

Limits to Growth and the Macroeconomics of Climate Change

ECON 314

Spring 2014 Syllabus

Instructor: Jonathan Cogliano

Office hours: Tuesdays 2:00-4:00pm
Wednesdays 10:00am-12:00pm
(or by appointment)

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Class Meetings: Tuesdays & Thursdays 10:30-11:45am
Althouse G08

Course Description:

Theories of economic growth will be introduced and analyzed in order to understand the prominent role they play in macroeconomics and climate change debates. Economic growth is often treated as a necessity for the functioning and development of national economies. Continuous growth of this kind requires the use of natural and human resources on an ever-expanding scale and carries with it increasing greenhouse gas emissions. In light of recent research on world climate change this vision of economic growth is brought into question and critically examined. Different approaches to accounting for the effects of greenhouse gas accumulation on the world economy in terms of output, employment, and distribution will be treated in depth. Potential mitigation efforts on a world scale will also be explored.

Pre-requisites: ECON 112; MATH 170. ECON 268 is highly recommended. Interested students who do not meet the pre-requisites are encouraged to contact the instructor.

Course Objectives:

The objectives of this course are as follows: (1) provide an introduction to the concepts and tools that comprise theories of economic growth; (2) understand the implications of different approaches to economic growth; (3) understand the linkages between economic growth and climate change; and (4) be able to engage with the ongoing discussion concerning climate change mitigation.

Background Knowledge

This course will make use of a variety of mathematical techniques, including: differentiation, comparative statics, maximization, differential equations, and stability analysis. Most of the background knowledge for these techniques is covered in MATH 170 and you will be expected to “hit the ground

running” in some cases. Differential equations and stability analysis are not covered in any of the pre-requisites, thus these techniques will be introduced and taught in class. Learning and applying all of these techniques is expected as part of the class.

Course Texts:

Jones, Charles I. and Dietrich Vollrath (2013). *Introduction to Economic Growth*. New York: W. W. Norton. 3rd edition.

Daly, Herman E. (1996). *Beyond Growth*. Boston: Beacon Press.

All required texts are part of the required reading for the course and must be acquired by students. Copies of the books are available for purchase at the College bookstore. Any readings from texts not listed above will be provided through Moodle.

Grading:

<u>Assignment</u>	<u>Weight</u>	<u>Date (tentative)</u>
Attendance & Participation	15%	
Homeworks	25%	
Discussion Papers	10%	
Midterm Exam 1	15%	Feb. 20
Midterm Exam 2	15%	Apr. 8
Final Exam	20%	May 8, 2:00pm

Grade Scale:

The grading scale for final grades for the semester is as follows:

Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
Score	≥ 93	90-92	87-89	83-86	80-82	77-79	73-76	70-72	67-69	63-66	60-62	≤ 59

Participation

The class participation portion of the overall grade for the semester consists of attendance and participation in class discussions. Students should prepare for each class by doing the readings and thinking about the material in advance. Lectures are designed to clarify and extend the assigned readings. Preparation requires that you have read and thought seriously about the assigned materials for each class. Participation in class means both sharing your ideas (by talking) and respecting and engaging the ideas of your classmates by actively listening and responding respectfully. Students’ meaningful participation in class is worth from 0-15 points and includes attendance, the quality and quantity of comments and questions, your attentiveness, and the seriousness with which you engage the course materials.

Attendance will be taken every class. If you are more than 10 minutes late to class you will be considered absent. Each unexcused absence in excess of two classes will result in a 2 point reduction

in your final grade for the semester. For example, if you are absent 4 times (unexcused), then you will lose 4 points off your final grade—more than a third of a letter grade. Point deductions for unexcused absences can harm your grade beyond the 15 points allocated for participation and attendance.

Electronic Devices:

The use of cellphones or smartphones of any kind during class is *not* permitted. The use of tablet computers and laptops/notebooks for the purpose of taking notes is allowed. However, this is not license to use these devices for non-course related purposes during class (e.g. Facebook, personal e-mail, online shopping). If the use of approved devices becomes a distraction for the class then you may be asked to put them away.

Homework:

Homework will be given periodically as we progress through the course material. Homework assignments are designed to help students work through course material and problems encountered during class. The goal of the homework is for you to deepen your understanding of what is covered in class by carefully working through the theories, models, and ideas encountered in the course materials.

Discussion Papers

There will be two discussion papers assigned during the semester. The purpose of these discussion papers is to foster lively in-class discussion, debate, and reflection on the course materials. Each paper should consist of a concise neutral summary of the course material and its key arguments (1.5-2 pages) and an additional page of your reflections.

