) including their causes, impacts, ways to reduce them, and adaptation possibilities.
2. Understand the social causes of the GHG problem due to “externalities” and that solutions are both technical and social.

3. Understand key categories of net abatement costs, climate change impacts and damages, ways these are quantified and monetized, and limitations of these measures.
4. Understand policy solutions to mitigate and adapt to climate change and pros and cons.
5. Practice problem solving skills by applying economics in the context of global warming.
6. Apply basic linear algebra to find model variables such as socially efficient carbon prices and gain skills plotting graphs and using these to evaluate and compare policies.
7. Learn how to find scientifically valid information including numerical data related to the GHG problem.
8. Learn how to analyze data using Excel.
9. Learn and practice critical thinking, writing, and communicating.
10. Understand ethical and moral dimensions of the GHG problem including criteria to judge policy alternatives, while considering the concept of "climate justice".
11. Understand the seriousness and urgency of the GHG problem and how you can help.

“The human mind is our fundamental resource.” John F. Kennedy
“Planet Earth, creation, the world in which civilization developed, the world with climate patterns that we know and stable shorelines, is in immanent peril. The urgency of the situation crystallized only in the past few years.” James Hansen, 2009, Storms of My Grandchildren

Sample Course Materials Available Through Brightspace

- Online material for the course is available in "**Brightspace**" under "**Content**", "**Discussions**", "**Announcements**" and "**Assessments**".

Students are responsible for checking "**Announcements**" regularly to be sure not to miss important information.

[Stern, Nicolas \(2006\) *The Economics of Climate Change: The Stern Review \(SR\)* \(online\)](#)

[UN IPCC \(Oct, 2018\) Special Report: Global Warming of 1.5OC: Summary For Policy Makers](#)

[UNEP Emissions Gap Report \(2021\) Executive Summary](#)

[UN IPCC Summary for Policy Makers 6th Assessment Report](#)

[Key Takeaways from COP 27: What did COP27 achieve and what needs to happen next?](#)

Course Assessment:

Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

A+ (90-100)	B+ (77-79)	C+ (65-69)	D	(50-54)
A (85-89)	B (73-76)	C (60-64)	F	(<50)
A- (80-84)	B- (70-72)	C- (55-59)		

There are two course assessment schemes as indicated below.

Scheme 1 (poster and no video with more weight on midterm and final exam).

Scheme 2 (poster and video with less weight on midterm and final exam).

Your grade for both schemes will be calculated and you will receive the higher of the two grades.

Component	Weight (% of final grade)		Date, Details
	Scheme 1	Scheme 2	
Midterm	22	20	Tues, Feb. 25th, in person on paper in class
Final Exam	43	40	in person on paper, scheduled by Registrar
Assignments 1 to 4	21	21	- your score is the average of the best 3 out of 4 - each assignment has two components, Part A: submit by "assessments">"quizzes" (individual work) Part B: Country Question Component, to be submitted by "assessments" >> "assignments" (1 to 3 students per group)
Assn 5: Country Project Poster	10	10	- make a poster using Powerpoint and save as a PDF. - submit to the to the UNFCCC COP29 poster & Video session under " Discussions " and " assessments " >> " assignments ". (1 to 3 students per group)
Country Project Video (optional)	0	5	- optional 5 minute video of your country poster to be submitted along with your poster to the UNFCCC COP28 poster session . (1 to 3 students per group)
Poster & Video Evaluations & Group & Self Assessment	4	4	Provide Feedback on a sample of other posters and videos, (individual work)

* For details on due dates for project subcomponents, see table below.

Details on Course Work and Assessment

Assignments:

Part A: consists of Brightspace Quiz type questions and may include some written components, algebraic answers, or graphs. All should be submitted via "assessments">"quizzes"

- this work is done **individually by students**.

Part B: Country Project

Each student or group of students (maximum of 3 members per group) will sign up for a country and prepare a poster (and you may decide to make an optional video) to be presented at the **Mock United Nations Framework Convention on Climate Change (UNFCCC) 30th Meeting of the Committee of Parties (COP30)**. The real meeting will be held in Belém, Brazil next

November. During Assignments 1 to 4, you will conduct background research. For Assignment 5, you will put together all the information in a poster and may decide to do an optional video. For assignment 6, you will evaluate a sample of posters using provided assessment forms, and write comments on the discussion board where the posters and videos will be found, and do an assessment of yourself and your group (if applicable). All Part Bs of Assignment 1 to 5 and the poster and video should be submitted via "**assessments**">"**assignments**". Details for Assn 6 submissions will be forthcoming.

