



## Parametric Competing Risks and Multi-state models:

January 15<sup>th</sup> – 17<sup>th</sup>, 2018

### Course description

#### Faculty

**Prof. Paul Lambert**

University of Leicester and Karolinska Institutet

**Dr Michael Crowther**

Biostatistics Research Group, Department of Health Sciences, University of Leicester, UK

#### Place

**CH – 3823 Wengen | SWITZERLAND**

Room Sunstar (see map on <http://www.epi-winterschool.org/hotels>)

#### Introduction

This course will focus on the use of parametric survival models when analysing data with competing risks and then extending to multi-state models. Multi-state models are increasingly being used to model complex disease profiles. By modelling transitions between disease states, accounting for competing events at each transition, we can gain an improved understanding of patients prognosis and how risk factors impact over the whole disease pathway. 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 use an efficient and generalizable simulation method to obtain clinically useful and directly interpretable predictions, which are particularly useful for more complex models. 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 package.

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

Course participants should be familiar with standard survival models, such as the Cox model and/or parametric survival models (e.g. Weibull).

#### Contact:

University of Bern | Institute of Social and Preventive Medicine

Finkenhubelweg 11

3012 Bern | Switzerland

[www.epi-winterschool.org](http://www.epi-winterschool.org) | [winterschool@ispm.unibe.ch](mailto:winterschool@ispm.unibe.ch)

<b>Course objectives</b>	<p>By the end of this short course participants will have</p> <ul style="list-style-type: none"> <li>• An understanding of how to fit and interpret flexible parametric survival models, including Royston-Parmar models.</li> <li>• An understanding of fitting and interpreting time-dependent effects.</li> <li>• An understanding of competing risks models and how to estimate cumulative incidence functions using parametric models.</li> <li>• An understanding of how to construct, analyse and interpret a multi-state model.</li> <li>• An understanding of the variety of useful measures that can be obtained from multistate models.</li> <li>• Practical experience of fitting the models using Stata®.</li> </ul>									
<b>What you have to bring</b>	<p>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 on Sunday night.</p>									
<b>Outline of course</b>	<p>The course will run over three days and consists of a combination of lectures and computer practical. During the extended break in the afternoon, participants review course materials, catch up on emails or go skiing.</p> <p><b>Monday, January 15th</b></p> <ul style="list-style-type: none"> <li>• Brief Review of time-to-event data including Cox</li> <li>• Flexible Parametric Survival Models</li> <li>• Modelling competing risks</li> <li>• Estimating cumulative incidence functions</li> </ul> <p><b>Tuesday, January 16th</b></p> <ul style="list-style-type: none"> <li>• Introduction to multistate models</li> <li>• The illness death model</li> <li>• The Markov assumption</li> <li>• Stacked versus separate models</li> <li>• Extending the simulation approach for multistate models</li> <li>• Performing contrasts between groups</li> </ul> <p><b>Wednesday, January 17th</b></p> <ul style="list-style-type: none"> <li>• Expected length of stay in different states</li> <li>• Resetting the clock and semi-Markov models</li> <li>• Shared covariate effects between transitions</li> <li>• Standardisation in multistate models</li> </ul>									
<b>Credit</b>	1.5 ECTS									
<b>Course book</b>	Patrick Royston and Paul C. Lambert (2011) <i>Flexible Parametric Survival Analysis Using Stata: Beyond the Cox Model</i> , Stata Press									
<b>Course fee</b>	<table> <tr> <td>SSPH+:</td> <td>CHF</td> <td>0</td> </tr> <tr> <td>Academic:</td> <td>CHF</td> <td>900</td> </tr> <tr> <td>Industry:</td> <td>CHF</td> <td>2000</td> </tr> </table>	SSPH+:	CHF	0	Academic:	CHF	900	Industry:	CHF	2000
SSPH+:	CHF	0								
Academic:	CHF	900								
Industry:	CHF	2000								
<b>Registration</b>	You can register on the Winter School website <a href="http://www.epi-winterschool.org">www.epi-winterschool.org</a> .									
<b>Course hotels</b>	Participants must book their accommodations themselves (see map and recommendations on <a href="http://www.epi-winterschool.org/hotels">www.epi-winterschool.org/hotels</a> ).									