



# Robust Statistics: Foundations and Recent Developments

III International School on Classification and Data Analysis, under the auspices of ClaDAG  
and organized by Francesca Greselin - University of Milano Bicocca  
*Lake Como School of Advanced Studies 2-6 May 2022*

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### ROBUST STATISTICS: FOUNDATIONS and RECENT DEVELOPMENTS

2-6 May, 2022

Lake Como School of Advanced Studies (Como, Italy)

Robust statistics is at the forefront of statistical research, and a central topic in multidisciplinary science where mathematical ideas are used to model and understand the real world, without being affected by contamination that could occur in the data.

Nowadays, with the increasing availability of Big data, robust statistical methods are crucially needed.

The aim of this course is three-fold: present novel models to describe real-world phenomena, and their properties; study their behavior under different kinds of contamination; discuss their implementation through computational methods.

The lectures are addressed to Master, PhD students and postdocs.

#### Lecturers:

[Anthony Atkinson](#), London School of Economics, UK

[Agustin Mayo-Iscar](#), University of Valladolid, ES

[Marco Riani](#), University of Parma, IT

[Francesca Greselin](#), University of Milano-Bicocca, IT

**Registration fees:** 350 Euro (VAT included), covering lunches and social events. Information and registration at <https://rsfd.lakecomoschool.org/registration>

Please note that the conference room allows only for a very limited number of participants (no more than 30).





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## Scientific Board

**Andrea Cerioli**, University of Parma, Italy

**Volodymyr Melnykov**, University of Alabama, United States

**Carlos Matràn**, Universidad de Valladolid, Spain

**Valentin Todorov**, United Nations Industrial Development Organization, Vienna, Austria

Organizer: **Francesca Greselin**, University of Milano-Bicocca



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## Lecturers

**Anthony Atkinson**  
London School of Economics, UK

**Agustin Mayo-Iscar**  
University of Valladolid, ES

**Marco Riani**  
University of Parma, IT

**Francesca Greselin**  
University of Milano-Bicocca, IT

### ANTHONY ATKINSON

Emeritus Professor at LSE, he was head of the Department of Statistics at the London School of Economics for 10 years.

He served as editor of The Journal of the Royal Statistical Society, Series B, and as an associate editor of Biometrika and Technometrics.

He has co-authored more than 250 publications, most of which have appeared in international peer-reviewed statistical journals.

With Riani and Cerioli he is the co-author of two books on robust statistical methods using the Forward Search. His other research interests include optimum experimental design and randomization methods in the design of clinical trials.

Google Scholar h-index: 55



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**Atkinson, Anthony C.**

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Multivariate Outliers; Robust Regression; Breakdown Point  
11 documents  
Optimal Experimental Design; Model-Based Design; Identifiability  
2 documents  
Essential Tensors; Head View; Movement Disorders  
1 document  
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### AGUSTIN MAYO-ISCAR

He is Professor at the Department of Statistics and Operational Research of the University of Valladolid and member of the Institute of Mathematics of University of Valladolid (IMUVA).

Most of his scientific production is related with the development of Robust Methodology for Clustering and for estimating Mixture models.

He is author or co-author of more than 40 scientific peer-reviewed scientific works, most of which are published in leading international journals, such as Annals of Statistics, Journal of the Royal Statistical Society Series B, Statistics & Computing, Computational Statistics & Data Analysis and Advances in Data Analysis & Classification. He is member of the steering committee of the ICORS (International Conference of Robust Statistics).

Google Scholar h-index: 29



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Model-Based Clustering; Finite Mixture; EM Algorithm  
11 documents  
Clinical Decision; Heart Areas; Early Warning  
2 documents  
Hyperfactorial; Lactic Acid; Organ Dysfunction Scores  
2 documents  
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### MARCO RIANI

He is Full Professor at the Department of Economics and Management of the University of Parma and director of the Interdepartmental center of RObust Statistics (Academy) for Big Data (Ro.S.A.) of the University of Parma. His main research interests are robust statistics (regression, multivariate analysis and classification). He is author of more than 120 publications and coauthor of two books published by Springer Verlag New York. Most of his publications have appeared in leading international peer reviewed Journals of Statistics. Since 2006 he has been a member of the steering committee of the ICORS (International Conference of Robust Statistics). At present he is associate editor of the Journals "Statistical Methods and Applications" and "Metron".

