



**Faculty of Science: Department of Economics**  
**Course Syllabus**

**ECON2216.03** (2023, Summer): The Economics of Global Warming

**Instructor:** Ruth Forsdyke, [Ruth.Forsdyke@Dal.ca](mailto:Ruth.Forsdyke@Dal.ca)

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

**Teaching Assistant:** Munia Morsheda Begum, [mr823860@dal.ca](mailto:mr823860@dal.ca)

**Office Hours in Brightspace Collaborate** under "content":

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

**Munia (teaching assistant):** Tues 10 am to 11 am, [mr823860@dal.ca](mailto:mr823860@dal.ca)

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

**Course Delivery:** Online asynchronous, you are required to have daily access to high speed internet.

- lecture slides are posted for all lectures and are accompanied with videos which give full or partial coverage of course material).

## 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

- the basic science of greenhouse gases (GHGs) including their causes, impacts and possibilities regarding ways to reduce them.
- that the GHG problem is both technical and social due to “*externalities*” and requires both sorts of solutions.

- key categories of abatement costs and side benefits, climate change impacts and damages, some basic methods of estimation, limitations and the degree of uncertainty.
- the rationale of discounting and social discount rates and how they are used.
- economic theory on optimal emissions reduction and carbon price trajectories based on descriptive understanding of climate-economy models (ex. Nordhaus DICE model).
- policies to mitigate and adapt to climate change, and their pros and cons. Examples include carbon taxes, emissions standards, cap and trade systems, technology, price and design standards.
- ethical and moral dimensions the GHG problem and its solutions (ex. normative vs positive distinction, utilitarian perspective)
- global warming is already causing widespread serious damages.
- that aggregate country pledges to reduce emissions under the Paris Agreement are insufficient to meet the scientists recommendation to prevent the Earth's average temperature from increasing by more than 1.5 degree C the "aspirational" Paris Agreement temperature target" and that aggregate current policy is not on track to meet these pledges.
- that failure to meet this 1.5 degree target may cause catastrophic and irreversible damages.
- the seriousness and urgency of the GHG problem and how you can help.

## 2. Learn skills and knowledge by doing and practice

- problem solving skills by applying economics in the context of global warming.
- downloading time series data for a particular country from sources like The World Bank.
- uploading this data into Excel and creating new variables using functions and graphing this data using **Excel "Charts"**.
- communicating making an e-poster for a **Mock United Nations Framework Convention on Climate Change** (UNFCCC) global climate meeting of country delegates using a slide show program like Powerpoint or Keynote.
- **communicating skills via video to present results (optional).**
- use basic linear algebra to find variables in microeconomic models such as the socially efficient carbon prices, emissions quantities.
- gain skills plotting graphs and using these to evaluate and compare policies.
- find scientifically valid information on the GHG problem.
- critical thinking.
- writing short answers, essays on tests, in project assignments, and on discussion board.

*“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  
*“Denial ain’t just a river in Egypt”*, Mark Twain (quoted by Al. Gore, An Inconvenient Truth, 2006, page 254-255)

## Sample Course Materials Available Through Brightspace

[Stern, Nicolas \(2006\) \*The Economics of Climate Change: The Stern Review \(SR\)\*](#) (online)  
[UN IPPC \(Oct, 2018\) Special Report: Global Warming of 1.5OC: Summary For Policy Makers](#)  
[UNEP Emissions Gap Report \(2021\) Executive Summary](#)  
[UN IPPC Summary for Policy Makers 6<sup>th</sup> Assessment Report \(available in Brightspace\)](#)  
[Key Takeaways from COP 27: What did COP27 achieve and what needs to happen next?](#)

### **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. Your grade will automatically be calculated under both schemes and your grade will be the highest of the two schemes.

