

POPULATION THEORIES AND MODELS

UNIVERSITÀ DI PADOVA
Dipartimento
di Scienze Statistiche

UNIT 0

POPULATION THEORIES AND MODELS 2025-26

INSTRUCTION FOR USE

Who am I?

- **Maria Letizia Tanturri** - instructor of this course.
  - Professor of Demography at the Department of Statistical Sciences (office #161).

- My OFFICE HOUR in the first semester is:
  - Thursday: 11.30-12.30

- e-mail: ml.tanturri@unipd.it
- Tel. 049 8274160



Projects I am working at:

Child ZERO

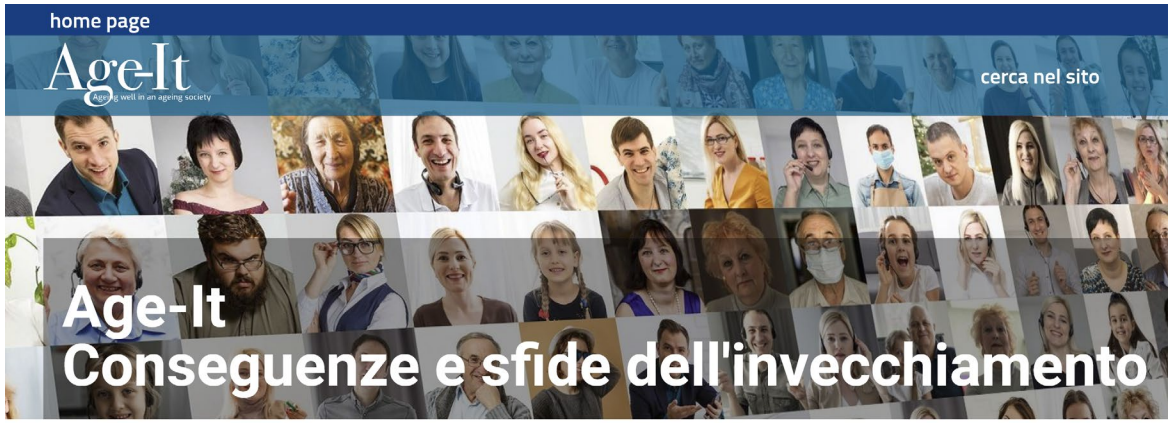
BEHIND THE CHILDLESS BOOM IN ITALY:
INSIGHTS VIA EXPERIMENTAL DESIGN

Study of decision-making mechanisms leading to childlessness by means of a web-based survey

It aims to understand whether Italians' motivations for having children are changing, given various macro factors such as the pandemic, economic uncertainties, geopolitical tensions and climate crises



The project I am working at:



- https://ageit.it/
- Challenge 4 - Trajectories for active and healthy ageing (behavioural and psychological determinants)

Now it is your turn

Who are you ?
Why are you here?



www.wooclap.com/TMD2025

Wooclap link on Moodle

See report Wooclap

What is demography?

- Demography? …once you get to know it, you fall in love with it!

- It's hard, however, for that spark to ignite if the discipline is mainly presented as a cold, technical body of knowledge — a set of tools for measuring population size and structure and for accounting for inflows and outflows.



"The population is the most general framework in which all social facts must be placed"

M. Halbwachs



The heart of the discipline

- The heart of the discipline lies elsewhere, and it is warm.

- It doesn't lie in building indicators, but in the unique interpretative key it offers for understanding the challenges we face in our individual and collective history. (A. Rosina and A. De Rose)



Two perspectives

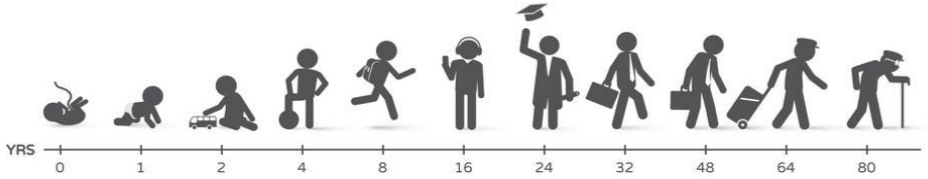
Macro



- It helps us better decipher the specific features and changes of our time, encouraging us to look beyond the present to grasp the medium- and long-term dynamics of the major transformations under way.
- It helps us make decisions.

Micro

- It speaks about us and the choices we make in shaping our lives



The course organisation

- A highly interactive course
- A method that is new to Statistical Sciences but well-established:
  - **Team-Based Learning** (**TBL**, for friends)



- ✓ We meet every other week to work together in class
- ✓ In the weeks you are not in class, you study the assigned material at home

Student-centered teaching



The team of students
is the protagonist
of the learning process



A flipped classroom

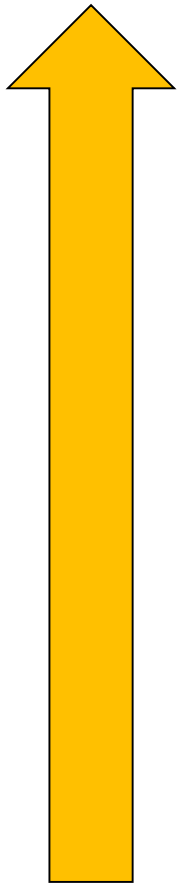


Students will independently study the topics assigned week by week

In class — through engaging hands-on activities carried out in groups — they will apply the knowledge acquired to concrete demographic research problems.



