

## HOW to REGISTER

**step 1)** fill in the application form on the website: <http://www.summerschoolbicocca.com/statisticals2020.php> and wait for the acceptance letter.

**step 2)** proceed to payment by credit card or bank transfer as explained in the acceptance letter.

Registration will be effective ONLY after completion of step 2).

Maximum number of participants is 30. Applications are considered in order of receipt.

Eight places are reserved to PhD students. To apply you have to upload in **step 1)** a supervisor's letter.

One scholarship for participation of a PhD student is provided by the The Doctoral School of the University of Milano-Bicocca. To apply you have to upload in **step 1)** a short letter (max 200 words) describing how your PhD project relates to the topic of the course. Deadline for application is **15 December**.

**DEADLINE for REGISTRATION**  
**20 December 2019**

## REGISTRATION FEE

Inclusive of teaching material, bus transfer, hotel accommodation and meals (from dinner of the 1<sup>st</sup> of March to the breakfast of the 6<sup>th</sup> March).

General participant:	1400 €
PhD student:	1100 €
IBS/SISMEC/ISCB member:	1300 €

## REGISTRATION CANCELLATION POLICY

By contacting the secretariat by the 31<sup>st</sup> of January 2019. Fifty euros will be kept as a non-refundable processing fee.

## OBJECTIVES of the COURSE

The general aim is to provide an introduction to statistical methods for the analysis of longitudinal and life history data. An emphasis will be given to the kinds of data arising in epidemiology and public health research, with some issues being specific to the analysis of data from clinical studies.

We will begin with a focus on common approaches for the analysis of repeated measurements from individuals over common scheduled assessment times, including mixed effects models, generalized estimating equations, and autoregressive models. Models and methods will then be discussed for the analysis of life history data obtained from continuous observation of individuals who are subject to right-censoring. The assumptions justifying the various approaches to analysis will be highlighted, and the interpretation of covariate effects and other possible estimands will be emphasized. Recurring themes will include robustness, the implications of a dependence between the longitudinal or life history process and the observation process (i.e. missing data, censoring and informative observation mechanisms), and causal inference. Substantive examples from medical science will be used throughout the course to motivate the methods and illustrate the different interpretations given to estimates of intervention and other covariate effects. R code and selected output will be provided in worked examples.

## COORDINATORS

Maria Grazia Valsecchi and Laura Antolini  
Center of Biostatistics for Clinical Epidemiology  
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## SECRETARIAT

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**UNIVERSITY OF MILANO-BICOCCA**  
**SCHOOL OF MEDICINE AND SURGERY**  
Center of Biostatistics for Clinical Epidemiology



*Statistical Alps*  
*Winter course on medical statistics.....in the Alps*  
**9<sup>th</sup> Edition**

## THE ANALYSIS OF LONGITUDINAL AND LIFE HISTORY DATA

**Richard Cook**

Professor of Statistics in the Department of Statistics and Actuarial Science at the University of Waterloo, Canada

**Daniel Farewell**

Reader in Statistics in the School of Medicine at Cardiff University, UK

**BICOCCA WINTER SCHOOL, BICOCCA DOCTORAL SCHOOL, PhD in PUBLIC HEALTH**

**1 – 5 March 2020**

**PONTE DI LEGNO – BRESCIA, ITALY**

With the endorsement of



International Biometric Society



Società Italiana di Statistica Medica ed Epidemiologia Clinica



International Society for Clinical Biostatistics

## PROGRAM

### ARRIVAL - 1 MARCH 2020

19.30	Registration
20.00	Welcome Dinner

### 1<sup>ST</sup> DAY – 2 MARCH 2020 LONGITUDINAL DATA ANALYSIS VIA HIERARCHICAL AND MARGINAL MODELS

9.00:13.00	The assumptions underlying the formulation of hierarchical random effects models will be covered along with the construction of likelihoods; software will be discussed and applied to illustrative examples.
14.30:16.00	Robustness properties of marginal models and the theory of generalized estimating equations will then be covered with applications given to illustrate how to fit such semiparametric methods; the differences in the interpretation of estimators from the random effect and marginal formulations will be contrasted.
16.30:18.30	

### 2<sup>ND</sup> DAY – 3 MARCH 2020 TRANSITIONAL ANALYSIS OF LONGITUDINAL DATA

9.00:13.00	The formulation of models and likelihoods will be discussed based on conditional (autoregressive) analyses of continuous and discrete data in discrete time; the latter will introduce Markov and semi-Markov models and generalizations
14.30:16.00	Continuous time processes will be considered for categorical data (i.e. discrete state spaces). Intensity functions will be defined and likelihoods will be constructed in a general way for right censored data.
16.30:18.30	

### 3<sup>RD</sup> DAY – 4 MARCH 2020 RECURRENT EVENT AND MULTISTATE MODELS

8.30:12.30	Particular types of multistate processes will be covered including recurrent event, competing risk, illness-death, and more general multistate processes. Software will be presented and the interpretation, strengths, and limitations of analyses based on intensity functions, rate functions and other marginal features; these will be discussed from both the conceptual standpoint and through applications.
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### 4<sup>TH</sup> DAY – 5 MARCH 2020 CHALLENGES WITH INCOMPLETE DATA

9.00:12.30	The general theme for this day is the challenge of incomplete data arising from intermittent observation of continuous-time processes. Methods for the analysis of longitudinal data will be covered in which the observation times are irregularly spaced.
14.00:16.00	Methods for fitting multistate models under intermittent observation will then be discussed with a particular emphasis on Markov models. The assumptions justifying the use of standard methods will be highlighted along with methods which can accommodate some form of dependence between the response and observation processes.

19.30	Course closure – Social Dinner
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### DEPARTURE - 6 MARCH 2020

8.30	Departure from Hotel
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### TUTORIALS:

Illustrative analyses using R and discussion

## PREREQUISITES

Basic knowledge of survival analysis.

## TUTORS

Davide Bernasconi and Elena Tassistro  
Center of Biostatistics for Clinical Epidemiology –  
School of Medicine and Surgery  
University of Milano-Bicocca

Participants will have the possibility to:  
-Enjoy winter sports in the surrounding  
-Spend time for individual study during the half day break.

## COURSE VENUE

Hotel Mirella \*\*\*\*  
Via Roma 21, Ponte di Legno (BS)  
Tel: +39.0364.900500 - Fax: +39.0364.900530  
<http://www.hotelmirella.it>

## COURSE WEB PAGE AND SOCIAL LINKS

Web (registration)  
<http://www.summerschoolbicocca.com/statisticalps2020.php>  
Facebook (general information)  
<https://www.facebook.com/Statisticalps-Course-on-Medical-Statistics-9th-edition-2243932959157446/>  
Twitter (general information)  
[@StatisticAlps](https://twitter.com/StatisticAlps)  
Moodle (teaching material)  
<https://elearning.unimib.it/course/view.php?id=26715>