Statistical Inference, Advanced level, ST703A, 7.5 ECTS credits

Teaching plan

Home page

Home page of course is in http://gauss.stat.su.se/site/scheman/vt11/inferens.pdf 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

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

Pär Stockhammar, B:777 at the building B, floor 7. Tel. 08-16 29 81, e-mail: studievagledare@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: Friday, 18th of March. Time: $9^{00} - 14^{00}$. Place: Laduvikssalen.

Next written exam: Friday, 8th of April. Time: $9^{00} - 14^{00}$. Place: Brunnsvikssalen.

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 **L**ectures and theoretical exercises and **C**omputer laborations, respectively.

Week/Date	Time Place	Topic	Reading	Assignment
W1 (18/01): **L1**	13.00-16.00 **D9**	Principles of data reduction. The sufficiency principle. Exponential family of distributions and factorization theorem. Ancillary statistics.	6.1-6.2	6.1, 6.2, 6.3, 6.4, 6.6
W1 (21/01): **L2**	9.00-12.00 **D9**	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 (25/01): **L3**	9.00-12.00 **D9**	Point Estimation: Bias, Risk, Consistency (repetition). Methods of finding estimators. Method of moments. Maximum likelihood estimators.	7.1, 7.2.1-7.2.2	7.2, 7.3, 7.8, 7.10, 7.11
W3 (1/02): **L4**	9.00-12.00 **D9**	Methods of evaluating estimators. Cramér-Rao lower bound and Fisher information of the sample. Sufficiency and unbiasedness. Rao-Blackwell theorem.	7.3 (7.3.4 is not included)	7.38, 7. 40, 7.41, 7.48 (a,b)
W4 (8/02): **L5**	9.00-12.00 **D9**	Hypotheses testing. Methods of finding tests. Likelihood ratio test.	8.2	8.1, 8.2, 8.3, 8.5 a), b), 8.8
W4 (10/02): **L6**	9.00-12.00 **D9**	Methods of evaluating tests. Error probabilities and power function. Size of the test, most powerful tests and Neyman-Pearson lemma. p-values.	8.3 (8.3.5 is not included)	8.12, 8.16, 8.18, 8.20, 8.37, 8.38 (a,b)
W5 (15/02): **L7**	13.30-16.30 **D9**	Interval estimation. Methods of finding interval estimators. Inverting a test statistics. Pivotal quantities.	9.2	9.1, 9.3, 9.5, 9.11
W5 (16/02): **L8**	8.00-10.00 **E319**	Methods of evaluating interval estimation. A uniformly most accurate confidence set.	9.3	9.12, 9.14, 9.25, 9.35
W6 (21/02): **L9**	8.00-10.00 **E319**	Methods of evaluating interval estimation. A uniformly most accurate confidence set (cont.).	9.3	9.12, 9.14, 9.25, 9.35 (cont.)
W7 (3/03): **L10**	8.00-10.00 **A5137**	Asymptotic methods. Consistency and asymptotic efficiency of maximum likelihood estimators.	10.1	10.1, 10.3, 10.15, 10.17 (R-code)
W8 (7/03): **L11**	11.00-13.00 **F413**	Large sample properties of likelihood ratio tests. Approximate maximum likelihood intervals.	10.3-10.4	10.19, 10.31, 10.32, 10.37
W9 (14/03): **L12**	9.00-12.00 **D7**	(Prel.) This lecture will be given by Prof. D. Thorburn (SU) and Prof. Terukovsky (If P&C Insurance)		
W7 (10/03): **C1:A**	13.00-16.00 **B319**	Large sample properties of point estimators.		
W7 (11/03): **C1:B**	13.00-16.00 **B319**	Large sample properties of point estimators.		
W9 (15/03): **C2:A**	9.00-12.00 **B319**	Confidence intervals and hypothesis testing.		
W9 (16/03): **C2:A**	9.00-12.00 **B319**	Confidence intervals and hypothesis testing.		