Towards higher learning outcomes



Create	design, formulate, build, invent, create, compose, generate, derive, modify, develop.	*By the end of this lesson, the student will be able to design an original homework problem dealing with the principle of conservation of energy.*
Evaluate	choose, support, relate, determine, defend, judge, grade, compare, contrast, argue, justify, support, convince, select, evaluate.	By the end of this lesson, the student will be able to determine whether using conservation of energy or conservation of momentum would be more appropriate for solving a dynamics problem.
Analyze	classify, break down, categorize, analyze, diagram, illustrate, criticize, simplify, associate.	*By the end of this lesson, the student will be able to* differentiate between potential and kinetic energy.
Apply	calculate, predict, apply, solve, illustrate, use, demonstrate, determine, model, perform, present.	*By the end of this lesson, the student will be able to* calculate the kinetic energy of a projectile.
Understand	describe, explain, paraphrase, restate, give original examples of, summarize, contrast, interpret, discuss.	*By the end of this lesson, the student will be able to* describe Newton's three laws of motion to in her/his own words
Remember	list, recite, outline, define, name, match, quote, recall, identify, label, recognize.	*By the end of this lesson, the student will be able to* recite Newton's three laws of motion.

Learning outcome examples adapted from, Nelson Baker at Georgia Tech: nelson.baker@pe.gatech.edu

Do not be afraid of English!

- My English is certainly not perfect, and yours probably isn't either
- Do not be afraid! Do not be too shy!



- It is a unique occasion to:
  - ✓ learn technical terms,
  - ✓ use the language to comunicate
  - ✓ use the language in a simulate-working-context.

SOMETIMES IT WILL BE CHALLANGING BUT WE WILL HAVE FUN!

Lecture Time-tables

- Term:
  - 22nd September 2026 – 18th December 2026
  - 17th December: pre-test on the syllabus valid for the exam
- Project work :
  - Preparation 7-12-13 January (in classroom if you like, in team, without teacher)
  - Project work presentation (in group): 14th January
- Lectures:
  - Tuesday (14.30-17.30)
  - Wednsday(13.30-16.30)
  - Thursday (8.30-11.30)

} ROOM SC 20



Any problems?

Course general objectives



- The course has two main objectives:

1. to provide thorough and rigorous knowledge of demographic analysis methods and population models

2. to develop the skills needed to select and apply the most appropriate methods to solve real-world cases and make decisions

Course specific objectives



- In particular, considerable attention is given to:

A. the main population theories that attempt to explain demographic change as it has occurred both in developed and developing countries;
B. models emphasizing how population changes as a result of the interaction of multiple demographic processes;
C. tools that allow forecasting the future development of a population;
D. how demographic phenomena can be modelled when statistics are scarce (e.g. developing countries or small areas)

Contents

1) Basic demography recap
2) Mortality models and theories
3) Fertility, nuptiality models and theories, and intermediate fertility variables
4) Migration models and theories
5) Population models
6) Demographic forecasting
7) Indirect estimation with scarce data

Exam format 1

- Final test (multiple-choice) (40%)
- Assignment involving analysis of demographic data applied to case studies (60%)

Students who actively take part in the Team-Based Learning sessions can earn up to **3 bonus points on their final grade**.



Exam format 2

- For **students attending classes**, the final demographic analysis assignment may be replaced by a **project work** (60% of the grade), carried out in groups, involving:

✓reading the essential bibliography on the topic

✓analysis of demographic data to solve a specific problem

✓writing a research report commenting on the results obtained

✓classroom presentation

What do you think about it?



Assessment criteria

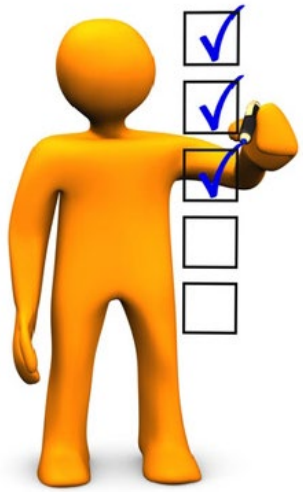
- Your ability to do the following will be assessed:
  - acquire a thorough knowledge of demographic analysis methods
  - critically apply this knowledge to demographic data analysis in order to solve concrete problems
  - critically read scientific literature on certain demographic topics
  - work in a team
  - make decisions
  - present in public and argue your points



Prerequisites

- Those who have never studied Demography can study the fundamental demographic concepts and measures from:

  - Rowland D. T. (2003), Demographic methods and concepts, Oxford University Press (ch. 1, 2,3,4,6,7)

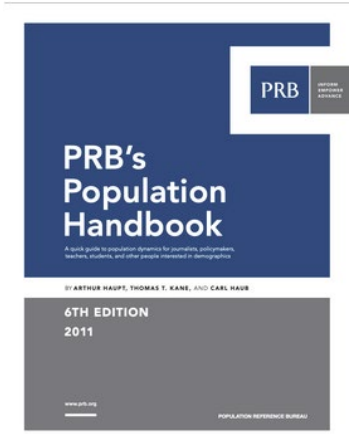


Or alternatively (in Italian):

- Livi Bacci M. , "Introduzione alla demografia", ultima edizione, Loescher Editore.

