



Faculty of Science: Department of Economics

Course Syllabus

ECON2216.03 (2019, Winter): The Economics of Global Warming

Instructor: Ruth Forsdyke, Ruth.Forsdyke@Dal.ca, room C12, Maxwell House, (902) 494-6990

Lectures: Mon., Wed., 8:35 – 9:55, Chemistry Rm 226

Office Hours: Mon. & Wed., 2 – 3 pm (*drop in*) or by appointment.

TA: Cameron Sawyer, Cameron.Sawyer@dal.ca, Office Hour, time and location TBA

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

Notes:

“**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 July) 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 GHGs.
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 and practice computing and data management skills including Excel and Brightspace ePortfolio.
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.

Course Materials:

Required Books & Papers:

Mann M.E. and Kump, L.R. (2015) *Dire Predictions: Understanding Climate Change, The Visual Guide to the Findings of the IPCC (DP) 2nd Ed.* Paper copies available at Dal. Bookstore or digital versions can be purchased at this [link](#).

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* (online)

Brightspace Learning Management System:

The key material for the course is available under “**content**” and “**discussions**” tabs. Announcements are put under “**announcements**” on the home page. **Students are responsible for checking “Announcements” regularly.** Part I of each assignment asks you to answer questions which are mainly based on DP and is to be answered and submitted using the quiz tool under “**Assessments**”. Students will use **Brightspace ePortfolio** to collect data and information for assignments and optional project.

Killam Library Reserves:

Olewiler, N.D & Field, B.C. (2011) *Environmental Economics: 3rd Can. Ed.*, McGraw-Hill Ryerson, Toronto.

Tietenberg, T. & Lewis, L. (2010) *Environmental Economics and Policy*, 6th ed., Addison-Wesley

Gore, Al (2006) *An Inconvenient Truth*, Rodale, New York.

Gore, Al (2006) *Earth in the Balance: Ecology and the Human Spirit*, Rodale, New York

Berners-Lee, M. (2011) *How Bad are Bananas? The Carbon Footprint of Everything*, Greystone Books, Vancouver.

Course Assessment:

There are two course assessment schemes based upon whether you chose to participate in the ePortfolio and Presentation Mock UNFCCC COP25 Project as follows:

1) Non-presenting COP delegate: **Scheme 1**

2) Presenting COP delegate: Score = **Max Grade out of Scheme 1 or Scheme 2**

Component	Weight (% of final grade)		Date, Details
	Scheme 1 (non-presenting COP delegate)	Scheme 2 (presenting COP delegate)	
Test 1	12.5	10	Wed. Feb. 6
Test 2	12.5	10	Wed. Mar. 6
Final Exam	40	35	Scheduled by Registrar
Assignments	27.5 (Best 3 out of 4)	22.5 (Best 2 out of 4)	
Participation	5	5	- grade based on top 80% of assessments
ePortfolio	0	7.5	- see details below
COP Presentation	0	7.5	- March 25 th & 27 th - 5 min presentation + 5 min questions
COP Meetings Assessment Sheet	2.5	2.5	- score presenters and provide feedback. - group and self 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)		

COP 25 Country and Country Group ePortfolios and Presentation Project:

Each student will choose a country from one of the 8 country groups and will create an ePortfolio in Brightspace for that country and will join a shared ePortfolio for their respective country group. As part 3 of each assignment, students will collect data and answer questions on their country and share these with the professor, TA and the country group ePortfolio.

Students who opt for the COP “Presenter” delegate scheme (above) will also do a group project which will consist of organizing and consolidating country material received to the Country Group ePortfolio (due to submissions from part 3 of each assignment) and proposing target atmospheric GHG concentration, equilibrium average surface temperature, and a GHG abatement plan and time frame, and policy approach. Presenter students will give a presentation to explain their abatement plan and to provide their reasoning. In addition, these students will add this presentation, consolidated material and other resources to their country and country group ePortfolio. Each student’s **ePortfolio grade** will be the maximum grade on their individual country ePortfolio and their country group ePortfolio. You are encouraged to use your ePortfolio to reflect on what you are learning.

