



**ECO313 - Environmental Economics**  
**Fall 2012 Schedule**  
**Professor Matthew Turner**  
**Department of Economics**  
**UNIVERSITY OF TORONTO**

- [Office hours](#)
- [How we marked your HW](#)

Objectives and Requirements:

This course investigates the economics of global warming.

The problem of global warming can be usefully formulated as a very simple economics problem. We face a trade-off between current consumption and future climate. We have preferences over current consumption and future climate and would like to choose our optimal climate/consumption bundle.

This course is organized around filling in the details required to make the model useful, characterizing the optimal climate/consumption path suggested by the model, and finally, investigating policies to achieve the optimal path.

The first half of the course will be devoted to developing an understanding of the facts that confront us. This part of the course will require a familiarity with basic statistics and will require you to learn to write simple programs in Stata. The second part of the course will be devoted to solving for the optimal climate and consumption path. The third part of the course will investigate carbon mitigation policies. The second and third parts of the course will require familiarity with microeconomics and basic calculus. In particular, you will be expected to be familiar with the material from intermediate microeconomics and be able to solve univariate and simple multivariate optimization problems.

Prerequisites:

- ECO200Y1/ECO204Y1/ECO206Y1,
- ECO220Y1/ECO227Y1/(STA247H1,STA248H1)/(STA250H1,STA255H1)/(STA257H1,STA261H1)

The University and the Economics Department enforce prerequisite requirements strictly. Students enrolled in courses for which they do not have the published prerequisites may have their registration in those courses canceled at any time without warning. If you are unsure whether you satisfy the prerequisites, please check with our undergraduate secretary, Ms. Robb Innes. Note that the University does not allow me to waive prerequisites.

Lectures: There is a single section of this course. Lectures are on Tuesday from 1-3 PM in SS2110. There is also single mandatory tutorial on Stata as noted on the schedule below.

Required Texts:

- Storms of my grandchildren, J. Hansen, Bloomsbury, 2009.
- A Question of Balance, W. Nordhaus, Yale University Press, 2008. Here is [a pre-publication version with some typos](#).

Both should be available at the bookstore. I will often refer to: The Economics of Climate Change: The Stern Review, N. Stern, Cambridge University Press 2008. Here is an online version of [The Stern Review](#). You are also required to have access to the Stata software package. You can get the student version inexpensively from the [software licensing office](#) in Robarts library. The six month subscription to small Stata is fine.

Grading: A final which will count 50%. It will be two hours long and will take place at a time to be arranged during the December exam period. This course is in its second year and the one previous exam is available on the course website.

There will also be approximately weekly problem sets. I will collect problems sets at the beginning of three randomly selected lectures. The best two of these three will count for 15% of your grade. Problems sets will not be accepted after the lecture during which they are collected. If you need to miss class, you can hand in problem sets early to the economics receptionist.

If you are unhappy with your grade on a problem set, look at the solution set before you come to talk to me about it. If you want a problem set remarked, we will generally remark the whole thing, with the possibility that your mark could go up or down. This schedule deliberately allows for a make-up problem set, so you get to be sick once for free. If you miss a second problem set I may allow you to hand it in late. I will consider this on a case by case basis. Expect that I will require a doctor's note indicating that you were too sick to do the work or come to class.

Academic misconduct: Copying or plagiarizing or other forms of academic misconduct will not be tolerated. Students caught engaging in these activities will be subject to academic discipline ranging from a mark of zero on an assignment to dismissal from the university, as outlined in the academic handbook.

Email Policy: I will try to reply to email within 24 hours, except on weekends. For me to be able to do this, I need some rules about email correspondence. These rules are:


- Try to write `yes, or `no' questions, or at most a one (or two) sentence response (maximum). If it takes more then the question is too hard for email and you should come to office hours
- I won't answer emails that request information that can be found on this website. Check here first.
- I will not answer emails about grading. For that, you need to come to office hours.

I encourage you to provide course feedback by email.

**Lecture and reading schedule:** . The following is a tentative schedule for the material to be covered during the term. You should check this schedule at least weekly for updates and changes.

