



IMPRS-PHDS elective course

IDEM 104

Multistate Models: Analysis from event histories and panel data

Course coordinator: Jutta Gampe

Start: 13 May 2024

End: 17 May 2024

Location: Max Planck Institute for Demographic Research. Onsite-only course.

Instructors:

- Jutta Gampe, MPIDR
- Hein Putter, Leiden University Medical Center
- Ardo van den Hout, University College London

Course description

The life course of individuals can be conceived as a sequence of transitions between different states, for example

- from being healthy to being ill, possibly recovering, and finally to death or
- from living in parental home to living alone, cohabiting with a partner, with or without children, to perhaps living in an institution until death.

The aim of life course analysis is to understand the timing and sequence of transitions as well as the risk factors that accelerate or slow down transitions. Multistate models are the statistical framework to analyze life course patterns and to study and predict resulting population dynamics.

In this 4.5-days course the participants will be introduced to the concepts of multistate models and will learn how to estimate the essential quantities in the two most frequently encountered data situations: Event-histories, for which the exact times of transitions are known, and panel data, where observations are only made at (more or less) regular points in time, leading to interval-censored data.

The course will start with a brief recap of standard survival analysis on which many of the concepts in multistate modeling are based. Moving beyond two-state models the core concepts will be introduced. Besides the estimation of the key parameters, the transition intensities, derived quantities, such as expected lengths of stay in particular states, will be discussed. Selecting and validating well-fitting models,

assessing uncertainty of estimates and illustrative presentation of results will also be covered.

There will be an opportunity for participants to present own research ideas within the scope of multistate models.

Organization

The course will be a mix of lectures and computer practicals, with about five hours of teaching per day. In general, students should devote about 6-8 hours per day to the course (lectures, computer practicals, readings). The course will be held on site at the MPIDR. We will use the statistical software R.

Target audience and prerequisites

The course addresses demographers and researchers from related disciplines such as epidemiology or other social sciences. Participants should be enrolled in a PhD program or have received their PhD. Participants should have a good working knowledge of standard survival analysis and be familiar with the software R. Students are expected to bring their own laptops with the most recent version of R and an appropriate editor (e.g. Rstudio) installed.

Examination

Students who will attend the course can obtain a certificate on the basis of a take-home assignment which will be handed out towards the end of the course.

General readings

- Putter, Fiocco, Geskus (2007). Tutorial in biostatistics: competing risks and multi-state models. *Statistics in Medicine*. <https://doi.org/10.1002/sim.2712>
- van den Hout (2017). *Multi-State Survival Models for Interval-Censored Data*. Chapman & Hall/CRC Monographs on Statistics and Applied Probability

A list with additional references will be distributed to the participants. Slides and R-code used in the lectures will be made accessible, too.

Financial support

There is no tuition fee for this course. Travel and accommodation expenses for admitted PHDS students will be covered by the MPIDR.

Application instructions for PHDS students and MPIDR scientific staff

A maximum of 20 students will be admitted to the course.

There is an expedited application procedure for PHDS students and MPIDR scientific staff (pre-docs and post-docs).

- If you would like to enroll for this course, please send an email to phds@de-mogr.mpg.de. Begin your email message with a statement saying that you

- apply for course IDEM 104 – Multistate Models. You must also include a statement of motivation (PDF) that includes the following.
- A paragraph about how your research relates to the topic of the course (half a page or less);
 - a paragraph about how you meet the prerequisites for this course (half a page or less).
- Application deadline is February 16, 2024.
 - Applicants will be informed of their acceptance by March 1, 2024.

Recruitment of students external to the IMPRS-PHDS network

Since there are only 20 seats available, we will initially offer them to our PHDS students as well as MPIDR scientific staff (pre-docs and post-docs). After the PHDS students and MPIDR scientific staff are accommodated, we will offer the remaining seats (if any) to pre-docs and post-docs from elsewhere through our [IDEM website](#).

Email inquiries about the course and the application process should be sent to phds@demogr.mpg.de.