<i>Component</i>	<i>Task</i>	<i>Due Date</i>
<i>Assn 1</i>	- Sign up for a Country. - Download Emissions Data from the World Bank and one Kaya identity driver and import into Excel.	Tues. Jan 28th
<i>Assn2</i>	- Use Excel to calculate various quantities and graph your data and export to a Word file. Describe the trends. - Conduct research to make reasonable hypothesis regarding trends illustrated in your graphs and write these down.	Tues. Feb 11th
<i>Assn3</i>	- Download the remaining Kaya Identity emissions drivers, make graphs and analyze trends and make more hypothesis regarding trends based on research.	Thurs. Mar 6
<i>Assn4</i>	- Research your country's Nationally Determined Contributions, main abatement options, impacts, NDC targets, and policies. - Discuss whether you think your country is doing enough and provide suggestions for how to make the target.	Tues. Mar 18
<i>Assn 5</i>	Combine the information gathered in Assn 1-4 into a poster and submit to the UNFCCC Poster Sessions under "Discussions" and also the project drop box under "Assignments". If you have chosen the video option, make a 5 minute video to explain your poster and submit with your poster to the video session.	Thur., Mar 27th (poster) Mon. March 31(video)
<i>Assn 6</i>	Provide Feedback on a sample of other posters and or videos.	Tues. Apr. 1st - Fri. Apr 4th

* your grade is the top 3 grades of Assn 1 to 4 plus the grade for Assn5 and Assn6.

Readings: are posted on the first page of the slides and see topics table below. These should, hopefully, help you to add context to the slides and help you to link ideas together to "see the big picture".

Lecture Slides: will be posted after the class. Slides are quite detailed and can be thought of as being analogous to textbook chapters. Note that not all content in slides may be covered in class, so if you miss a class, you are advised to ask other students what was covered, and borrow their notes if possible.

Covid Videos: After the live class, videos made during the covid 19 lockdowns will be posted for those lectures for which videos are available. This may be helpful if you need to miss lectures due to illness, for example. Note that **videos and slides are best thought of as complements for lectures, not substitutes**. Videos may not be available for all lectures and in-class emphasis may differ considerably from that of videos. Hence, if you miss a lecture, its advised that you attend office hours or ask other students to find out what you missed.

Practice Problems: These are provided for practice and are NOT to be handed in. **Answers** are posted so you can check your answers and if you get stuck, you may peak at answers to help you to see how to proceed. However, do your best to try the problem on your own before peaking at the answers.

Discussion Board (optional): Participate in Discussion board forums by means such as asking a question, making a comment, relating class content to real world events (ex. link to news article with brief explanation), or responding to posts made by the professor, TAs, or other students, and making helpful posts. You may either use your name or participate anonymously (meaning that other class members will not know who you are but the professor and teaching assistants will know your name).

Virtual Rooms (Collaborate): These are used for office hours and meetings and allow students to interact via video, audio, and chat. At least one room will be open all the time for meetings and can be accessed via "**Content**">> "**office hours and virtual meeting rooms**". You may wish to meet with your group via these rooms.

Office Hours: If you are unable to make these hours and have a question, please email the professor or TAs to set up an appointment. If you are sick and want to attend office hours, it is best to email us to set up an appointment to meet online via "**Collaborate**". Dependent upon Covid conditions, office hours may be moved entirely Online.

Course Content:

- *topics and dates are tentative as time permits.*
- *recommended background readings include sections from Stern Review of Climate Change (SR)*
- *other supplementary readings will be added as the term progresses and are provided on Brightspace.*
- *some lectures indicated below cover more than one day.*

