

Applied Time Series Analysis – SS 2015

People:

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Organization:

This course will be visited by students of various Master and Doctoral Program at ETH and elsewhere. It is the short version of the course which will be awarded with 4 ECTS credits. The extended version with 6 ECTS credits takes place in the even years.

Lectures:

Lectures will be held on Mondays from 10.15-11.55 at ETH Zentrum, room HG E1.2. Theory and examples will be shown on power point slides and the blackboard. Also, a scriptum is available. The tentative schedule is as follows:

Week	Date	L/L	Topics
01	16.02.2015	L/L	Introduction; Stationarity; Visualization
02	23.02.2015	L/E	Transformation; Decomposition
03	02.03.2015	L/L	Autocorrelation; Partial Autocorrelation
04	09.03.2015	L/E	White Noise, Autoregressive Models
05	16.03.2015	L/L	Autoregressive and Moving Average Models
06	23.03.2015	L/E	Autoregressive and Moving Average Models
07	30.03.2015	L/L	Time Series Regression
--	06.04.2015	-/-	<i>Easter Break</i>
08	13.04.2015	L/E	ARIMA and SARIMA Models
09	20.04.2015	L/L	Forecasting 1
10	27.04.2015	L/E	Forecasting 2
11	04.05.2015	L/L	Multivariate Time Series Analysis
12	11.05.2015	L/E	Spectral Analysis
13	18.05.2015	L/L	Miscellaneous, Outlook
14	25.05.2015	-/-	<i>Whitmonday</i>

Exercises:

Exercises will be held every second week in the lecture room HG E1.2, where an assistant will provide some background and useful hints on how to approach the problems. Solving the problems needs to be done autonomously and requires the use of the statistical software package R. The exercise is as follows:

Series	Date	Topic	Hand-In	Solutions
01	23.02.2015	Time series in R, Decomposition	02.03.2015	09.03.2015
02	09.03.2015	Autocorrelation, AR-Modelling	16.03.2015	23.03.2015
03	23.03.2015	ARMA-Models and Applications	30.03.2015	13.04.2015
04	13.04.2015	Time Series Regression, ARIMA	20.04.2015	27.04.2015
05	27.04.2015	Forecasting with Time Series	04.05.2015	11.05.2015
06	11.05.2015	Multivariate / Spectral Analysis	18.05.2015	---

Software:

The exercises will be based on the statistical software package R. This is a freely available open source suite which works on all platforms, see (<http://stat.ethz.ch/CRAN/>). Some basic previous knowledge of R is required; the exercises will solely focus on time series specific aspects of R. If you lack this previous knowledge, do not worry. You can quickly and easily gain it by going over one of the many tutorials which are available. I recommend chapters 1-5 of

<http://www.cyclismo.org/tutorial/R/>,

or, going through the entire content of

<http://math.illinoisstate.edu/dhkim/rstuff/rtutor.html>.

The classic resource for the basics on R is the manual “An Introduction to R”, which is quite a bit longer and more technical, but a very worthwhile read:

<http://cran.r-project.org/doc/manuals/R-intro.html>

We assume that you either have a personal computer or a notebook where you can install R and do the exercises on. Moreover, on the workstations at ETH, R is already installed.

Written Material

A scriptum for this course will be provided. The current version is available for download from the course webpage which can be found at.

<http://stat.ethz.ch/education/semesters/ss2015/atsa>.

From the very same webpage, the slides as well as exercise sheets and master solutions are also available for download. Please note that some updates may be made to the both scriptum and slides during the semester, i.e. the presented material may slightly differ from the one that was distributed at the beginning of the term. However, the latest versions will be made available on the course webpage. Furthermore, we may not be able to cover all slides and scriptum pages during the course.

Attendance to Lectures and Exercises:

There are no conditions for obtaining the attendance certificate. However, it will be hard to pass the exam based on reading the scriptum only. Especially solving the exercises is absolutely key.

Exam

There will be an oral exam during the regular session that lasts 30 minutes. It will focus on the practical aspects of time series analysis, i.e. it will test whether you know the basic theory of time series analysis and can make use of it for solving time series analysis problems. It covers all topics which were discussed and/or applied during either the lectures or the exams. Please note that this does nearly, but not necessarily fully match with the contents of either slides and/or scriptum.