

Statistical Inference (C004080)

Course size (nominal values; actual values may depend on programme)
 Credits 6.0 Study time 180 h Contact hrs 45.0 h

Course offerings and teaching methods in academic year 2020-2021

A (semester 2)	English	seminar: coached	15.0 h
		exercises	30.0 h
		lecture	

Lecturers in academic year 2020-2021

Ley, Christophe	WE02	lecturer-in-charge
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Offered in the following programmes in 2020-2021

Master of Science in Statistical Data Analysis	crdts	offering
	6	A

Teaching languages

English

Keywords

Estimation theory, hypothesis tests

Position of the course

The students learn the important concepts and methods in estimation theory and acquire a theoretical foundation in statistics. This training enables the students to get a good insight in each of the statistical methods used in the different domains and application fields of statistics. Students learn to develop inference methods to solve specific statistic problems using this general theory.

Contents

The Likelihood Principle and Maximum Likelihood Estimators
 Score vectors, Fisher information, bias, efficiency
 Computational procedures related to Maximum likelihood estimation
 Large sample inference: convergence, Laws of large numbers, Central Limit Theorem, Consistency
 Slutsky's lemma and the Delta method
 Maximum likelihood inference: Wald, Score and Likelihood ratio tests
 Confidence intervals and hypothesis testing
 Bayes estimators and Bayesian inference
 Robustness and M-estimators
 Bootstrap inference
 Parametric model selection, information criteria
 Monte Carlo simulations

Initial competences

Having successfully followed the courses Probability and Mathematical Statistics and Statistical Models and Data Analysis or having acquired the intended competences in another way.

Final competences

- 1 Have knowledge of the basics of statistical inference theory.
- 2 Apply in a specific context the most important estimation methods and inference techniques of statistics.
- 3 Derive the relevant properties of estimators and test procedures.
- 4 Judge the applicability and limitations of statistical methods.
- 5 Use methods to solve practical statistical problems.
- 6 Correctly interpret the properties of the methods in the specific context of the application.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Lecture, seminar: coached exercises

Learning materials and price

Cost: 0.0 EUR Slides are electronically available.

References

Boos, D. and Stefanski, L. (2013) Essential Statistical Inference. Springer New York.
Welsh, A.H. (1996). Aspects of Statistical Inference, Wiley-Interscience.
Casella G. en Berger, R.L. (2002). Statistical Inference, Duxbury Press.
Pawitan, Y. (2001). In All Likelihood: Statistical Modelling and Inference using Likelihood, Oxford University Press.

Course content-related study coaching

Interactive support via Ufora (e-mail) and personally after electronic appointment.

Evaluation methods

end-of-term evaluation and continuous assessment

Examination methods in case of periodic evaluation during the first examination period

Written examination, open book examination

Examination methods in case of periodic evaluation during the second examination period

Written examination, open book examination

Examination methods in case of permanent evaluation

Assignment

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible in modified form

Calculation of the examination mark

Periodical evaluation (75%) + non-periodical evaluation (25%). For the second examination chance, an alternative activity is offered for the non-periodical evaluation.