* If a given country group has 2 members or less, the group or individual has the option of joining another group or may limit the project to the one or two countries. In this case, the students have the option of giving the presentation in class or to the professor in her office.

Participation Grade:

This grade will be based upon participation and completion of in-class exercises including games, break out group activities, and worksheets and will be based on the top 80% of these assessments.

Course Policies

Missed Assignments or Tests: If you miss a quiz or assignment due to illness, a doctor’s note must be provided in which case other assessment components will be given more weight. **IMPORTANT:** If you are sick, you must get a doctor’s note *while you are sick* so that the doctor can verify that you were sick.

Late Assignments receive a maximum penalty of 5% per day, unless the student provides a doctor’s note. Assignments will NOT be accepted after answers have been posted on Brightspace. Late assignments can be handed into my mailbox, which is on the ground floor of the middle house in the Econ Department. Please get the secretaries to sign and date these prior to depositing them in my mailbox.

Missed Classes: This is not an online class -- if you miss a class, you are responsible for asking other students if you missed any information and are advised to get another student’s notes. You will also miss participation grades, which are based on inclass activities including worksheets. Posted slide shows provide a guide to lectures but are by no means a perfect substitute.

Announcements: Announcements are made in class and are posted under “News” on the Brightspace Homepage. **Students are responsible for checking announcements regularly.**

Assignment Policy Regarding Working in Groups: Although you are encouraged to work in groups to solve assignment problems, the work you hand in must be your own including your own wording and

ideas. If you work in a group, please indicate the other group members on the top of your assignment but hand in your own assignment. The TA will mark a random selection of questions.

Practice Problems: Practice problems are for practice and are not to be handed in.

Final Exam: Students are responsible for *not booking flights prior to the end of the exam period.*

Course Content:

- topics are tentative as time permits.
- recommended background readings include Stern Review of Climate Change (SR) and Dire Predictions (DP) are indicated below.
- other supplementary readings will be provided on Brightspace.
- global warming economics relevant news events given at start of class provide context to course material and are posted on [Twitter](#)

Wk	Date	Lecture # and Topic	Background Readings
I Introductory Section			
1	Jan 7	L1_Introduction & GHGs as a social problem with social solutions.	SR, Executive Summary Long or Short Version (Read during Jan.)
	Jan 9	L2_Climate Change as a Technical Problem with Technical Solutions (Science)	DP, Part I & 2 (read over January) SR, Ch. 1, <i>Climate Change Science</i> , Kopp & Hsiang (2018) <i>An Economists Guide to Climate Change Science</i>
2	Jan 14	L3_Emissions Scenarios, Projections & Options for GHG Emissions Reductions (Kaya Identity)	Kaya Identity: SR Ch. 7, section 7.3 – 7.4, RCPs: DP, 92 – 99, 116, 127, 149, SRES: http://www.ipcc.ch/ipccreports/sres/emission/index.php?idp=2
	Jan 16	L4_Markets & Welfare Analysis	- note
3	Jan 21	L5_Market Failure due to Externalities	- note, SR Ch. 2 (pg. 25 & key message box, pg. 23), Stavins & Fullerton “How Economists See the Environment”
	Jan 23	L6_Policies that Directly Target Goods Markets (Pigou tax, subsidies, quotas, technology, performance, design standards).	- note - Ch. 2 SR, Climate Change Ethics
II Economics of Global Warming in Static Market Framework			
4	Jan 28	L7_Life Cycle Assessment and Carbon Footprinting	- note & sample LCAs, Berniers-Lee (2011) <i>How Bad are Bananas?</i> (library reserves)
	Jan 30	L8_Socially Efficient Emissions Levels/ One Period MAC MD Framework	- note, SR, Section 2.2, pg. 24 – 28
5	Feb. 4	Finish off previous lecture, student question session.	
	Feb 6	Test 1	
6	Feb 11	L9_Policies that Directly Target GHGs Part I (Carbon Taxes, Emissions standards, Abatement Subsidies & Standards)	- note, SR, Ch. 14 World Bank (2016) <i>State and Trends in Carbon Pricing</i>
	III Damages and Abatement Costs and their Measurement, Social Cost Benefit Analysis		
	Feb 13	L10_Impact Analysis, Damages and their Measurement	Sections from SR, Ch. 3, 4, 5. DP, Part III (pg. 118 – 149)
7		Study week	
8	Feb 25	L11_Abatment Costs and their Measurement	SR, Ch. 9, 10
	Feb.27	L12_Logic of Discounting and how it Affects IAMs Recommendations	DP, pg. 192-193, SR, Ch. 2 (section 2.4, technical details in appendix)