Lecture # and Topic	Background Readings
Part I: Introductory	
L1_ Introduction & GHGs as a social problem with social solutions.	- slides, SR (Executive Summary) & IPCC Special Report 1.5 degrees - UNIPCC (2021) Summary for Policy Makers, 6th Assessment Report, The Physical Science Basis
L2_ Climate Change as a Technical Problem with Technical Solutions (Science)	- slides, SR, Ch. 1, <i>Climate Change Science</i> or Kopp & Hsiang (2018) <i>An Economists Guide to Climate Change Science</i>
Part II: Markets and Policies that Directly Target Goods & Services	
L3_ Markets & Welfare Analysis	- slides
L4_ Market Failure due to Externalities	- slides, SR Ch. 2 (pg. 25 & key message box, pg. 23), Stavins & Fullerton "How Economists See the Environment"
L5_ Policies that Directly Target Goods Markets (Pigou tax, subsidies, quotas, technology, performance, design standards, feed in tariffs, fossil fuel divestment, rations, moral suasion).	- slides - Ch. 2 SR, Climate Change Ethics

Part III: Emissions, MAC MD Framework, Policies that Directly Target Emissions	
L6_ Emissions Scenarios, Projections & Options for GHG Emissions Reductions (Kaya Identity)	- slides, Kaya Identity: SR Ch. 7, section 7.3 – 7.4, RCPs and SRES: http://www.ipcc.ch/ipccreports/sres/emission/index.php?idp=2 - SR, Ch. 13, Towards a Goal for Climate Change Policy
L7_ Socially Efficient Emissions Levels/ One Period MAC MD Framework	- slides, SR, Section 2.2, pg. 24 – 28
L8_ Shifts MACs and MDs related to Emissions Scenarios, RCPs, Jevons Paradox	- slides
L9_ Policies that Directly Target GHGs Part I (Carbon Taxes, Emissions standards, Abatement Subsidies & Standards)	- slides, SR, Ch. 14, World Bank (2019) <i>State and Trends in Carbon Pricing</i>
Part IV: Measurement of Damages & Abatement Costs and IAMs	
L10_ Damages and their Measurement	- slides, sections from SR, Ch. 3, 4, 5.
L11_ Abatement Costs and their Measurement	- slides, SR, Ch. 9, 10
L12_ Integrated Assessment Models (Climate Economy Models) and Discounting	- slides, SR, Ch. 2 (section 2.4, technical details in appendix), Nordhaus, Satoru, (2013) DICE 13R: Introduction and Users Manual
Part V: Cap & Trade and Broader Policy	
L13_ Cap & Trade & Policy Comparisons	- slides, SR Ch. 15
L14_ Global Agreements and Carbon Border Tariffs	- slides, UNEP Emissions Gap Report (2018)
L15_ Adaptation Policy and Geoengineering	- slides, SR, Ch. 18 - 20
L16_ Green New Deal, Short Run Macroeconomic fiscal and monetary policy.	- slides, Harris, J. (2009) Ecological Macroeconomics, Consumption, Investment and Climate Change, <i>Real World Econ. Rev.</i> , 50(1), pp. 34-48 SR, Section 17.4,
L17_ Problem of Public Misunderstanding	- slides

Course Policies:

1) Students are responsible for **checking the final exam schedule prior to booking any flights**. Due to challenging logistics, there are **no early exams under ANY circumstances**.

2) **Late or Missed Midterms or Assignments:** If you miss a midterm or assignment due to illness, as soon as possible, inform the professor via email and attach a **Student Declaration of Absence (DOA)** form. DOA forms may only be used twice for this course. These are available at: https://www.dal.ca/dept/university_secretariat/policies/academic/missed-or-late-academic-requirements-due-to-student-absence.html

3) If you submitted a DOA, in the case of a **missed midterm**, the **entire test weight will be moved to the final exam**. If you submitted a student DOA for a missed assignment, assignment weights will be re-weighted. There will be **no make-up midterm**.

4) If the **final exam is missed** due to illness, death in the family, or other traumatic circumstances, please inform the professor by email as soon as possible to arrange to write an alternative exam.

5) **Late assignments** receive a **maximum penalty of 3% per day**, unless the student submits a DOA form and **will not be accepted after answers have been posted on the Brightspace**.

