Introduction to Demographic Methods
SOC 533 - Winter 2018

Instructor: Emilio Zagheni
E-mail: emilioz@uw.edu
Phone: (206) 616-1173
Office: Savery Hall 235

Lecture: Mon. 3:30-6:20pm
ART 004
Office Hours: by appointment

In this course, we will study fundamental concepts, measures and models that demographers use to understand population dynamics. Demography as a discipline relies on a core methodological component that addresses problems related to i) measuring and estimating population rates; ii) developing models to expand our analytical thinking; iii) formalizing theories; iv) linking individual-level processes with macro-demographic trends; iv) producing forecasts that combine all the available information. The use of demographic methods is constantly changing, as new problems and priorities arise. Some examples of the work that demographers have developed include approaches to understand the determinants of population growth; to evaluate the consequences of changing age structure; to produce estimates of mortality and fertility rates using indirect techniques; to assess the impact of heterogeneity across individuals on population health and mortality; to produce population projections.

The main goal of the course is to familiarize students with tools and concepts that are widely used by demographers and that are essential in order to be able to understand the literature that uses demographic methods.

Prerequisites and Diversity of Student Backgrounds: Students in this class have different backgrounds and come from different departments. Some students may have strong quantitative skills, some others may not. Some students may be familiar with population studies, some others may not. To accommodate the range of backgrounds, I emphasize key methodological concepts and encourage the participation of students who do not have extensive background in methods, but are eager to learn.

The course assumes that students have some familiarity with handling data using a software of their choice (e.g., Excel, R, Stata, SAS). Some homework assignments and the final project require data manipulation. R is among the most suitable programming languages for demographic data analysis. I will provide some examples of tools for demographic research written in R. However, knowledge of R is not necessary to complete the course successfully. Some familiarity with other software, like Excel or Stata, is acceptable. For those who are interested in learning R, I would suggest attending R workshops on campus offered by CSDE, CSSCR or Software Carpentry.

I will assume fluency with high-school mathematics. For part of the material that we cover in this course, basic familiarity with calculus is useful to fully appreciate the derivations and techniques presented. However, it is not necessary: we would review the necessary concepts from calculus along the way.

Textbook: We will use the following book:

Wachter, Kenneth (2014) *Essential Demographic Methods*. Harvard University Press

All the material assigned from this book is required. The textbook is available at the University Bookstore. I recommend that you purchase the book. Alternatively, you could download PDFs of single chapters of the book via JSTOR, through your UW library connection, using the following link:
http://www.jstor.org/stable/j.ctt6wps5v

Additional books that are useful as a reference include:
Preston, S., Heuveline, P., and Guillot, M. (2000). *Demography: Measuring and Modeling Population Processes*.

Keyfitz, N., & Caswell, H. (2005). *Applied Mathematical Demography* (Vol. 47). New York: Springer.

Course Requirements and Grading

Participation & Contribution	10%
Homework Assignments	50%
Term Project	30%
Final Presentation	10%
Total	100%

Class Participation: Class participation will count towards your final grade. Please help create a constructive learning environment. Different people have different ways in which they participate best, all of which are valid: thoughtful preparation, sharing a well-formulated idea after a long pause, stimulating discussion through questions, helping a classmate understand a concept, discussing ideas and challenges during office hours, sharing news articles with the class via canvas, etc. I strongly encourage you to interact with me and the other students. Please listen to your peers, wait for your turn to speak, and refrain from using discriminatory language. If you are very talkative, make sure that your quieter peers get a chance to speak. If you are shy, remember that if you have a question, most likely there is at least one other person with the same question who would be happy to listen to the answer.

Homework assignments: There will be homework assignments every week. Most of the assignments will include problem sets where you will be asked to answer questions, like the ones at the end of the book chapters. These are typically "paper and pencil" type of problems, that you would be able to address with the help of a hand calculator. Some assignments may include questions where you will be asked to automate demographic methods discussed in class using a software or programming language of your choice. For some assignments, you will be asked to read a journal article that uses demographic methods and to write a summary of the key concepts and a critical review. You may work in small groups (2-3 people) on the assignments, but each person of the group must submit a copy of the assignment and report the names of all the group participants.

