Time Series Analysis
Fall 2019
Andreas Jakobsson

Administration

Course program
Course webpage
http://www.maths.lu.se/kurshemsida/fmsn45masm17/

Registration
Sign up, check, add social security number.

Book

Teaching staff
Prof. Andreas Jakobsson, MH:217, aj@maths.lth.se
Office hours: Wedn 10-12 (until 11/12).
Additional office hours: 12/12 at 9-12.
Note: I will be unavailable 13-19/12. Please plan accordingly.
Filip Elvander, MH:138
Office hours: Tue 9-12 (until 4/12)
Per Niklas Waaler, MH:223
Office hours: 10-11 on the 5/12 and 10/12, and 10-12 on the 16/12.
Per Niklas Waaler, Amanda Nilsson, Erik Wik, Wilhelm Ålander

Tutorial exercises
The tutorials will be held on Thursdays and Fridays; see schedule. No tutorials this week.

Regular problems
Regular textbook problems from the course book.

Mini projects
There are three mini-projects to prepare you for the computer exercises. These are voluntary.

Computer exercises
The course examination consist of 3 mandatory computer exercises. They take a long time; come well prepared. Sign up on the webpage. If you are not done, try to get graded at a later exercise.

Computer exercise 0 is voluntary and review stochastic processes.
Examination

The examination consist of the computer exercises, a take-home exam and a project.

Project examination will take place on 21/12 (13-16) or on 18/1 (13-16).

A detailed project report and presentation material should be handed in no later than at the start of the presentation.

The take-home is available at 12.00 on 14/1, and is due 21/1, at 13.15.

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<tr>
<td>Computer exercises</td>
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<td>Take-home exam</td>
<td>30</td>
<td>P</td>
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<tr>
<td>Project presentation</td>
<td>P/F</td>
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<td>Project report</td>
<td>60</td>
<td>30</td>
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Number of airline passengers
Average ice breakup date of the Tanara River

SAR image of oil spill covering the coastal waters of the Yellow Sea, South Korea, Dec. 11, 2007
**Course content**

This course treats:
- Modelling of linear stochastic systems
- Pre-treatment of measurements
- Prediction, filtering and reconstruction
- Parameter estimation
- Model selection and validation
- Recursive techniques
- Spectral estimation

What to do next:
- Stationary and non-stationary spectral estimation (VT1, 2020).
- Non-linear time series analysis (HT1+2).
- Financial statistics (HT2).
- Valuation of derivative assets (HT1).
- Loads of cool thesis projects!!

**Thesis proposals**

Some current thesis proposals:
- Future spaceborne synthetic aperture radar systems (with German Aerospace Center, Oberpfaffenhofen, Germany).
- Three projects on radar signal processing (with Axis).
- Evaluation of energy prognosis (with EnergyOpticon).
- Unsupervised learning of sepsis data.
- Modelling of gait patterns for Parkinson patients.
- Detection and modelling of voice changes.
This week

We will cover

• Multivariate random variables. Stochastic processes.
• Reading instructions: Ch. 1, 2, 3.1-3.3
• Problems: 2.1-2.3, 3.1-3.4
• Three video lectures!