

Swiss Epidemiology Winter School 2023



Competing Risks and Multi-state Models

19 – 21 January 2023

Faculty

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Venue

CH – 3823 Wengen | SWITZERLAND

Hotel Edelweiss (see map on <https://www.epi-winterschool.org/course-hotel-locations/>)

Description

This course will focus on the use of parametric survival models, when analysing data with competing risks, and the general setting of multi-state models. Competing risks models play an increasingly important role for predicting absolute risks of disease and prognosis using time to event data. An overarching goal of this course is to provide a solid introduction to important concepts when performing a competing risks analysis (e.g., which quantities can be estimated and what they do represent) as well as practical aspects of estimation. Multi-state models provide an extension of competing risks models that also enable modelling of complex disease profiles. By modelling transitions between disease states, accounting for competing events at each transition, we can gain an improved understanding of a patient's prognosis and how risk factors impact over the whole disease pathway. Throughout the course we will place emphasis on the use of flexible parametric survival models that incorporate restricted cubic splines on the log hazard or log cumulative hazard scale. This will include models with time-dependent effects (non-proportional hazards). We will focus on obtaining clinically useful and directly interpretable predictions, which are particularly useful for more complex models, but also describe the challenges and various approaches to calculating them. We will also discuss assumptions of the models, including the Markov assumption and how this can be relaxed. The course will be taught using Stata making use of the multistate and merlin packages.

Objectives

By the end of this course participants will have:

- An understanding of how to fit and interpret flexible parametric survival models, including Royston-Parmar models.
- An understanding of fitting and interpreting time-dependent effects.

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- An understanding of competing risks models and how to estimate cumulative incidence functions non-parametrically and using parametric models.
- An understanding of how to construct, analyse and interpret a multi-state model.
- An understanding of the variety of useful measures that can be obtained from multistate models.
- Practical experience of fitting the models using Stata®.

Target audience Course participants should be familiar with standard survival models, such as the Cox model and/or parametric survival models (e.g. Weibull) and be interested in extending their knowledge to the more complex issues of competing risks and multistate models.

The course will discuss the theory but emphasis will be placed on applying and interpreting the methods.

Outline The course will run over three days and consist of lectures, computer practical sessions. We start early in the morning with a review of the previous day. During the extended break in the afternoon participants review course materials, catch up on emails or go skiing. We reconvene at 4:30 pm for the computer sessions.

Thursday, 19 January 8:00 – 12:00 | 16:30 – 18:30

- Brief review of time-to-event data including the Cox model
- Flexible parametric survival models
- Modelling competing risks
- Estimating cumulative incidence functions

Friday, 20 January 8:00 – 12:00 | 16:30 – 18:30

- Introduction to multi-state models
- The illness death model
- The Markov assumption
- Stacked versus separate models
- Estimating contrasts between groups

Saturday, 21 January 8:00 – 12:00 | 13:00 – 15:00

- Expected length of stay in different states
- Resetting the clock and semi-Markov models
- Standardisation in multi-state models
- Reporting of competing risks and multi-state models

Credits 1.0 ECTS

To bring along Students should bring their own portable computers. A course license for Stata® will be available, to be installed before arrival. University of Bern IT staff onsite can provide help upon request per e-mail (it@ispm.unibe.ch)

Course book Patrick Royston and Paul C. Lambert (2011) *Flexible Parametric Survival Analysis Using Stata: Beyond the Cox Model*, Stata Press

Course fee

PhD Bern Students:	CHF 700
Academic:	CHF 900
Industry:	CHF 2000

Registration You can register on the Winter School website www.epi-winterschool.org.

Accommodation Participants must book their accommodations themselves. Please see our recommendations on <https://www.epi-winterschool.org/course-hotel-locations/> for special prices.