Applied Time Series Analysis – FS 2012

People:

Lecturer: **Dr. Marcel Dettling** (marcel.dettling@zhaw.ch)

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Organization:

This course will be visited by students of the "Weiterbildungs-Lehrgang in Angewandter Statistik" (WBL, i.e. Advanced Studies in Applied Statistics"), students from the Master in Statistics, as well as from several other disciplines. It will be awarded with 6 ECTS credits.

Lectures:

Lectures will be held on Mondays from 8.15-10.00 at ETH Zentrum, room HG E5. Examples and part of the theory will be shown on power point slides, while other parts of the theory will be presented on the blackboard. Also, a scriptum is available. The schedule below gives an impression on the topics which are covered, but is only tentative.

Week	Date	L/L	Topics
01	20.02.2012	L/L	Introduction, Examples, Goals
02	27.02.2012	L/L	Mathematical Concepts, Time Series in R
03	05.03.2012	L/L	Visualization, Descriptive Decomposition
04	12.03.2012	L/L	Autocorrelation, Partial Autocorrelation
05	19.03.2012	L/L	White Noise, Autoregressive Models
06	26.03.2012	L/L	Moving Average Models, ARMA Models
07	02.04.2012	L/L	Non-Stationary Time Series Models
08	16.04.2012	L/L	Time Series Regression
09	23.04.2012	L/L	Forecasting 1
10	30.04.2012	L/L	Forecasting 2
11	07.05.2012	L/L	Multivariate Time Series Analysis
12	14.05.2012	L/L	Spectral Analysis
13	21.05.2012	L/L	Miscellaneous, Outlook
14	28.05.2012	-/-	-

Exercises:

Exercises will be held every Monday from 10.15-11.55 at ETH Zentrum, in the computer rooms HG E19 and HG E26.1. You will be handed out a set of problems at their beginning. We expect that you work on these problems; assistants and lecturer are available for assistance. At the end of an exercise session, a written master solution will be handed out and made available online. Generally, there is no need to hand in the exercises and no marking will be provided. In case of questions or discrepancies between yours and the master solution, please speak up to the assistant or lecturer during the next session.

For the WBL students, two mandatory exams will take place in the exercise sessions of March 26, and May 21. All other students will obtain the same set of problems, and we expect you to work on these during the session in the sense of a non-compulsory test

exam. After its end, you can hand in these test exams. Marking will be done by the assistant and grades will be given, but it is of no relevance.

Please note that the exercises in room E19 will be tutored by WBL assistant Sophie Schmassmann, thus places in this room are reserved for WBL students. All other students please visit room E26.1, where Christian Kerkhoff will act as a tutor. Your lecturer, Dr. Marcel Dettling, will circulate in both rooms and answer questions on theory / exercises.

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/ss2012/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:

For the non-WBL students, there are no conditions for obtaining the attendance certificate. On the other hand, for WBL students, the general rules regarding attendance that were communicated by the organizers are in effect.

Exam

While for the WBL students, the two above mentioned written exams during the exercise sessions will be used for grading, they are of no relevance for all other students. Their grade will be determined in oral exams during the regular session. This oral exam lasts for 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 applied time series analysis problems. Some more details will be communicated in the very last lecture of the course.