HOW to REGISTER

step 1) fill in the application form on the website: https://summerschoolbicocca.com/24_statisticalps.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 35. Applications are considered in order of receipt.

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

The support for registration of one PhD student is provided by 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 **24 May 2024**.

DEADLINE for REGISTRATION
21 June 2024

REGISTRATION FEE

Inclusive of teaching material, bus transfer, hotel accommodation and meals (from dinner of September 1st to breakfast of September 6th).

General participant:	**1550** €
PhD student:	**1200** €
IBS/SISMEC/ISCB member:	**1400** €

REGISTRATION CANCELLATION POLICY

By contacting the secretariat by **31 July 2024**. Fifty euros will be kept as a non-refundable processing fee.

OBJECTIVES of the COURSE

The course provides methods for estimating the shape of the relationship between predictors and response, with appropriate checking of underlying assumptions and avoiding overfitting.

Methods for data reduction will be introduced, to deal with the common case where the number of potential predictors is large in comparison with the number of observations.

Methods of model validation (bootstrap and cross–validation) will be covered, as will auxiliary topics such as modeling interaction surfaces, efficiently utilizing partial covariable data by using multiple imputation, variable selection, overly influential observations, collinearity, and shrinkage.

The methods covered will apply to almost any regression model, including ordinary least squares, longitudinal models, logistic regression models, ordinal regression, quantile regression and survival models. Statistical models will be contrasted with machine learning techniques.

The course mainly refers to the book "Regression Modeling Strategies: With Applications to Linear Models, Logistic and Ordinal Regression, and Survival Analysis" Springer Series in Statistics, Frank E. Harrell, Jr., Springer International Publishing, 2015

COORDINATORS

Maria Grazia Valsecchi and Laura Antolini
B4 Center of Boinformatics, Biostatistics and Bioimaging - School of Medicine and Surgery, University of Milano-Bicocca

SECRETARIAT

e-mail: statisticalps@unimib.it

UNIVERSITY OF MILANO-BICOCCA
SCHOOL OF MEDICINE AND SURGERY
B4 Center of Bionformatics, Biostatistics and Bioimaging

StatisticAlps
Summer course on medical statistics……in the Alps
10th Edition

REGRESSION MODELING STRATEGIES

Strategies for good statistical practice, developing accurate predictive models that validate, choosing between statistical models and machine learning, introduction to Bayesian regression modeling, and complete R examples

Frank E Harrell Jr
Department of Biostatistics, School of Medicine
Vanderbilt University
Drew Levy
Medical Evidence Generation, BioMarin, Inc.

BICOCCA SUMMER SCHOOL

1 – 6 September 2024

PONTE DI LEGNO – BRESCIA, ITALY

With the endorsement of

IBS	International Biometric Society
sismec	Società Italiana di Statistica Medica ed Epidemiologia Clinica
ISCB	International Society for Clinical Biostatistics

PROGRAM

ARRIVAL - 1 SEPTEMBER 2024

19.30 **Registration**
20.00 **Welcome Dinner**

1st DAY – 2 SEPTEMBER 2024

09.00: **Introduction**
Philosophy of statistical modeling; Hypothesis testing, estimation, prediction, and classification; Model uncertainty, and issues in data-driven model specification; Assumption checking vs. impact of model assumptions
10.00 **General aspects of fitting regression models**
Notation, model formulations, interpreting parameters; Splines and complex interactions
Break
11.30 **Choosing between machine learning and statistical modelling**
12.15 **Complex curve fitting case study**
13.00 *Lunch*

14.30 **Multivariable modelling strategies**
Allocating degrees of freedom; Harm of variable selection; Effective sample size and preventing overfitting; Data reduction; Comparing two models; Overall strategies
Break
17.30 **Causal models for guiding variable selection**
20.00 *Dinner*

2ND DAY – 3 SEPTEMBER 2024

09.00 **Causal models (cont'd)**
09.30 **R software**
10.15 **Introduction to parametric longitudinal models**
Break
11.00 **Case study in generalized least squares**
12.00 **Describing a fitted model**
Interpretation of effects; Measuring model performance and relative explained variation
13.00 *Lunch*

14.30 **Model validation by resampling**
Bootstrap and cross-validation; Pitfalls of data splitting and external validation; Using the bootstrap to validate model stability
Break
16.30 **Binary logistic regression**
Model form and usages; Model performance measures; Bayesian logistic model example; The Titanic: case study
20.00 *Dinner*

3RD DAY – 4 SEPTEMBER 2024

8.30 **Semiparametric ordinal regression models**
Model form and assumptions; Checking the proportional odds assumption vs. assessing its impact
10:00 **Ordinal regression for continuous Y**
Advantages over the linear model and quantile regression; Some ordinal models
Break
11:15 **Case study in ordinal regression for continuous Y**

13.00 *Lunch*
Free afternoon
20.00 *Dinner*

4th DAY – 5 SEPTEMBER 2024

9.00 **Some general aspects of Bayesian modeling**
Advantages of Bayesian over traditional frequentist modeling; Constraining regression models using Bayesian priors on contrasts
10:15 **Longitudinal ordinal models as unifying concepts**
Break
11:00 **Case study in ordinal Markov modeling**
13.00 *Lunch*

14.00 **Case study in nonlinear data reduction with imputation**
15.00 **Summary and discussion**
Break
16.30 **Other topics suggested by participants**
18:00 **Summary and conclusion**
19.30 *Social Dinner*

DEPARTURE - 6 SEPTEMBER 2024

8:30

TUTORIALS:

Illustrative analyses using R and discussion of case studies

PREREQUISITES

Basic knowledge of regression models

TUTORS

Giulia Capitoli and Matteo Petrosino
B4 Center of Bionformatics, Biostatistics and Bioimaging; School of Medicine and Surgery, University of Milano Bicocca
Giulia Risca, PhD in Public Health, School of Medicine and Surgery, University of Milano Bicocca

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Participants will have the possibility, during the half-day break, to enjoy sports in the surrounding and spend time for individual study

COURSE VENUE

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

WEB PAGE

Registration link:
https://summerschoolbicocca.com/24_statisticalps.php
It contains information on:

- how to reach the venue by flight, car or train
- free bus transfer from Bergamo to Ponte di Legno