Prerequisites

- Those who have never studied Demography must necessarily learn the fundamental demographic concepts and measures by studying:



PRB's Population Handbook (6th edition, 2011)



PRB, Population. An introduction to Demography

On Moodle

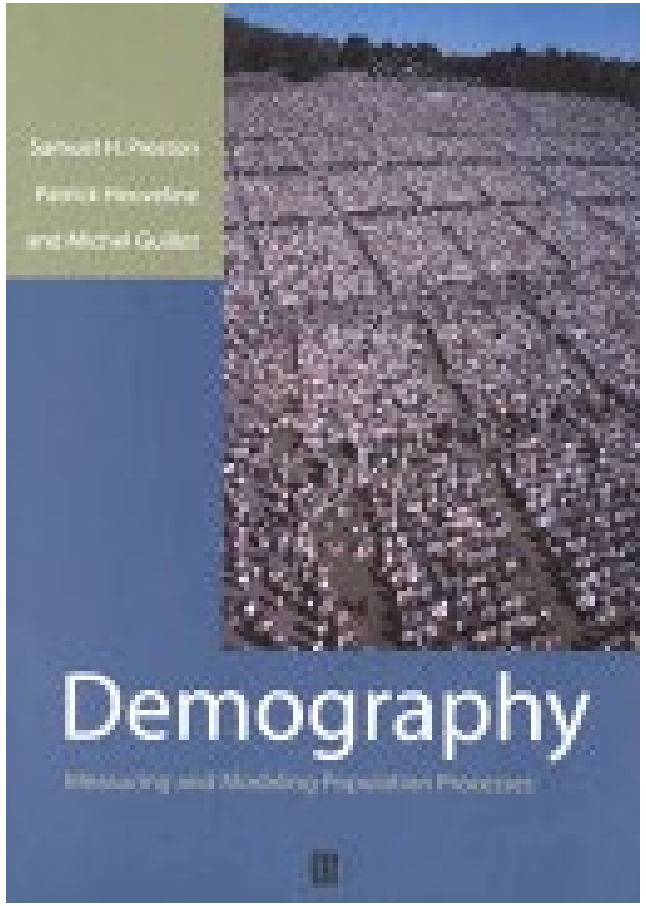
Do not get lost in translation

- If you have doubts on demographic technical language, have a look at:

  ✓Glossary of demografic terms
  ✓Avaialble at: https://www.prb.org/resources/glossary

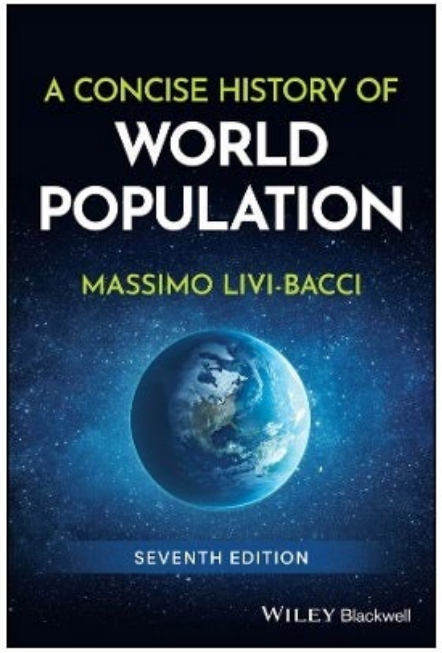


Reference textbooks



- Preston, S.H., P. Heuveline and M. Guillot, 2001, *Demography. Measuring and Modeling Population Processes*, Oxford, Blackwell

Reference textbooks



- For the first part of the course
- Selected chapters on Moodle

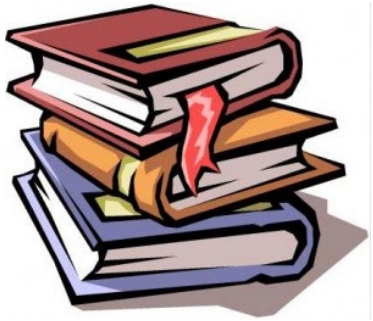
Massimo Livi Bacci (2026), *A concise history of the world population*, Wiley Blackwell

Other Materials & Moodle



- The syllabus, study materials, and slides will gradually be made available on MOODLE STEM: https://stem.elearning.unipd.it/course/view.php?id=16382

- Announcements will appear on the course's Moodle page



Any questions?
Doubts?
Clarification requests?

