

Applied Time Series Analysis – SS 2013

People:

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Organization:

This course will be visited by students from various Master and Doctoral Programs 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	18.02.2013	L/L	Introduction, Examples, Goals
02	25.02.2013	L/E	Mathematical Concepts, Stationarity
03	04.03.2013	L/L	Visualization, Transformations
04	11.03.2013	L/E	Descriptive Decomposition
05	18.03.2013	L/L	Autocorrelation, Partial Autocorrelation
06	25.03.2013	L/E	Stationary Time Series Models 1
07	08.04.2013	L/L	Stationary Time Series Models 2
08	15.04.2013	L/E	Time Series Regression
09	22.04.2013	L/L	Forecasting with Time Series
10	29.04.2013	L/E	Exponential Smoothing
11	06.05.2013	L/L	Multivariate Time Series Analysis
12	13.05.2013	L/E	Spectral Analysis
13	20.05.2013	-/-	-
14	27.05.2013	L/L	Miscellaneous, Outlook, Exam Information

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 schedule is as follows:

Series	Date	Topic	Hand-In	Solutions
01	25.02.2013	Time series in R	04.03.2013	11.03.2013
02	11.03.2013	Plotting and Decomposing	25.03.2013	18.03.2013
03	25.03.2013	Autocorrelation, Modelling	08.04.2013	15.04.2013
04	15.04.2013	ARMA-Models and Applications	22.04.2013	29.04.2013
05	29.04.2013	Forecasting with Time Series	06.05.2013	13.05.2013
06	13.05.2013	Miscellaneous Topics	21.05.2013	---

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/ss2013/atsa>.

Since the scriptum is not complete yet at the beginning of the term, new versions will be sent out via e-mail when available. E-Mail service will also be provided for the slides. Please note that they are usually not available before the weekend or Monday morning. Slides, exercise sheets and sample solutions are also archived on the course webpage.

Attendance Certificate:

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. Some more details will be communicated in the very last lecture of the course.