From Stone Tools to Robots: Economic Growth and Development -- Syllabus

Spring 2019

Instructor Information

Instructor	Email	Office Location & Hours
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General Information

Description

This class explores economic growth over the past millennia. For most of its history, humanity did not experience the type and quality of life, as we know it today (e.g., electricity, running water, medicine, telecommunications, and transport). It is only during the second half of the 18th century when Europe (and later U.S.) started to see economic growth. This growth started with the Industrial Revolution. In the first part of the course, we will study models that explain why economic growth is such a recent phenomenon. We will rely on models such as those proposed by Malthus to understand why the world did not grow at all for most of 5 millennia. We will also explore models that help us to understand the explosive economic growth experienced by the U.S. in the 19th and 20th centuries (and other countries more recently). As a by-product, there will be some discussion on the recent slowdown affecting most Western economies (the so-called Secular Stagnation). Importantly, we will talk about the increasingly reliance on automation for production. In particular, the impact automation may have on employment, welfare, and society.

A crucial part of the course is to understand how research and development (R&D) and innovation contribute to growth. Therefore, the second part of the course will be devoted to study R&D at the aggregate (macro) level but also at the industry level. We will use case studies in, for example, the pharmaceutical sector to study why R&D is such a crucial factor for growth but also difficult to implement and predict its impact on firms and ultimately on the economy. Here, we will also analyze the role of automation and big data (data mining, and machine learning) in R&D.

NOTE: There will be two versions of this course. The afternoon class will be technical and requires significant independent research. The morning class will demand less technical but requires a significant amount of reading. Please also check the math requirements below before you enroll!

Course Materials

Materials

We will rely on a variety of sources of information such as books, newspaper articles, and case studies.

- Reference textbook: Weil David (DW), Economic Growth (2013, 3rd Edition), Pearson Educational.
- Additional textbooks:
    - Acemoglu Daron (DA), Introduction to Modern Economic Growth, Princeton U. Press.
    - Gordon Robert (RGb), The Rise and Fall of American Growth, Princeton U. Press.
    - Tegmark Max (Max), Life 3.0: Being Human in the Age of Artificial Intelligence. Publisher: Knopf.
    - Brynjolfsson Erik and Andrew McAfee (BMc), The Second Machine Age. W.W. Norton & Company.
- Other Material:

- Gordon Robert (RGn), Why Innovation Won't Save Us. The World Street Journal (review article, December 22, 2012). Available at Gordon's website.
- Mokyr J., C. Vickers, and N. Zieberth (MVZ), The History of Technological Anxiety and the Future of Economic Growth: Is This Time Different? Journal of Economic Perspecties, 29, 2015.
- Mokyr J. (Mk), The Next Age of Invention: Technology's future is brighter than pessimists allow.
- Galor Oded (OG), Growth and Comparative Development: An Overview. Slide Presentation (econ department, Brown University).
- Drivers of Productivity and Global Competitiveness. Harvard Business School case # 5-72-037 (March 2012).
- Accounting for Productivity Growth. Harvard Business School case # 9-794-051 (Sept. 1994).
- Strategies for Productivity Growth. Harvard Business School case W16369.
- Schuhmacher A., O. Gassmann, and M. Hinder. Changing R&D models in research-based pharmaceutical companies. Journal of Translational Medicine, 14, 2016.
- Autor David and Anna Salomons (2018), Is Automation Labor-Displacing: Productivity Growth, Employment, and the Labor Share. Brookings Papers on Economic Activity.
- Acemoglu Daron and Pascual Restrepo (2018), Modeling Automation. Working paper MIT.
- ‘’ (2018), The Race between Man and Machine: Implications of Technology for Growth, Factor Shares and Employment. American Economic Review.
- ‘’ (2018), Robots and Jobs: Evidence from U.S. Labor Markets. Working paper MIT.

Evaluation

Evaluation will consist on homework, readings, class presentations/participation, two midterms, and a final exam. The grade distribution is as follows:

Midterm 1	20%
Midterm 2	20%
Final Exam	40%
Homework/readings	10%
Class presentation/participation	10%

You are expected to attend all lectures and be prepared to answer questions related to previous lectures. From time to time, the TA or I will host review sessions on Fridays' afternoon (time TBA). Although attendance to these sessions is not mandatory it is recommended.

There are no makeup midterm exams. If you miss one midterm, the final exam will automatically be 60%. Makeup final exams are exceptional and only due to "serious illness and/or family emergency."

Letter grade equivalence:

A	100 – 95
A-	94 – 90
B+	89 – 85
B	84 – 80
B-	79 – 75
C+	74 – 70
C	69 – 65

D	64 – 50
F	below 50

Requirements

This class uses models to explore economic questions. You are expected to have a strong command of ***calculus*** (preferably two courses of calculus), ***linear algebra***, and ***statistics***. Note that the class will use rigorous models so you need to be familiar with math and statistics. In addition, you must have completed ***macro theory.***

Course Schedule

This is a sketch of the first few weeks of class. Please review Canvas regularly for updated class information.

Week	Topic	Reading	Exercises
1	Facts to be explained	DW chapter 1 RGB chapter 1 OG	
2	Some basics on models/math	DW chapter 2	Self study
3	Physical Capital in the economy	DW chapter 3 DA chapter 2	
4 - 5	Population and Economic Growth	DW chapter 4 DW chapter 5	
6 – 7	Human Capital Taking the Solow Model to the data	DW chapter 6 DA chapter 3	
8	Measuring Productivity	DW Chapter 7 Accounting for Productivity Growth	
9 – 10	Technology and Economic Growth	DW Chapter 8	
11 – 12	Is Growth over?	DW chapter 9 RGn, Mk	
13 - 14	R&D and innovation Case studies from industries		

Exam Schedule

Date	Subject
Midterm 1	tba
Midterm 2	tba
Final	tba