



Course information 2023-24

ST2133 Advanced statistics: distribution theory (half course)

General information

COURSE LEVEL: 5

CREDIT: 15

NOTIONAL STUDY TIME: 150 hours

Summary

This half-course is intended for students who already have some grounding in statistics. It provides the basis for an advanced course in statistical inference.

Conditions

Prerequisites: If taken as part of a BSc degree, the following courses must be attempted before you can register on this course:

- ST1215 Introduction to Mathematical Statistics **OR (BOTH ST104a Statistics 1 AND ST104b Statistics 2)**[†]
- **AND (EITHER MT1174 Calculus OR MT1186 Mathematical methods OR (BOTH MT105a Mathematics 1 AND MT105b Mathematics 2))**

[†] You are advised to take the full unit statistics course as it provides a stronger foundation in concepts used in ST2133 Advanced statistics: distribution theory than are provided by the half-unit combinations ST104A Statistics 1 + ST104B Statistics 2.

Aims and objectives

The aim of this course is to provide a thorough theoretical grounding in probability distributions.

The course teaches fundamental material that is required for specialised courses in statistics, actuarial science and econometrics.

Learning outcomes

At the end of this half course and having completed the essential reading and activities students should be able to:

- recall a large number of distributions and be a competent user of their mass/density and distribution functions and moment generating functions
- explain relationships between variables, conditioning, independence and correlation
- relate the theory and method taught in the unit to solve practical problems.

Please consult the current EMFSS Programme Regulations for further information on the availability of a course, where it can be placed on your programme's structure, and other important details.

Essential reading

For full details, please refer to the reading list

Casella, G. and R.L. Berger *Statistical Inference*. (Duxbury, 2008) second edition [ISBN 978-8131503942]

Assessment

This course is assessed by a two-hour and fifteen-minute closed-book written examination.

Syllabus

Probability: Probability measure. Conditional probability. Bayes' theorem.

Distribution Theory: Distribution function. Mass and density. Expectation operator. Moments, moment generating functions, cumulant generating functions. Convergence concepts

Multivariate Distributions: Joint distributions. Conditional distributions, conditional moments. Functions of random variables.

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