- 6) Students are responsible for *checking Brightspace "Announcements" regularly*. Important information to guide your learning as well as occasional corrections to assignments, or test review questions is posted there.
- 7) **Online Access:** When connecting to online resources, you are *responsible for observing any applicable laws of the country you are connecting from*.
- 8) You are responsible for *establishing whether you have access to all course material as soon as the term begins and before the ADD/DROP date*. If you cannot access certain material, inform the instructor as soon as possible. Alternative access methods are not guaranteed.
- 9) *If you are sick*, it is recommended that you take a **covid test**. If you are sick, it's recommended that you rest at home and find out what you missed via emailing other students (or TA or professor if you do not know other students) and catch up via online content. You are encouraged to email us to set up an online office hour appointment.
- 10) **Academic Integrity:** Please see University Policy Statements on Academic Integrity below -- You are advised to read about what constitutes **plagiarism** at the link given. Note that communicating with anyone other than the professor, TA, or exam invigilators during midterms or final exams is considered to be a violation of academic integrity. Specific details on issues of academic integrity, will be included with individual assignments, tests, and midterms, and will be discussed in class. If you have questions, please ask the professor.

How to Learn in this Course:

- read through the course syllabus to get an idea of what lies ahead.
- attend class -- if you have to miss a lecture, due to illness, for example, find out what you missed and if there is an available video, watch it.
- attending class will help you to establish a rhythm and reduce chances of falling behind.
- taking notes in class requires thinking about and engaging with the lecture and may help you to pay attention.
- Trying the problems while the teacher does them on the board is an excellent way to "learn by doing".
- make a schedule, write down due dates in your planner and set aside times to study.
- Manage your time and avoid distractions such as social media while studying.
- After logging into Brightspace, check **Announcements** for new information.
- do all assignments-- start early -- if you get stuck, come and ask for help during office hours. Other students may also be helpful!
- read and work through the readings (as able) using the lectures material to guide your focus. Taking notes may help you to organize the material in a manner that makes sense to you and relates material to prior knowledge. Charts, flow charts and mind maps may be helpful. Work through the mathematical problems and write down and/or talk through the method used. It may help to make summaries to identify key points.
- do the practice problems on your own. If you get stuck, peak at the solution and then try on your own again. Repeat as necessary. Note down where you went wrong in your initial attempt. Ask questions.
- relate course concepts to other things you know.
- ask questions while studying, in office hours and on discussion boards.

- start studying early for tests. Do review sheet problems.
- explaining concepts to yourself and friends (orally using words) can be a great way to learn. Test yourself.
- If you are having trouble focussing your study, please visit office hours for advice.

Part B: University Policies and Statements

Recognition of Mi'kmaq Territory

Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel, and support. Visit or e-mail the Indigenous Student Centre at 1321 Edward St or elders@dal.ca. Additional information regarding the Indigenous Student Centre can be found at: https://www.dal.ca/campus_life/communities/indigenous.html

Internationalization

At Dalhousie, 'thinking and acting globally' enhances the quality and impact of education, supporting learning that is "interdisciplinary, cross-cultural, global in reach, and orientated toward solving problems that extend across national borders." Additional internationalization information can be found at: <https://www.dal.ca/about-dal/internationalization.html>

Academic Integrity

At Dalhousie University, we are guided in all our work by the values of academic integrity: honesty, trust, fairness, responsibility, and respect. As a student, you are required to demonstrate these values in all the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity. Additional academic integrity information can be found at: https://www.dal.ca/dept/university_secretariat/academic-integrity.html

Accessibility

The Student Accessibility Centre is Dalhousie's centre of expertise for matters related to student accessibility and accommodation. If there are aspects of the design, instruction, and/or experiences within this course (online or in-person) that result in barriers to your inclusion, please contact the Student Accessibility Centre (https://www.dal.ca/campus_life/academic-support/accessibility.html) for all courses offered by Dalhousie with the exception of Truro. For courses offered by the Faculty of Agriculture, please contact the Student Success Centre in Truro (<https://www.dal.ca/about-dal/agricultural-campus/student-success-centre.html>)

Conduct in the Classroom – Culture of Respect

Substantial and constructive dialogue on challenging issues is an important part of academic inquiry and exchange. It requires willingness to listen and tolerance of opposing points of view. Consideration of individual differences and alternative viewpoints is required of all class members, towards each other, towards instructors, and towards guest speakers. While expressions of differing perspectives are welcome and encouraged, the words and language used should remain within acceptable bounds of civility and respect.

