

# Syllabus: Economic Growth

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August 8, 2012

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## 1 Course Description

Classes take place every Friday from 9 am to 10:30 am and 12 pm to 1:30pm in class room 2262. The aim of the course is to survey different models of economic growth from a rigorous mathematical standpoint that allows students to develop an intuitive and analytical understanding of recent research in growth theory. The course is divided into three sections. The first two sections are meant to develop the student's intuition and analytical skills by reviewing standard growth models. We will discuss Solow's early contribution, the analytical foundations of neoclassical growth, the role of human capital, and finally different approaches of endogenizing technical change. During the first two sections, which will take approximately 2/3 of the course, we will heavily rely on Daron Acemoglu's textbook given in the reading list below. In the second part we will discuss recent research topics in growth theory, i.e. environmental issues, the direction of technical change, the role of institutions, and agent-based models of growth and technical change. I am also open to suggestions from students.

## 2 Textbooks

The course follows mainly the recent textbook by Daron Acemoglu. Other useful graduate textbooks that can be used to deepen one's understanding are the ones by Barro and Sala-i-Martin and Aghion and Howitt. Barro and Sala-i-Martin focus more on neoclassical growth models while Aghion and Howitt discuss mainly endogenous growth models.

Acemoglu, Daron, 2009, *Introduction to Modern Economic Growth*, Princeton.

Barro, Robert, and Sala-i-Martin, Xavier, 2004, *Economic Growth*, MIT-Press.

Aghion, Philippe, and, Howitt, Peter, 1997, *Endogenous Growth Theory*, MIT-Press.

## **3 Required Work**

### **3.1 Take-home Exam**

There will be two take-home exams (each 30% of your grade) with questions varying from simple definitions to more elaborate exercises and an essay question. I will give out the questions in English as well as in Spanish. It is up to you whether you wish to answer the questions in English or Spanish. The take home exams will be handed out after we have finished neoclassical growth theory and endogenous growth theory respectively. The exact date will be announced during class. You will have one week to work on the exercises.

### **3.2 Final Exam**

For the final exam (40% of your grade) you will have to choose between an in-class exam and a research paper. The in-class exam will be open-book and open-notes but closed-computer. The structure will be similar to the take-home exam. As an alternative you can write a research paper about a research topic discussed in the second part of the course. Research papers can be either a literature review or an extension of an existing model. If you decide to do a research paper please contact me at least two weeks before the course finishes.

### **3.3 Class Participation**

I do not give grades for class participation, but you should keep in mind that the dynamic of the course also depends on your participation. Active student participation makes the class much more interesting and will help you to shape preliminary research questions. Having a look at some of the readings before coming to class is always a good idea.

## **4 Topics**

Since the pace of the class depends on student's interest as well as of your prior knowledge the list of topics is only tentative. After every class I will give reading suggestions for the next class. Sections one and two of the course consist mainly of the first six topics. The third section of the course consists of topics seven to ten. Starred readings are required readings and will help you to develop the necessary tools in order to understand the main argument. The other readings are supplementary readings and will help you to understand the historical development of these arguments as well as some critical views on them.

## 4.1 Part One: Neoclassical Growth Theory

**TOPIC 1.** Introduction to Economic Growth (Stylized Facts, World Income Distribution, Convergence, Solow Model)

Readings:

\*Acemoglu, Daron, 2009, *Introduction to Modern Economic Growth*, Ch. 1-2.

Solow, Robert, 1956, “A Contribution to the Theory of Economic Growth”, in: *Quarterly Journal of Economics*, 70, pp. 65-94.

Jones, Charles, 1997, “On the Evolution of the World Income Distribution”, in: *Journal of Economic Perspectives*, 11, pp. 19-36.

**TOPIC 2.** The Solow Model in the Light of Empirical Data

Readings:

\*Acemoglu, Daron, 2009, *Introduction to Modern Economic Growth*, Ch. 3-4.