IV Dynamics of Socially Desirable Abatement			
9	Mar 4	L13_Shifts MACs and MDs related to Emissions Scenarios, RCPs, Jevons Paradox and student question and answer session.	DP, 92 – 99, note
	Mar 6	Test 2	
10	Mar. 11	L14_Stabilization Targets/ Integrated Assessment Models	SR, Ch. 8, Ch. 13, Nordhaus, Sztorc, (2013) DICE 13R: Introduction and Users Manual
	V Cap and Trade, Mitigation Policy Comparisons, Global Policy Dilemma		
	Mar 13	L15_Cap & Trade	SR, Ch. 15
11	Mar 18	L16_Mitigation Policy Comparisons, Decentralized Approaches (Divestment, Liability Approaches)	- note
	Mar 20	L17_GHG abatement as a Global Public Good & Prisoner's Dilemma	- note
12	Mar 25	Mock UN FCCC COP 25	- presenting delegates give their presentations and entire class will negotiate abatement targets.
	Mar 27		
VI Adaptation Policy, Geoengineering, Short Run Macroeconomics, Public Misunderstanding			
13	Apr 1	L18_Adaptation Policy and Geoengineering	DP, Part IV, 150 – 164, SR, Ch. 18 - 20 DP, 192 - 193
	Apr 3	L19_Short Run Macroeconomic Dilemma, Limits to Growth, Problem of Public Misunderstanding	Harris, J. (2009) Ecological Macroeconomics, Consumption, Investment and Climate Change, Real World Econ. Rev., 50(1), pp. 34-48 SR, Section 17.4, Gore (2006) An Inconvenient Truth.

How to Learn in this Course:

- attend lectures and take careful notes. If you have to miss a lecture, ask another student to take notes and find out what you missed.
- do assignments and practice problems (make a serious effort *before* looking at solutions).
- do readings to gain background context.
- ask questions during or after class, in office hours and while you are studying. The TA and I like to provide one-on-one help, please visit us!!!
- do all assignments and start early. If you are having trouble, visit office hours for help.
- use your ePortfolio to build your own information folder about your country and country group.
- study for tests (do review sheet problems).
- work with other students to share ideas and information.
- read newspaper and magazine and web site articles about climate change news.
- manage your time.
- If you are having trouble focussing your study, see us for advice. We want to help!

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

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

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

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 the office (Rm 3037, McCain Building), e-mail (elders@dal.ca) or leave message (902-494-6803).

Information: https://www.dal.ca/campus_life/communities/native.html

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

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

University Grading Practices

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

Student Resources and Support

Advising

General Advising https://www.dal.ca/campus_life/academic-support/advising.html

Science Program Advisors: <https://www.dal.ca/faculty/science/current-students/academic-advising.html>

Aboriginal Student Centre: https://www.dal.ca/campus_life/communities/native.html

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

International Centre: 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 **Studying for**

Success: 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 Services: https://www.dal.ca/campus_life/health-and-wellness/health-services/services.html

Counselling: https://www.dal.ca/campus_life/health-and-wellness/counselling.html

Student Advocacy: <https://www.dsu.ca/services/community-student-services/student-advocacy-service>

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

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