**Announcements:**



Lecture	Date	Reading	Problems	Solutions
#1: Introduction, How to measure climate and CO2	Sept. 11	Required: <ul style="list-style-type: none"> <li>Hansen to p111</li> <li><a href="#">Paleoclimatology: the Oxygen Balance, NASA Goddard Space Flight Center</a></li> </ul> Optional: <ul style="list-style-type: none"> <li><a href="#">Ice core video</a></li> <li><a href="#">Measuring Temperature - The 170 Year Record, J. Weaver, J. Braun, and W. J. Szlemko, climatethoughts.org</a></li> <li><a href="#">Ice cores and climate change, British Antarctic Survey, Sept 2010</a></li> </ul>	 Due Sept. 25	
Stata tutorial -- SS 1085	Sept. 16			
#2: The relationship between atmospheric CO2 and climate	Sept. 18	Required: <ul style="list-style-type: none"> <li>Nordhaus, Ch 1</li> <li>Hansen p112-71</li> </ul> Optional: <ul style="list-style-type: none"> <li><a href="#">IPCC 2007, Physical Science Basis, TS2-5.3</a></li> <li>Stern review, Ch 3, 7,8.</li> </ul>		
#3: CO2 emissions and atmospheric CO2	Sept. 25	Required: <ul style="list-style-type: none"> <li>Finish Hansen</li> </ul>		
#4: Climate and future consumption I	Oct. 2	Required: <ul style="list-style-type: none"> <li><a href="#">The Impact of Global Warming on Agriculture: A Ricardian Analysis, Robert Mendelsohn, William D. Nordhaus, And Daigee Shaw, AER 1994</a></li> <li><a href="#">Adapting to Climatic Challenges: A Progress Report on Studies of the Historical Evolution of Wheat Production, Alan Olmstead and Paul Rhode, unpublished, 2011</a></li> </ul>		
#5: Climate and future consumption II	Oct. 9	Both readings are required. Dell et al is difficult. Do your best, but don't expect to get it all. Just the first two pages of Roberts and Schlenker are required. <ul style="list-style-type: none"> <li><a href="#">Nonlinear temperature effects indicate severe damages to U.S. crop yields under climate change, W. Schlenker and M. J. Roberts, PNAS September 15, 2009</a></li> <li><a href="#">Climate Change and Economic Growth: Evidence from the Last Half Century, M. Dell, B. F. Jones and B. A. Olken, NBER Working Paper 14132</a></li> </ul> Optional: <ul style="list-style-type: none"> <li><a href="#">Seasons of discontent, The Economist, August 27, 2011</a></li> </ul>		

#6: Discounting, or how to compare present and future consumption	Oct. 16	Required: <ul style="list-style-type: none"> <li>• <a href="#">Dorfman and Dorfman, 1993, Chapter 19</a> .</li> <li>• <a href="#">An almost practical step toward sustainability, Robert Solow. An address to RFF (1993)</a></li> <li>• Nordhaus, p169-184</li> </ul>
#7 Midterm	Oct. 23	
#8: Abatement costs and (finally!) calculating the optimal mitigation path	Oct. 30 Note: Section 1 skips week	Required: <ul style="list-style-type: none"> <li>• Nordhaus Ch 2-5</li> </ul> <p>This is a more technical version of Nordhaus' chapters 2-4. It's optional, but if you can do the math, it's easier to get through and you can read it INSTEAD of the book.</p> <ul style="list-style-type: none"> <li>• <a href="#">Rolling the 'DICE': An optimal transition path for controlling greenhouse gases, W. Nordhaus, Resource and Energy Economics (1993)</a></li> </ul> <p>Optional. More facts about mitigation.</p> <ul style="list-style-type: none"> <li>• Stern Ch 9-10</li> <li>• <a href="#">IPCC 2007, Climate Change 2007: Mitigation of Climate Change, Summary for policy makers</a></li> </ul>
#9: The tragedy of the commons	Nov.6	Required: <ul style="list-style-type: none"> <li>• <a href="#">The Tragedy of the Commons, G. Hardin, Science (1968)</a></li> <li>• <a href="#">The economic theory of a common- property resource: the fishery, H.S. Gordon, Journal of Political Economy (1954)</a></li> </ul> <p>Optional: The lectures are based in part on Cheung, Ostrom is stories about common property in reality.</p> <ul style="list-style-type: none"> <li>• <a href="#">The structure of a contract and the theory of a non-exclusive resource, S. N. Cheung, Journal of Law and Economics(1970)</a></li> <li>• <a href="#">Ch 4,5 Governing the commons, E. Ostrom, Cambridge University Press(1990)</a></li> </ul>
#10: Regulation I	Nov. 20	Stavins is required. The Weitzman is hard and optional. <ul style="list-style-type: none"> <li>• <a href="#">Correlated Uncertainty and Policy Instrument Choice</a> R. Stavins , JEEM 1996.</li> <li>• <a href="#">Prices vs. Quantities</a> M. Weitzman, The Review of Economic Studies, 1974</li> </ul>
#11: Regulation II	Nov. 27	The lecture is based on these two readings. Spence will likely be too hard, so it is optional. The Page chapter is required. <ul style="list-style-type: none"> <li>• <a href="#">Environmental taxes</a> Talbot Page, Mimeo, 2004.</li> <li>• <a href="#">Effluent Charges and Licences Under Uncertainty</a> M. Roberts and M. Spence, J. Public Economics, 1976</li> </ul>
#12: Treaties and existing regulation	Dec. 4	Frankel is required as is the Reference manual to p 40. The text of the Kyoto Protocol is optional. <ul style="list-style-type: none"> <li>• <a href="#">An Elaborated Proposal for a Global Climate Policy Architecture: Specific Formulas and Emission Targets for All Countries in All Decades</a> Jeffrey Frankel (2008)</li> <li>• <a href="#">UNFCCC Kyoto Protocol Reference manual (2008)</a></li> <li>• <a href="#">Text of Kyoto Protocol (1998)</a></li> </ul>



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