



Faculty of Science: Department of Economics

Course Syllabus

ECON2216.03: The Economics of Global Warming

Winter, 2024

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, room C12, Maxwell House, (902) 494-6990

Lectures: Mon., Wed. 13:05 - 14:25 (LSC-Psychology, room P4260)

Office Hours (Professor):

In Person: Friday: 10:30 am - 11:20 am, Room C12, Econ. Department.

Online Brightspace Collaborate: Tues 10:30 am - 11:20 am

Teaching Assistant (TA): Maria Largo Lievano, mr357817@dal.ca, Office Hours (TBA)

Course Delivery: In person, lectures not recorded.

If you need help and are unable to attend these office hours, please email us to set up an appointment.

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 on the GHG problem.
8. Learn and practice critical thinking, writing, and communicating.
9. Understand ethical and moral dimensions of the GHG problem including criteria to judge policy alternatives, while considering the concept of "climate justice".
10. Understand the seriousness and urgency of the GHG problem and how you can help.

“The human mind is our fundamental resource.” John F. Kennedy
“Not everything that can be counted counts. Not everything that counts can be counted.” William Bruce Cameron

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 \(available in Brightspace\)](#)

[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	Monday, Feb. 26th, in person on paper in class
Final Exam	43	40	in person on paper, scheduled by Registrar)
Assignments 1 to 4	27	27	- 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) (Due dates, Jan. 24th, Feb. 7th, March 6th, March 18th)
Assn 5: Country Project Poster	5	5	- 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) - Due Wed. March 27th
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) - Due Wed. March 27th
Poster & Video Evaluations	3	3	Provide Feedback on a sample of other posters and videos, Due Wed. April 3rd (individual work)

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) 29th Meetings of the Committee of Parties (COP29)** to be held in Azerbaijan. During Assignments 1 to 4, you will do the background research. For Assignment 5, country groups put together all the information in a poster and may decide to do an optional video. For assignment 6, you fill in an assessment form and write comments on the discussion board where the posters and videos

will be found. 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.	<i>Wed. Jan 24th</i>
<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.	<i>Wed. Feb 7th</i>
<i>Assn3</i>	- Download the remaining Kaya Identity emissions drivers, make graphs and analyze trends and make more hypothesis regarding trends based on research.	<i>Wed. Mar 6</i>
<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.	<i>Mon. Mar 18</i>
<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.	<i>Wed., Mar 27th</i>
<i>Assn 6</i>	Provide Feedback on a sample of other posters and or videos.	<i>Wed. Apr 3rd</i>

* 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 will 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.

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 for cases in which students need to miss lectures due to illness. Note that **videos are best thought of as complements for lectures, not substitutes**. Videos may not be available for all lectures; 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 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. A 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 or study buddies via these rooms.

Office Hours: There are a mixture of online and real office hours (see above). If you are unable to make these hours and have a question, please email the professor or TAs to set up an appointment. 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 are good background reading for January. Figueres, C.(2013) Three Years to Safeguard the Planet, <i>Nature (check graphs)</i> <i>UNIPCC Summer</i>
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).	- 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/ipcreports/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, Sztorc, (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 Dilemma	- slides, Harris, J. (2009) Ecological Macroeconomics, Consumption, Investment and Climate Change, Real World Econ. Rev., 50(1), pp. 34-48 SR, Section 17.4,
L17 Problem of Public Misunderstanding Battle of Perspectives	- slides & demo

Course Policies:

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 signed **Declaration of Absence (DOA)** form. **This form may only be used twice for this course.** These are available at: https://www.dal.ca/dept/university_secretariat/policies/academic/misled-or-late-academic-requirements-due-to-student-absence.html

In the case of a **missed midterm or more than one missed assignment**, other evaluation components will be given higher weight. There is no make-up midterm.

If the **final exam is missed due to illness**, please inform the professor by email as soon as possible to arrange to write an alternative exam. A sick note from a qualified medical practitioner is required for missed final exam.

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

Class slides are a complement, not a substitute for reading the textbook. It is recommended that you read assigned readings prior to the lecture.

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.

Online Access: When connecting to online resources, you are responsible for observing any applicable laws of the country you are connecting from.

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 do not have access to certain

material, inform the instructor as soon as possible. Alternative access methods are not guaranteed.

If you are sick, please get a **covid test** and do not come to class. 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.

Students are responsible for ***checking the final exam schedule prior to booking any flights.*** ***Early final exams will NOT be scheduled under any conditions,*** so please do NOT ask.

How to Learn in this Course:

- attend class -- if you have to miss a lecture (due to illness or a varsity sports team event 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.
- take notes in class -- this will force you to process the information and help you to pay attention so as to make the best possible use of class time. If you missed some parts, leave a space and fill this in later using the slides, videos, or asking the professor or TA during office hours, etc.
- read through course syllabus to get an overview of what lies ahead.
- 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 textbook readings using the slides to guide your focus and watch any posted videos. Take notes organizing 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. 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 in the tutorial session.
- 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.
- explain concepts to yourself and friends (orally using words). 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/dept/university_secretariat/policies/academic/student-submission-of-assignments-and-use-of-originality-checking-software-policy-.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: Faculty of Science 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

South House Sexual and Gender Resource Centre: <https://southhousehalifax.ca/about/>

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>