Diversity and Inclusion – Culture of Respect

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness (Strategic Priority 5.2). Additional diversity and inclusion information can be found at: <http://www.dal.ca/cultureofrespect.html>

Student Code of Conduct

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner - perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution. The full Code of Student Conduct can be found at:

https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

Fair Dealing Policy

The Dalhousie University Fair Dealing Policy provides guidance for the limited use of copyright protected material without the risk of infringement and without having to seek the permission of copyright owners. It is intended to provide a balance between the rights of creators and the rights of users at Dalhousie. Additional information regarding the Fair Dealing Policy can be found at: https://www.dal.ca/dept/university_secretariat/policies/academic/fair-dealing-policy-.html

Originality Checking Software

The course instructor may use Dalhousie's approved originality checking software and Google to check the originality of any work submitted for credit, in accordance with the Student Submission of Assignments and Use of Originality Checking Software Policy. Students are free, without penalty of grade, to choose an alternative method of attesting to the authenticity of their work and must inform the instructor no later than the last day to add/drop classes of their intent to choose an alternate method. Additional information regarding Originality Checking Software can be found at: <https://www.dal.ca/about/leadership-governance/academic-integrity/faculty-resources/ouriginal-plagiarism-detection.html>

Student Use of Course Materials

Course materials are designed for use as part of this course at Dalhousie University and are the property of the instructor unless otherwise stated. Third party copyrighted materials (such as books, journal articles, music, videos, etc.) have either been licensed for use in this course or fall under an exception or limitation in Canadian Copyright law. Copying this course material for distribution (e.g. uploading to a commercial third-party website) may lead to a violation of Copyright law.

Part C: Student Resources and Support

University Policies and Programs

Important Dates in the Academic Year (including add/drop dates):

http://www.dal.ca/academics/important_dates.html

Classroom Recording Protocol:

https://www.dal.ca/dept/university_secretariat/policies/academic/classroom-recording-protocol.html

Dalhousie Grading Practices Policies:

https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html

Grade Appeal Process: https://www.dal.ca/campus_life/academic-support/grades-and-student-records/appealing-a-grade.html

Sexualized Violence Policy: https://www.dal.ca/dept/university_secretariat/policies/health-and-safety/sexualized-violence-policy.html

Scent-Free Program: <https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html>

Learning and Support Resources

General Academic Support – Advising (Halifax): https://www.dal.ca/campus_life/academic-support/advising.html

General Academic Support – Advising (Truro): <https://www.dal.ca/about-dal/agricultural-campus/ssc/academic-support/advising.html>

Student Health & Wellness Centre: https://www.dal.ca/campus_life/health-and-wellness.html

On Track (helps you transition into university, and supports you through your first year at Dalhousie and beyond): https://www.dal.ca/campus_life/academic-support/On-track.html

Indigenous Student Centre: https://www.dal.ca/campus_life/communities/indigenous.html

Indigenous Connection: <https://www.dal.ca/about-dal/indigenous-connection.html>

Elders-in-Residence (The Elders in Residence program provides students with access to First Nations elders for guidance, counsel, and support. Visit the office in the Indigenous Student Centre or contact the program at elders@dal.ca or 902-494-6803:

<https://cdn.dal.ca/content/dam/dalhousie/pdf/academics/UG/indigenous-studies/Elder-Protocol-July2018.pdf>

Black Student Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html

International Centre: https://www.dal.ca/campus_life/international-centre.html

LGBTQ2SIA+ Collaborative: <https://www.dal.ca/dept/vpei/edia/education/community-specific-spaces/LGBTQ2SIA-collaborative.html>

Dalhousie Libraries: <http://libraries.dal.ca/>

Copyright Office: <https://libraries.dal.ca/services/copyright-office.html>

Dalhousie Student Advocacy Services: <https://www.dsu.ca/dsas?rq=student%20advocacy>

Dalhousie Ombudsperson: https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html

Human Rights and Equity Services: <https://www.dal.ca/dept/hres.html>

Writing Centre: https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html

Study Skills/Tutoring: http://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html

Faculty of Science Advising Support: <https://www.dal.ca/faculty/science/current-students/undergrad-students/degree-planning.html>

Safety

Biosafety: <http://www.dal.ca/dept/safety/programs-services/biosafety.html>

Chemical Safety: <https://www.dal.ca/dept/safety/programs-services/chemical-safety.html>

Radiation Safety: <http://www.dal.ca/dept/safety/programs-services/radiation-safety.html>

Laser Safety: <https://www.dal.ca/dept/safety/programs-services/radiation-safety/laser-safety.html>