



Faculty of Science: Department of Economics
Course Syllabus

ECON2216.03 (2024, Summer): The Economics of Global Warming

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

Teaching Assistants:

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Lecture Slides & Videos: An announcement, slides, videos, and other materials are posted on Brightspace Tues, and Thurs. am.

Office Hours in Brightspace Collaborate:

Ruth (instructor): Tues and Thurs 2 pm - 3 pm

Teaching Assistants: TBA

If you need help and are unable to attend these office hours, please ask under "Discussions" or 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. Taking both PHYC2800 and ECON2216 is similar to taking “The Science and Economics of Climate Change (**ECON2850.06** or **PHYC2850.06**), a full credit course (offered in June) but with more integration of the science and economics. **ECON2216.03** or **ECON/PHYC2850.06** provides knowledge and skills that will be built upon or complement **upper level environmental stream** courses including: **Econ3335: Environmental Economics**, **ECON3332: Resource Economics** and **ECON4350: Social Cost Benefit Analysis**.

Course Objectives/Learning Outcomes:

1. Understand basic science of greenhouse gases (GHGs) including their causes, impacts and ways to reduce them.
2. Understand that the GHG problem is not only technical but is also social due to “externalities” and requires both technical and social solutions.

3. Understand key categories of net abatement costs, climate change impacts and damages, the magnitude of estimates, estimation methods and the degree of uncertainty.
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 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 the GHG problem and its solutions.
10. Understand the seriousness and urgency of the GHG problem and how you can help.
11. Understand that country pledges to reduce emissions under the Paris Agreement are insufficient to meet Paris Agreement temperature target and that current policy is not on track to meet these pledges.

“Education is a process of living, and not a preparation for future living.” John Dewey
“The human mind is our fundamental resource.” John F. Kennedy

Brightspace Learning Management System:

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.

Course Assessment: There are two course assessment schemes as indicated below:

Component	Weight (% of final grade)		Date, Details
	Scheme 1	Scheme 2	
Midterm	21	19	Midterm (Thurs May 30th) (9:30 am - 11:00 am ADT)
Final Exam	42	37	Final Exam (Wed. June 26th)(9:30 am - 12:30 am ADT) - For students West of the Ontario time zone, please email me if you would like to write your exam later and indicate a later time zone.
Country Project	27	27	- in all weeks except the Midterm week, there are assignments which correspond to components of this project. In the 5th assignment, you put together the material to produce a poster which will be submitted to the UNFCCC COP29 poster session under "Discussions". You also evaluate other posters. - details of the project marking scheme are below.
Country Project Video	0	7	- optional video of your Country poster to be submitted along with your poster to the UNFCCC COP28 poster session .
Brightspace Quiz Assignments	10	10	- Let n represent the total number of quizzes. Your score is based on the top n-1 quizzes.

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)		

Details on Course Work and Assessment

Country Project: Each student will sign up for a country and will prepare a poster to be presented at the **Mock United Nations Framework Convention on Climate Change (UNFCCC)** 28th Meetings of the **Committee of Parties (COP28)** to be held in Baka. Note that students may work in groups of 1 to 3 students.

Component	Task	Due Date	Mark Scheme
Assn 1	- Sign up for a Country. - Download Emissions Data from the World Bank and one Kaya identity driver and import into Excel.	Tues. May 14th	5
Assn2	- 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. May 21	5
Assn3	- Download the remaining Kaya Identity emissions drivers, make graphs and analyze trends and make more hypothesis regarding trends based on research.	Tues June 4	5
Assn4	- 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 June 11	5
Assn 5	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 video to explain your poster and submit with your poster to the video session.	Tues., June 18th	7 (poster) 7 (optional video)
Assn 6	Provide Feedback and evaluate a sample of other posters and or videos, self appraisal.	Thurs, June 20	5

* your grade is the top 3 grades of Assn 1 to 4 (15 marks) plus the grade for Assn5 (7 or 14 marks) and Assn6 (marks)

Readings: are posted on the first page of the slides.

Lecture Slides/Videos: These and other material are posted on Tuesday and Thursday. When you log into Brightspace, first visit announcements for new information. The videos may vary in length and may not cover all topics in the slides. To ask questions, use **Discussions** and/or visit the professor and/or TAs during **Virtual Office Hours**. If your question is likely to be of general interest to the class, *we prefer that you use Discussions*. However, you may **email** your questions to the TAs or professor particularly if the question is not of general interest to the class.

Midterm and Final Exam: contain a mixture of Brightspace Quiz questions (ex. multiple choice, matching, ordering, fill in the blank) and written components (ex. graphing, microeconomic problems, short explanations and/or short essay).

Assignments: Your grade will be the average of the best 3 out of 4 assignments. *You must hand in individual assignments, which **must be written in your own words***. These may contain written and Brightspace Quiz components. Written components must be submitted via **Assessments >> Assignments** as ONE PDF file (unless specified otherwise) such that pages are aligned with the top corresponding to the top of the computer screen to help markers. TAs will mark a selection of submitted questions. Brightspace quiz components should be submitted via **Assessments>>Quizzes**

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 Participation (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). Discussion board participation is highly encouraged and constitutes an optional 5% of the grade (under scheme 1).

Virtual Office Hours: Held by the professor on Tuesday and Thursday (2 to 3 pm) in the Collaborate Virtual Rooms assessable via Brightspace. TA office hours will be announced. If you are unable to make these hours and have a question, please email the professor or TAs to set up an appointment.

Virtual Rooms (Collaborate): These are used for office hours and students may use these rooms at other times.

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 are provided on Brightspace.
- global warming economics news events posted on Discussions boards.
- 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/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, 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, <i>Real World Econ. Rev.</i> , 50(1), pp. 34-48 SR, Section 17.4,

Course Policies:

Exam Conflicts & Time Zones: In cases of *conflicts on midterms and finals and time zones* which make it difficult to write at the same time as the other students, please email the professor to arrange to write an alternative test at an alternative time on the same day.

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 submit a **Student Declaration of Absence (DOA)** form available at:

https://www.dal.ca/dept/university_secretariat/policies/academic/missed-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.

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*.

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 (Jan. 15th, 2020). If you do not have access to certain material, inform the instructor as soon as possible.

Alternative access methods are not guaranteed.

Please do NOT give me **gifts** as they may create a conflict of interest.

Sample Course Materials Available Through Brightspace

[Stern, Nicolas \(2006\) *The Economics of Climate Change: The Stern Review \(SR\)* \(online\)](#)
[UN IPCC \(Oct, 2018\) Special Report: Global Warming of 1.5°C: 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?](#)

How to Learn in this Course:

- 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
- 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 and using words). Test yourself.
- If you are having trouble focussing your study, please visit office hours for advice.
- ask questions on the discussion boards and in office hours and tutorials.

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>