Papers will be evaluated in terms of the accuracy and clarity of your summaries, thoughtfulness, and the quality and depth of your engagement with the readings. Each paper should be 3 pages in length (as described above), double-spaced, 1 inch margins around the page, and size 11 Times New Roman or similar font. Any direct quotes from, or reference to, sources, including course readings, should be properly cited and listed in a bibliography.

Midterm Exams

The midterm exams are intended to be straight forward and test students on their understanding of the key concepts discussed in class and in the required readings. The exams will not be overly tricky or complicated, but will require a clear understanding of the general concepts behind the course topics.

Final Exam

The final exam, like the midterms, is designed to test students on their knowledge of material covered in class, the readings, and homeworks. However, the final exam will be designed to be more comprehensive of the material covered throughout the semester than the midterms.

Course Policies:Attendance Policy

See course grading information above.

Electronic Devices

See course grading information above.

Late Assignments

All assignments must be turned in on time. Late assignments will not be accepted and will result in a zero unless inability to complete and submit the assignment is caused by a verified medical/family emergency.

Academic Honesty

Dickinson College's policies on academic integrity and honesty will be strictly enforced. Policies on cheating and plagiarism can be found in *The 2012-13 Community Standards*.

Accommodating Students with Disabilities

Dickinson College makes reasonable academic accommodations for students with documented disabilities, according to equal access laws. I am available to discuss the implementation of those accommodations. Students requesting accommodations must first register with Disability Services to verify their eligibility. After documentation review, Marni Jones, Director of Learning Skills and Disability Services, will provide eligible students with accommodation letters for their professors. Students must obtain a new letter every semester and meet with each relevant professor prior to any accommodations being implemented. These meetings should occur as soon as possible in the semester, and at least five days before any testing accommodations. Disability Services is located in Biddle House. Address inquiries to Stephanie Anderberg at 717-245-1734 or email disabilityservices@dickinson.edu. For more information, see the Disability Services website: www.dickinson.edu/disabilityservices.

Course Outline/Readings (tentative):

Readings should always be completed before class. Any readings listed with an asterisk (*) before them are considered optional readings and are meant to serve as a guide to further reading should a particular topic be of interest.

I.) Course Introduction

(a) Macro & Climate Change: Setting the Stage Jan. 21

Nordhaus, W. D. (2008). *A Question of Balance*. New Haven: Yale University Press: pages 1-6.

Foley, D. K. (2009). "The Economic Fundamentals of Global Warming". In J. M. Harris and N. R. Goodwin (Eds.), *Twenty-First Century Macroeconomics: Responding to the Climate Challenge*. Cheltenham: Edward Elgar.

Leal-Arcas, R. (2013). *Climate Change and International Trade*. Cheltenham: Edward Elgar: Ch. 2, sections 2.2, 2.3, and 2.4.

*IPCC (2013). "Climate Change 2013 – The Physical Science Basis: Summary for Policymakers". *Intergovernmental Panel on Climate Change Fifth Assessment Report*. www.climatechange2013.org

*Nordhaus, W. D. (1991). "To Slow or Not to Slow: The Economics of The Greenhouse Effect". *Economic Journal* 101(407), pp. 920-937.

(b) Intermediate Macro Review (or Crash Course) Jan. 23

Jones & Vollrath: Appendix A

Notes provided for class

II.) Economic Growth

(a) Introduction to Growth Jan. 28

Jones & Vollrath: Ch. 1

(b) The Solow Model Jan. 30, Feb. 4

Jones & Vollrath: Ch. 2

Solow, R. M. (1956). "A Contribution to the Theory of Economic Growth". *Quarterly Journal of Economics* 70(1), pp. 65-94.

(c) The Solow Model and the Facts of Growth Feb. 6

Jones & Vollrath: Ch. 3, Appendix C

Jones & Vollrath: Ch. 4

Barro, R. J. (2001). "Human Capital and Growth". *American Economic Review* 91(2), pp. 12-17.

(d) Growth & Technology

Feb. 11-27

Jones & Vollrath: Ch. 5

Romer, P. M. (1990). "Endogenous Technological Change". *Journal of Political Economy* 98(5), pp. S71-S102.

Aghion, P. and P. Howitt (1992). "A Model of Growth Through Creative Destruction". *Econometrica* 60(2), pp. 323-351.

Romer, P. M. (1994). "The Origins of Endogenous Growth". *Journal of Economic Perspectives* 8(1), pp. 3-22.

Solow, R. M. (1987). "Robert M. Solow – Prize Lecture: Growth Theory and After". *Nobelprize.org*. Nobel Media AB. www.nobelprize.org

Solow, R. M. (1994). "Perspectives on Growth Theory". *Journal of Economic Perspectives* 8(1), pp. 45-54.

*Lucas, R. E. (1988). "On the Mechanics of Economic Development". *Journal of Monetary Economics* 22(1), pp. 3-42.

