

## Times Series Analysis

### Objectives

To understand the basics of time series theory and practice. At the end of the course the student should be able to set up a time series model and judge the goodness of fit and the performances of the model in terms of prediction.

### Contents

Time Series are observations of stochastic processes. The core of the course is the study of ARMA and ARIMA processes with the three steps of identification, estimation and prediction as well as important classes of non-linear models (GARCH-type). We will discuss about

1. Stationary processes
2. Modeling the marginal distribution of a stationary process  
Modeling the tails
3. ARMA models
4. Modeling and forecasting with ARMA processes  
Estimation  
Forecasting  
Order selection  
Goodness of fit tests
5. Times series regression and Garch models (if time permits)

### Evaluation

- CC: Continuous assessment including a 2-hour written within-semester test or final project, homeworks, smaller projects, class participation the result of which determine the final grade according to the following weighting system: 60% exam/final project, 20% smaller projects and homeworks, 20% class participation.
- Reexamination session (September) : 2h written test

### Textbooks:

- P. Brockwell and R. Davis, *Introduction to Time Series and Forecasting*, Springer, 2002.
- D. Ruppert, *Statistics and Finance: An Introduction*, Springer, 2006.

### Characteristics

- 6 ECTS credits
- Compulsory course for the master in statistics
- Spring Semester
- Learning activities: 4 hours lectures/presentations per week. The students will actively participate in the presentation and explanation of the concepts involved.
- Prerequisite: knowledge of probability, statistical inference, regression, linear algebra, multivariate calculus and stochastic processes

### Teaching team

- *Prof. Catalin Starica*, Institut de Statistique  
Pierre-à-Mazel 7, CH-2000 NEUCHATEL  
Office phone: +41 (0) 32 718 14 52 Email: [catalin.starica@unine.ch](mailto:catalin.starica@unine.ch)