

**ECON 125**  
**The Science of Population**  
**Syllabus**

Time and place: Tu/Th 9:30 am – 10:50 am @ SOLIS 104

Course webpage: <https://canvas.ucsd.edu/courses/64684>

Course GitHub repository: <https://github.com/tomvogl/econ125>

Professor: Tom Vogl

E-mail: [tvogl@ucsd.edu](mailto:tvogl@ucsd.edu)

Office hours: Th 3:00 pm – 4:00 pm @ SDSC E-194 (except week 1)

Teaching assistant: Regina Calles Martinez

E-mail: [rcallesmartnez@ucsd.edu](mailto:rcallesmartnez@ucsd.edu)

Problem set labs: Wed 5:30 pm – 7:30 pm @ SSB 107 (problem set weeks only)

Grader: Grace Alster

E-mail: [gralster@ucsd.edu](mailto:gralster@ucsd.edu)

## **COURSE DESCRIPTION**

Explores how to measure and understand the forces that shape human population and its interaction with the social, economic, and natural environments. Topics include the growth rate and structure of the population, as well as mortality, fertility, migration, and their drivers. Emphasizes hands-on analysis of demographic data using statistical programming. Applications focus on differences between the past and present, between rich and poor countries, and between racial and ethnic groups within the US. Prerequisite: an introductory statistics course (ECON 120A, ECE 109, MAE 108, MATH 11, MATH 181A, MATH 183, PSYC 60, or another statistics course by EASy request).

## **ASSIGNMENTS**

The course assigns **ten readings and five problem sets**. You must complete each week's reading before the first class of the week. Problem sets involve analysis using R. For the code, you are encouraged to collaborate in groups of five or fewer. For the written answers, you must work independently. If your written answers are identical to a classmate's, you will receive 0 points; we will report repeat offenders to the Academic Integrity Office. Late problem sets are not accepted, but your lowest problem set grade is dropped.

## **EXAMS**

The course has a **midterm** and a **final**, both written and in-person. You may bring one page of handwritten notes. Your midterm score will be dropped if it helps your grade.

## PARTICIPATION

Participation matters for your course grade. You are expected to attend class regularly. Beyond attendance, participation can take many forms. Some students ask questions during lecture; others active during discussions about readings; others come to office hours with questions.

## GRADING

Letter grades are assigned on a curve based on a weighted average of performance. The curve follows typical economics department standards. The weighted average is 10% participation, 40% problem sets, and (20% midterm, 30% final) or (0% midterm, 50% final).

## ACADEMIC INTEGRITY

Academic Integrity means striving to learn the course material and not copying others' work.

- For problem set coding, academic integrity means working together and contributing to the group effort, **not** just waiting for everyone else to do all the work.
- For problem set write-ups, academic integrity means using your own words to demonstrate your understanding, **not** copying someone else's words or thoughts.
- For the midterm and final, academic integrity means demonstrating your own understanding of the course material, **not** using others' notes as your own, looking at others' responses, or communicating with others during the exam.

Academic Integrity is important because it is fair and ensures the value of a UCSD diploma. We will grade fairly and report violations of academic integrity as needed.

## INFORMATION ABOUT R

In class and on problem sets, we will use **R**, **RStudio**, **tidyverse**, and **R Markdown**.

- **R** is a statistical programming language
- **RStudio** provides a convenient user interface for it
- **Tidyverse** is a collection of R packages for data transformation and visualization
- **R Markdown** is an R package that creates documents with text, code, and output

Problem Set 1 will guide you through the setup process. Classroom examples will demonstrate all the programming tools you need for the problem sets, but here are a few additional resources:

- [R for Data Science](#) provides a general introduction to R and the tidyverse.
- [R Markdown: The Definitive Guide](#) has details on R Markdown.
- [ChatGPT](#) is very good at coding in R, and you are welcome to use it for help.
- [Cheat sheets](#) in the course GitHub repository provide quick reference but are very dense.

## TENTATIVE SCHEDULE

### Week 1 (4/1, 4/3): Growth

Topics: Population growth; demographic transition; balancing equation.

Data exercise: World population growth and its components since 1950.