Google Scholar h-index: 26



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**Riani, Marco**

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1009 Citations by 196 documents  
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#### Most contributed Topics 2016–2020

Multivariate Outliers; Robust Regression; Breakdown Point  
12 documents  
Model-Based Clustering; Finite Mixture; EM Algorithm  
4 documents  
Outlier Detection; Data Streams; Nominal or Categorical Data  
1 document  
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### FRANCESCA GRESELIN

Associate Professor of Statistics at the University of Milano-Bicocca, she wrote about 40 peer-reviewed scientific works, published in international peer-reviewed journals. Member of the board of the Ph.D. in Statistics and Economics of Milano-Bicocca since 2009, she is Vice-Coordinator of the XXXIII cycle. Editor of Statistics and Computing, Guest Editor of Statistical Analysis and Data Mining, she serves as a Referee for more than 40 statistical journals. She is involved in Scientific Committees of international conferences, has given some plenary talks and organized many specialized sessions. Her research activity includes inequality measures, and mixture models within the classification framework, with emphasis on robust inferential methods.

Google Scholar h-index: 15



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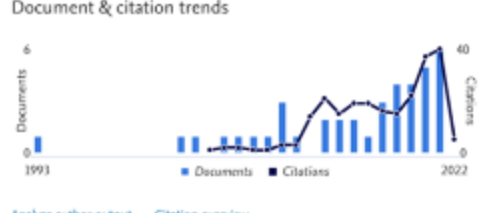
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#### Most contributed Topics 2016–2020

Model-Based Clustering; Finite Mixture; EM Algorithm  
9 documents  
Lorenz Curve; Gini; Inequality Indices  
4 documents  
Skew-Normal Distributions; Scale Mixture; Skew  
1 document  
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## Schedule

### Monday, May 2

*Opening ceremony*

*Cinzia Viroli,*

*President of the Classification and Data Analysis Group  
of the Italian Statistical Society*

Introduction to robust statistics,

– **Anthony Atkinson** (9:00 – 11:00 a.m., 2:30 – 4.00 p.m.)

Applications in Matlab,

– **Agustin Mayo Iscar, Marco Riani** (11:00 a.m – 1:00 p.m., 4:00 – 5.30 p.m.)

### Tuesday, May 3

*Welcome address*

*Corrado Crocetta,*

*President of the Italian Statistical Society*

Robust regression analysis, multivariate analysis and variable transformations,

– **Anthony Atkinson** (9:00 – 11:00 a.m., 2:30 – 4.00 p.m.)

Applications in Matlab,

– **Agustin Mayo Iscar, Marco Riani** (11:00 a.m – 1:00 p.m., 4:00 – 5.30 p.m.)

### Wednesday, May 4

Introduction to robust clustering,

– **Agustin Mayo Iscar** (9:00 – 11:00 a.m., 2:30 – 4.00 p.m.)

Applications in R and Matlab,

– **Agustin Mayo Iscar, Marco Riani** (11:00 a.m – 1:00 p.m., 4:00 – 5.30 p.m.)

### Thursday, May 5

Advances in robust clustering,

– **Agustin Mayo Iscar** (9:00 – 11:00 a.m., 2:30 – 4.00 p.m.)

Applications in R and Matlab,

– **Agustin Mayo Iscar, Marco Riani** (11:00 a.m – 1:00 p.m., 4:00 – 5.30 p.m.)

### Friday, May 6

Robust semi-supervised classification to detect novel classes and anomalies,

– **Francesca Greselin** (9:00 a.m. – 1:00 p.m.)

Poster session and discussion (2.30 – 5.30 p.m.)

where participants, upon request, may present their research.

### Saturday May 7th – Morning

A social program (e.g. tour of the Villa Grumello park, lakeside promenade, depending also on the weather forecast) is scheduled on Saturday morning, program to be defined.

A POSTER SESSION will take place in the afternoon of the last day of the week, where participants, upon request, may present their research.

## Social Events

### ▪ Tuesday, May 3rd

5.45 p.m. Guided tour of the botanical park of "Villa del Grumello"

7.00 p.m. String quartet concert

### ▪ Wednesday, May 4th

6.30 p.m. Guided tour of the church of Sant'Abbondio – Como





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