

PAA 2025 One-Day Short Course
Subnational Bayesian Population Projections: Theory and Practice
Westin Washington D.C. Downtown, Meeting Room 2
April 10, 2025; 8:00am-5:00pm

Instructors: Adrian Raftery and Hana Ševčíková (University of Washington)

The instructors are members of the research group that developed the methods to be taught in the course (<http://bayespop.csss.washington.edu>).

Course description: Population projections have traditionally been done deterministically using the cohort component method, yielding a single value for each projected future population quantity of interest. Over the past decade, the United Nation Population Division has adopted a probabilistic approach to project fertility, mortality, migration and population for all countries. In this approach, the total fertility rate, female and male life expectancy at birth, and net migration rates are projected using Bayesian hierarchical models estimated via Markov Chain Monte Carlo. These are then combined with a cohort component model which yields probabilistic projection for any quantity of interest. The methodology is implemented in a suite of R packages which has been used by the UN analysts producing the most recent revision of the World Population Prospects. More recently the methods have been extended to be applied to subnational population projections for states and counties.

This course will teach the theory and practice behind Bayesian subnational population projections. Ideas of the Bayesian hierarchical modeling will be explained. In hands-on exercises, students will become familiar with the functionality of the R packages. By the end of the course, they will have a basic understanding of the methods, be able to generate projections using their own data, and visualize probabilistic projections for many quantities of interest using various output formats, such as graphs, tables, maps, and pyramids.

Schedule:

8:00-8:30am	Check-in
8:30-10:00am	1. Review of population projections and Bayesian hierarchical models
10:00-10:30am	Coffee break
10:30am-12:00pm	2. Bayesian projection of fertility, mortality, migration and population
12:00-1:30pm	Lunch break
1:30-3:00pm	3. Subnational probabilistic population projections
3:00-3:30pm	Coffee break
3:30-5:00pm	4. Computer lab

Course prerequisites: Students are expected to have taken at least a basic first year graduate statistics sequence, and to have a basic familiarity with R. Students should bring their laptops with R installed. They are encouraged to download, install and experiment with the `bayesTFR`, `bayesLife` and `bayesPop` R packages before the course. It would be helpful, but not essential, for students to learn some basic Bayesian statistics, or refresh their knowledge, before the course.

Registration: Participants will register for the course as part of the registration for the PAA Annual Meeting. There will be a maximum of 50 places, allocated on a first come first served basis.