Reading: [Lee, Ronald. \(2002\). "The demographic transition: three centuries of fundamental change." \*Journal of Economic Perspectives\* 17\(4\): 167-190.](#)

### Week 2 (4/8, 4/10): Mortality

Topics: Mortality rates; age-adjustment; life expectancy; socioeconomic determinants.

Data exercise: Mortality rates and life expectancy across countries.

Reading: [Cutler, David, Angus Deaton, and Adriana Lleras-Muney. \(2006\). "The determinants of mortality." \*Journal of Economic Perspectives\* 20\(3\): 97-120.](#)

**Problem Set 1 (lab 4/9, due 4/10):** Introduction to R and RStudio.

### Week 3 (4/15, 4/17): Disease

Topics: Cause of death; morbidity; prevalence and incidence; adjusted life years.

Data exercise: Tracking the HIV/AIDS pandemic.

Reading: [GBD 2021 Causes of Death Collaborators. \(2024\). "Global burden of 288 causes of death and life expectancy decomposition in 204 countries and territories and 811 subnational locations, 1990–2021." \*Lancet\*.](#)

### Week 4 (4/22, 4/24): Fertility

Topics: Fertility rates; fertility transition; demand for children; wanted/unwanted fertility.

Data exercise: Fertility rates by race and ethnicity in the US.

Reading: [Bongaarts, John, and John Casterline. \(2013\). "Fertility transition: Is Sub-Saharan Africa different?" \*Population and Development Review\* 38\(S1\): 153-186.](#)

**Problem Set 2 (lab 4/23, due 4/24):** Mortality change in the United States.

### Week 5 (4/20, 5/1): Family

Topics: Marriage, family structure.

Data exercise: none.

Reading: [Jones, Gavin W. \(2007\). "Delayed marriage and very low fertility in Pacific Asia." \*Population and Development Review\* 33\(3\): 453-478.](#)

**Midterm Exam (5/1):** covering weeks 1 – 4

### Week 6 (5/6, 5/8): Gender

Topics: Son preference; sex differences in morbidity and mortality.

Data exercise: Sex ratios and son-biased fertility stopping in India.

Reading: [Bongaarts, John, and Christophe Guilmoto. \(2015\). "How many more missing women? Excess female mortality and prenatal sex selection, 1970-2050." \*Population and Development Review\* 41\(2\): 241-269.](#)

**Problem Set 3 (lab 5/7, due 5/8):** Fertility across countries.

**Week 7 (5/13, 5/15): Migration**

Topics: US immigration past and present, rural-urban migration.

Data exercise: Selectivity of Mexico-US migrants.

Reading: [Abramitzky, Ran, and Leah Boustan. \(2017\). "Immigration in American economic history." \*Journal of Economic Literature\* 55\(4\): 1311-1345.](#)

**Week 8 (5/20, 5/22): Aging**

Topics: Population pyramids, old-age support, demographic dividend.

Data exercise: Age structure in Asia.

Reading: [Bloom, David E., and Dara Lee Luca. \(2016\). "The global demography of aging: facts, explanations, future." In John Piggott and Alan Woodland, eds., \*Handbook of the Economics of Population Aging, Vol. 1\*. Amsterdam: North-Holland, pp. 3-56.](#)

**Problem Set 4 (lab 5/21, due 5/22):** Immigration and the composition of the US population.

**Week 9 (5/27, 5/29): Time**

Topics: Age-period-cohort analysis, Lexis diagram.

Data exercise: Cohorts and life cycles in China.

Reading: [Case, Anne, and Angus Deaton. \(2017\). "Mortality and morbidity in the 21<sup>st</sup> century." \*Brookings Papers on Economic Activity\* Spring: 397-476.](#)

**Week 10 (6/3, 6/5): The Future**

Topics: Population decline; regional/religious distribution; environmental/economic effects.

Data exercise: none.

Reading: [United Nations Population Division \(2024\). \*World Population Prospects 2024: Summary of Results\*. UN DESA/POP/2024/TR/NO. 9](#)

**Problem Set 5 (lab 6/4, due 6/5):** Age-earnings profiles in Mexico and the US.

**Final Exam (8am – 11 am, 6/10):** covering weeks 1 – 10