Component	Weight (% of final grade)		Date, Details
	Scheme 1	Scheme 2	
Midterm	22	20	Midterm (Thurs June 1st) (11am - 12:30 pm ADT)
Final Exam	43	40	Final Exam (Wed. June 28th)(11 am - 2 pm ADT) * time could be changed dependent upon location of students. This time attempts to accommodate students in Vancouver and China.
Country Project (weekly assignments)	25	25	- weekly assignments starting in the second week except the Midterm week, correspond to components of this project. - in the final week, you put together the material to produce a poster to be submitted to the UNFCCC COP28 poster session under "Discussions" and evaluate a sample of other posters. - details of the project marking scheme may be found below.
Country Project Video	0	5	- optional 5 minute video of your Country poster to be submitted along with your poster to the UNFCCC COP28 poster session under scheme 2.
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**

#### **Announcements:**

- When you log into Brightspace, first visit "Announcements" for new information.

### **Lecture Modules:**

- find under "Content" -- these contain slides, videos, brightspace quiz questions, links to other materials such as readings.

### **i) Lecture Slides:**

- posted on Tuesday and Thursday morning.

- contains information on readings.

### **ii) Videos:**

- these were made during Covid lockdowns and are slowly being updated. Disregard any information regarding dates such as assignment deadlines within the videos as this applied to dates within the Covid Lockdown.

- available to accompany most slides, may vary in length and may not cover all topics in the slides.

### **ii) Links to Brightspace Quizzes**

- these accompany most topics. Your grade is the best three out of 4. They are **due 1 week after they are posted**. Late quizzes are accepted until answers are posted with a maximum of 5 marks subtracted per day.

### **Country Project:**

Student sign up for a country and 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 Dubai, United Arab Emirates in Nov-Dec. 2024. Students may prepare an optional video under scheme 2. The link to the signup sheet will be communicated via "Announcements".

<i>Component</i>	<i>Task</i>	<i>Due Date</i>	<i>Marking Scheme</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>Tues May 16</i>	<i>4*</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>Tues May 23</i>	<i>4*</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>Tues June 6</i>	<i>4*</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>Tues June 13</i>	<i>4*</i>
<i>Assn 5</i>	Combine the information gathered in Assn 1-4 in a poster and submit to the UNFCCC Poster	<i>Tues June 20</i>	<i>10</i>

	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.		
<b>Assn 6</b>	Provide Feedback on a sample of other posters and or videos.	<b>Thurs June 22</b>	<b>3</b>

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

\* submit via Assessments >> Assignments as one PDF file (for all assignments except for Assn 1) and your Excel Workbook.

\* **DOA forms cannot be used for the poster; The poster is mandatory.**

- hand in individual assignments, which **must be written in your own words.**

- TAs will mark a selection of submitted questions and/or for overall completion as time permits.

### Readings and other External Media:

- posted on the first page of the slides and linked up within topic modules.

### Asking Questions:

- post your question under **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, **please use Discussions**. If you do not deem a question to be of general interest to the class, please ask during office hours. If this fails, you may email the professor or TA.

**Midterm and Final Exam:** These are run via Brightspace (BS) through Assessments >> Quizzes and written parts will either be submitted via the BS Quizzes or BS Assignments. More details will be provided on the test review sheets. These tests will 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).

**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:

Develop a community spirit by Participating 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). If you know the answers to other student's questions and can help them out by replying, please do. This will also help you to learn the material by writing it down.

**Collaborate Virtual Rooms for Office Hours (OH):** Find the rooms via "Content" in Brightspace. If you are unable to make these OHs and have a question, please ask on Discussion boards if you deem the question to be of general interest or email the professor or TA(s) the

question. If the question is short, we may answer it by email while if it is longer we may set up an appointment to help you to work through it. **See OH days and times at top of this document.**

**Collaborate Virtual Rooms for Student Meeting Rooms:** Students may use these rooms at other times to study together. Feel free to just drop in and use them.