*Uzawa, H. (1965). "Optimum Technical Change in An Aggregative Model of Economic Growth". *International Economic Review* 6(1), pp. 18-31.

(e) Historical Roots of Sustainable Growth

Mar. 6

Jones & Vollrath: Ch. 8

(f) Other Theories of Endogenous (and Cyclical) Growth

Mar. 18

Jones & Vollrath: Ch. 9

Taylor, L. (1991). *Income Distribution, Inflation, and Growth*. Cambridge: MIT Press: Chs. 1, 2.

Taylor, L. (2012). "Growth, Cycles, Asset Prices and Finance". *Metroeconomica* 63(1), pp. 40-63.

*Dutt, A. K. (1984). "Stagnation, income distribution and monopoly power". *Cambridge Journal of Economics* 8(1), pp. 25-40.

*Taylor, L. (2004). *Reconstructing Macroeconomics: Structuralist Proposals and Critiques of the Mainstream*. Cambridge: Harvard University Press: Ch. 5, "Short-Term Model Closure and Long-Term Growth".

III.) Growth & Climate Change

(a) Primer on Growth & Natural Resource Limits

Mar. 20

Jones & Vollrath: Ch. 10

- Taylor, L. (2009). “Energy Productivity, Labor Productivity, and Global Warming”. In J. M. Harris and N. R. Goodwin (Eds.), *Twenty-First Century Macroeconomics: Responding to the Climate Challenge*. Cheltenham: Edward Elgar.
- Rezai, A., L. Taylor, and R. Mechler (2013). “Ecological macroeconomics: An application to climate change”. *Ecological Economics* 85, pp. 69-76.

(b) The Landscape of Climate Change Mar. 25, 27

- Ackerman, F. and E. Stanton (2013). *Climate Economics: The state of the art*. Abingdon, Oxon: Routledge: Ch. 1.
- Daly: Introduction, Chs. 1, 2, 3
- Daly, H. E. (2005). “Economics in a Full World”. *Scientific American*, September 2005.
- Nordhaus, W. D. (2008). *A Question of Balance*. New Haven: Yale University Press: Chs. 1, 2, 3.

(c) A Short History of the Legislation Apr. 1

- Leal-Arcas, R. (2013). *Climate Change and International Trade*. Cheltenham: Edward Elgar: Chs. 4, 5

(d) The Debates and the Models Apr. 3, 8

- Daly: Chs. 4, 5, 8, 9
- Nordhaus, W. D. (2008). *A Question of Balance*. New Haven: Yale University Press: Chs. 4, 5

(e) The Debates and the Models II Apr. 10

- Foley, D. K. (2012). “Dilemmas of Economic Growth”. *Eastern Economic Journal* 38, pp. 283-295.
- Skott, P. and L. Davis (2013). “Distributional biases in the analysis of climate change”. *Ecological Economics* 85, pp. 188-197.

(f) Some Alternative Models Apr. 15-24

- Rezai, A., D. K. Foley, and L. Taylor (2012). “Global warming and economic externalities”. *Economic Theory* 49, pp. 329-351.
- Taylor, L., D. K. Foley, J. F. Cogliano, and R. Kumar (2013). “Greenhouse Gas Accumulation and Demand-driven Economic Growth – A Simulation Model”. Working Paper presented at “Achieving 2°C climate stabilization: macroeconomic benefits or costs?” conference sponsored by The Cambridge Trust for New Thinking in Economics, Cambridge UK, 4-5 July 2013.
- Ackerman, F., E. A. Stanton, and R. Bueno (2013). “CRED: A new model of climate and development”. *Ecological Economics* 85, pp. 166-176.

*Taylor, L., D. K. Foley, J. F. Cogliano, and A. Rezai (2013). “Demand-Driven Growth and Climate Change: Initial Simulations”. Mimeo, New School for Social Research, New York, NY.

(g) The (Mitigation) Policy Questions Moving Forward

Apr. 29, May 1

Nordhaus, W. D. (2008). *A Question of Balance*. New Haven: Yale University Press: Ch. 9

Rezai, A. (2010). “Recast the DICE and its Policy Recommendations”. *Macroeconomic Dynamics* 14 (Supplement 3), pp. 275-289.

Tol, R. S. J. (2013). “Targets for global climate policy: An overview”. *Journal of Economic Dynamics & Control* 37, pp. 911-928.

Leal-Arcas, R. (2013). *Climate Change and International Trade*. Cheltenham: Edward Elgar: Ch. 8

Ackerman, F. and E. Stanton (2013). *Climate Economics: The state of the art*. Abingdon, Oxon: Routledge: Ch. 10.

IPCC (2013). “Renewable Energy Sources and Climate Change Mitigation”. *Special Report of the Intergovernmental Panel on Climate Change*. www.ipcc.ch: “Summary for Policymakers”