STATISTICAL INFERENCE, ADVANCED LEVEL, ST703A, 7.5 ECTS CREDITS

TEACHING PLAN

Home page

Home page of course is in http://gauss.stat.su.se/master/slht.shtml and will be updated regularly. Additional information about the Department of Statistics can be found in http://www.statistics.su.se/.

Teacher (lectures and computer exercises)

Tatjana Pavlenko, B:742, tel. 08-16 25 78, e-mail: tatjana.pavlenko@stat.su.se.

Course expedition/Student office

Hanna Berggren Larsen, Hedda Werner Åström.

The secretary's office is B:724 at the building B, floor 7. Office is open Mon-Tue $9^{00} - 11^{00}$, $13^{00} - 14^{00}$ (during the term) and Thurs $14^{00} - 16^{00}$ (during the term), tel. 08-16 29 95, e-mail: expedition@stat.su.se

Student counsellor

Elisabet Edlund, B:777 at the building B, floor 7. Tel. 08-16 29 81, e-mail: Elisabet Edlund@stat.su.se Lectures, theoretical and computer exercises

See the last page for the schedule.

Computer exercises

Two **compulsory** computer laboratory exercises are planed in the course. The main goal of these exercises is to give students the basic knowledge on how to use the Statistics Toolbox of Matlab. The toolbox provides a comprehensive set of techniques to assess and understand data, and offers a rich set of statistical plot types and interactive graphics. All toolbox functions are written in the open Matlab language so that you can check the algorithms, modify the source code, and create your own custom functions.

It is recommended that all the students participate in the computer exercises in the scheduled time. Those who miss a session will need to perform the planned exercises themselves and return a written report for that session.

Literature

Casella G. & Berger R. L. *Statistical Inference*. Second Edition, Duxbury Press (Thomson Learning Academic Resource Center), 2007.

Other literature references

These books are recommended as a general reference for probability theory and statistics in an intermediate level.

A. Gut An Intermediate Course in Probability Theory, Second Edition, Dordrecht Springer-Verlag, 2009. J. A. Rise Mathematical Statistics and Data Analysis, Second Edition, Duxbury Press (An Imprint of Wadsworth Publishing Company), 1996.

Exam

Written exam: Wednesday, 24th of March. Time: $13^{30} - 16^{30}$. Place: D:220. Next written exam: Thursday, 29th of April. Time: coming later. Place: coming later.

Allowed aids in the exams

Table of common distributions; see the book by Casella & Berger, p. 620-627 (will be attached to the exam).

Calculator.

Dictionaries for translation.

Schedule of what will be covered on which classes, including lists of problems

In the following L, C stands for Lectures and theoretical exercises and Computer laborations, respectively.

Week/Date	Time Place	Topic	Reading	Assignment
W1 (20/01): L1	14.00-17.00 B315	Principles of data reduction. The suf- ficiency principle. Exponential family of distributions and factorization the- orem. Ancillary statistics.	6.1-6.2	6.1, 6.2, 6.3, 6.4, 6.6
W1 (22/01): L2	9.00-12.00 B705	Principles of data reduction (cont.) The formal likelihood paradigm and the equivariance principle.	6.3-6.4	6.9 (a, b), 6.14, 6.25, 6.40
W2 (28/01): L3	9.00-12.00 B705	Point Estimation: Bias, Risk, Consi- stency (repetition). Methods of finding estimators. Method of moments. Maxi- mum likelihood estimators.	7.1, 7.2.1-7.2.2	7.2, 7.3, 7.8, 7.10, 7.11
W3 (3/02): L4	9.00-12.00 B705	Methods of evaluating estimators. Cramér-Rao lower bound and Fisher information of the sample. Sufficien- cy and unbiasedness. Rao-Blackwell theorem.	7.3 (7.3.4 is not included)	7.38, 7. 40, 7.41, 7.48 (a,b)
W4 (10/02): L5	9.00-12.00 B705	Hypotheses testing. Methods of finding tests. Likelihood ratio test.	8.2	8.1, 8.2, 8.3, 8.5 a), b) 8.8
W4 (12/02): L6	9.00-12.00 B705	Methods of evaluating tests. Error pro- babilities and power function. Size of the test, most powerful tests and Neyman-Pearson lemma. <i>p</i> -values.	8.3 (8.3.5 is not included)	8.12, 8.16, 8.18, 8.20, 8.37, 8.38 (a,b)
W5 (18/02): L7	13.30-16.30 B705	Interval estimation. Methods of finding interval estimators. Inverting a test sta- tistics. Pivotal quantities.	9.2	9.1, 9.3, 9.5, 9.11
W6 (24/02): L8	9.00-12.00 B705	Methods of evaluating interval estima- tion. A uniformly most accurate confi- dence set.	9.3	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
W7 (4/03): L9	13.30-16.30 B307	Asymptotic methods. Consistency and asymptotic efficiency of maximum like- lihood estimators.	10.1	10.1, 10.3, 10.15, 10.17 (R-code)
W8 (11/03): L10	13.30-16.30 B705	Large sample properties of likelihood ratio tests. Approximate maximum li- kelihood intervals.	10.3-10.4	$\begin{array}{c} 10.19, \ 10.31, \ 10.32, \\ 10.37 \end{array}$
W8 $(12/03)$: C1	9.00-12.00 B319	Large sample properties of point esti- mators.		
W9 (22/03): C2	13.30-16.30 B319	Confidence intervals and hypothesis testing.		