Mankiw, Gregory; Romer, David; Weil, David, 1992, “A Contribution to the Empirics of Economic Growth”, in: *Quarterly Journal of Economics*, 107, pp. 407-437.

**TOPIC 3.** Analytical Foundations of Growth Theory (Optimization Techniques)

Readings:

\*Acemoglu, Daron, 2009, *Introduction to Modern Economic Growth*, Ch. 5-7.

**TOPIC 4.** Neoclassical Growth Theory (Ramsey Model, Overlapping Generations Model)

Readings:

\*Acemoglu, Daron, 2009, *Introduction to Modern Economic Growth*, Ch. 8-9.

Ramsey, Frank, 1928, “A Mathematical Theory of Saving”, in: *Economic Journal*, 38, pp. 543-559.

## 4.2 Part Two: Endogenous Growth

**TOPIC 5.** Endogenous Growth I: Expanding Variety Models

Readings:

\*Acemoglu, Daron, 2009, *Introduction to Modern Economic Growth*, Ch. 13.

Romer, Paul, 1990, “Endogenous Technical Change”, in: *Journal of Political Economy*, 98, pp. 71-102.

**TOPIC 6.** Endogenous Growth II: Schumpeterian Models

Readings:

\*Acemoglu, Daron, 2009, *Introduction to Modern Economic Growth*, Ch. 14.

Aghion, Philippe; Howitt, Peter, 1992, “A Model of Growth Through Creative Destruction”, in: *Econometrica*, 60, pp. 323-351.

### 4.3 Part Three: Recent Research

#### TOPIC 7. Endogenous Direction of Technical Change

Readings:

\*Acemoglu, Daron, 2002, "Directed Technical Change", in: *Review of Economic Studies*, 69, pp. 781-809.

Kennedy, Charles, 1964, "Induced Bias in Innovation and the Theory of Distribution", in: *Economic Journal*, 74, pp. 541-547.

Drandakis, E.; Phelps, Edmund, 1965, "A Model of Induced Invention, Growth, and Distribution", in: *Economic Journal*, 76, pp. 823-840

Jones, Charles, 2005, "The Shape of Production Functions and the Direction of Technical Change", in: *Quarterly Journal of Economics*, 120, pp. 517-549.

#### TOPIC 8. Economic Growth and the Environment.

Readings:

\*Acemoglu, Daron; Aghion, Philippe; Bursztyn, Leonardo; Hemous, David, 2012, "The Environment and Directed Technical Change", in: *American Economic Review*, 102, pp. 131-166.

Buonanno, Paolo; Carraro, Carlo; Galleotti, Marzio, 2003, "Endogenous Induced Technical Change and the Costs of Kyoto", in: *Resource and Energy Economics*, 25, pp. 11-34.

Foley, Duncan, 2003, "Endogenous Technical Change with Externalities in a Classical Growth Model", in: *Journal of Economic Behavior and Organization*, 52, pp. 167-189.

#### TOPIC 9. Economic Growth and Institutions.

Readings:

\*Acemoglu, Daron; Johnson, Simon; Robinson, James, 2005, "Institutions as a Fundamental Cause of Long-Run Growth", in: Aghion, P.; Durlauf, S. (ed.) *Handbook of Economic Growth*, Amsterdam.

#### TOPIC 10. Evolutionary and Agent-based Models of Growth and Technical Change.

Readings:

\*Nelson, Richard; Winter, Sidney, 1982, *An Evolutionary Theory of Economic Change*, The Belknap Press of Harvard University, Ch. 8-11

Dosi, Giovanni, 1988, "Sources, Procedures, and Microeconomic Effects of Innovation", in: *Journal of Economic Literature*, 26, pp. 1120-1171.

Dosi, Giovanni, Fagiolo, Giorgio; Roventini, Andrea, 2010, "Schumpeter meeting Keynes: A policy-friendly model of endogenous growth and business cycles", in: *Journal of Economic Dynamics and Control*, 34, pp. 1748-1767.