**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
<b>Part I: Introductory</b>	
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>
<b>Part II: Markets and Policies that Directly Target Goods &amp; Services</b>	
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
<b>Part III: Emissions, MAC MD Framework, Policies that Directly Target Emissions</b>	
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: <a href="http://www.ipcc.ch/ipccreports/sres/emission/index.php?idp=2">http://www.ipcc.ch/ipccreports/sres/emission/index.php?idp=2</a> - 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>
<b>Part IV: Measurement of Damages &amp; Abatement Costs and IAMs</b>	
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

### 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 class, after class, during 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.

### 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 attach a **Student Declaration of Absence (DOA)** form. DOA forms may be used twice for this course but NOT for the final poster. The due date for the poster can be deferred in the case of illness. Please read the information on these DOA forms carefully to understand situations in which they can be used. They are available at:

[https://www.dal.ca/dept/university\\_secretariat/policies/academic/missed-or-late-academic-requirements-due-to-student-absence.html](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 provide medical documentation and inform the professor by email as soon as possible to arrange to write an alternative exam. There are **no early final exams**.

*Late assignments* receive a *maximum penalty of 1% 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. If you do not have access to certain material, inform the instructor as soon as possible. Alternative access methods are not guaranteed.



## Part B: University Policies and Statements

**This course is governed by the academic rules and regulations set forth in the University Calendar and by Senate**

### Academic Integrity

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of 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.

**Information:** [https://www.dal.ca/dept/university\\_secretariat/academic-integrity.html](https://www.dal.ca/dept/university_secretariat/academic-integrity.html)

### Accessibility

The Advising and Access Services Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (Canada and Nova Scotia).

**Information:** [https://www.dal.ca/campus\\_life/academic-support/accessibility.html](https://www.dal.ca/campus_life/academic-support/accessibility.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.

**Code:** [https://www.dal.ca/dept/university\\_secretariat/policies/student-life/code-of-student-conduct.html](https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html)

### 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

**Statement:** <http://www.dal.ca/cultureofrespect.html>

### 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 (1321 Edward St) ([elders@dal.ca](mailto:elders@dal.ca)).

**Information:** [https://www.dal.ca/campus\\_life/communities/indigenous.html](https://www.dal.ca/campus_life/communities/indigenous.html)

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

<https://academiccalendar.dal.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=117&chapterid=-1&topicroupid=31821&loaduserredits=False>

### University Grading Practices

[https://www.dal.ca/dept/university\\_secretariat/policies/academic/grading-practices-policy.html](https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html)

## Part C: Student Resources and Support

### Advising

**General Advising** [https://www.dal.ca/campus\\_life/academic-support/advising.html](https://www.dal.ca/campus_life/academic-support/advising.html)

**Science Program Advisors:** <https://www.dal.ca/faculty/science/current-students/undergrad-students/degree-planning.html>

**Indigenous Student Centre:** [https://www.dal.ca/campus\\_life/communities/indigenous.html](https://www.dal.ca/campus_life/communities/indigenous.html)

**Black Students Advising Centre:** [https://www.dal.ca/campus\\_life/communities/black-student-advising.html](https://www.dal.ca/campus_life/communities/black-student-advising.html)

**International Centre:** [https://www.dal.ca/campus\\_life/international-centre/current-students.html](https://www.dal.ca/campus_life/international-centre/current-students.html)

### Academic supports

**Library:** <https://libraries.dal.ca/>

**Writing Centre:** [https://www.dal.ca/campus\\_life/academic-support/writing-and-study-skills.html](https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html)

**Studying for Success:** [https://www.dal.ca/campus\\_life/academic-support/study-skills-and-tutoring.html](https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html)

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

**Fair Dealing Guidelines** <https://libraries.dal.ca/services/copyright-office/fair-dealing.html>

### Other supports and services

**Student Health & Wellness Centre:** [https://www.dal.ca/campus\\_life/health-and-wellness.html](https://www.dal.ca/campus_life/health-and-wellness.html)

**Student Advocacy:** <https://dsu.ca/dsas>

**Ombudsperson:** [https://www.dal.ca/campus\\_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html](https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html)

### Safety

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

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

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

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

**Dalhousie COVID-19 information and updates:** <https://www.dal.ca/covid-19-information-and-updates.html>