Term Project: You are expected to develop your own term project for this class. There are three main options for the project:
1) You can write a research paper that uses a demographic method to address a substantive topic relevant for your own research;
2) You can replicate an existing paper that uses demographic methods;
3) You can produce a tool for demographic research: for example you can produce a mini R package that implements a series of demographic methods, provide examples of applications on real data, and write a report that describes the package.

You may work in small groups (2-3 people) for the term project, or you can work individually. Please discuss with me your choice of topic and format for the term paper. On the last day of the course you will be asked to make a brief presentation of your project.

Final Presentation: On the last day of the course you will present your term project to the class. This is an opportunity for you to receive feedback from fellow students in the class, and for everyone to be exposed to a number of substantive topics and applications of demographic methods.

Students with Disabilities

Please inform me as soon as possible of special needs that you may have.
The sooner you notify me, the better I will be able to make appropriate arrangements.

Academic Integrity

A fundamental tenet of all educational institutions is academic honesty. Students must do all their work within the boundaries of acceptable academic norms. See the UW statement about student academic responsibility prepared by Committee on Academic Conduct in the College of Arts and Sciences (https://depts.washington.edu/grading/pdf/AcademicResponsibility.pdf). Students found guilty of plagiarism or academic dishonesty will be subject to appropriate disciplinary actions.

Approximate Course Schedule

Week 1 **Mon, Jan 8th – Introductions; models of population growth; periods and cohorts; balancing equation; person-years; doubling times; the stationary population identity**

Textbook Reference: Chapter 1 of Wachter (2014)

From the literature:
Lee, R. D. (1987). Population dynamics of humans and other animals. *Demography*, *24*(4), 443-465.

Week 2 **Mon, Jan 15th –** Martin Luther King Day – No Class

Week 3 **Mon, Jan 22th – The structure of demographic rates; cohort mortality and cohort life tables**

Textbook Reference: Chapters 2 and 3 of Wachter (2014)

From the literature:
Ryder, N. B. (1965). The cohort as a concept in the study of social change. *American Sociological Review*, 843-861.

Week 4 **Mon, Jan 29th – Hazard rates, Gompertz model, Cohort fertility rates and parity progression ratios**

Textbook Reference: Chapters 3 and 4 of Wachter (2014)

From the literature:
Carey, J. R. (1997). What demographers can learn from fruit fly actuarial models and biology. *Demography*, *34*(1), 17-30.

Week 5 **Mon, Feb 5th – Population Projections; Transition matrices and Leslie Matrices**

Textbook Reference: Chapter 5 of Wachter (2014)

From the literature:
Raftery, A. E., Li, N., Ševčíková, H., Gerland, P., & Heilig, G. K. (2012). Bayesian probabilistic population projections for all countries. *Proceedings of the National Academy of Sciences*, *109*(35), 13915-13921.

Samir, K. C., Barakat, B., Goujon, A., Skirbekk, V., Sanderson, W. C., & Lutz, W. (2010). Projection of populations by level of educational attainment, age, and sex for 120 countries for 2005-2050. *Demographic Research*, *22*, 383-472.

Week 6 **Mon, Feb 12th – Period Fertility; Tempo and Quantum**

Textbook Reference: Chapter 6 of Wachter (2014)

From the literature:
Bongaarts, J., & Feeney, G. (1998). On the quantum and tempo of fertility. *Population and Development Review*, 271-291.

Week 7 **Mon, Feb 19th –** Presidents Day – No Class

Week 8 **Mon, Feb 26th: Period mortality; Brass relational model; Lee-Carter model**

Textbook Reference: Chapter 7 of Wachter (2014)

From the literature:
Lee, R. D., & Carter, L. R. (1992). Modeling and forecasting US mortality. *Journal of the American Statistical Association*, *87*(419), 659-671.

Week 9 **Mon, March 5th – Stable Age Structures**

Textbook Reference: Chapter 10 of Wachter (2014)

From the literature:
Goodman, L. A., Keyfitz, N., & Pullum, T. W. (1974). Family formation and the frequency of various kinship relationships. *Theoretical Population Biology*, *5*(1), 1-27.

Term project due on Mon, March 12 at 3:30pm via Canvas

Final presentations will be during the time slot allocated for the final exam (Thursday, March 15, 2018, 630-820pm) **unless we can find a day/time that is more convenient for everyone in the class.**