Course information 2020-21
ST104b Statistics 2 (half course)

General information

COURSE LEVEL: 4

CREDIT: 15

NOTIONAL STUDY TIME: 150 hours

Summary

This half course requires the student to develop the concepts introduced in ST104a Statistics 1 of measurement and hypothesis testing.

Conditions

Co-requisite: Students can only take *ST104b Statistics 2* at the same time as, or after, the following course, not before:

* ST104a Statistics 1

Aims and objectives

The aim of this half course is to develop students' knowledge of elementary statistical theory. The emphasis is on topics that are of importance in applications to econometrics, finance and the social sciences. Concepts and methods that provide the foundation for more specialised courses in statistics are introduced.

Learning outcomes

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

* apply and be competent users of standard statistical operators and be able to recall a variety of well-known distributions and their respective moments
* explain the fundamentals of statistical inference and apply these principles to justify the use of an appropriate model and perform tests in a number of different settings
* demonstrate understanding that statistical techniques are based on assumptions and the plausibility of such assumptions must be investigated when analysing real problems.

Essential reading

For full details please refer to the reading list.

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.

Newbold, P., W. Carlson and B. Thorne Statistics for Business and Economics. (London: Pearson, 2019) ninth edition [ISBN 978-1292315034]

Assessment

This half course is assessed by a two-hour unseen written examination.

Syllabus

Probability: Set theory: the basics; Axiomatic definition of probability; Classical probability and counting rules; Conditional probability and Bayes' theorem.

Random variables: Discrete random variables; Continuous random variables.

Common distributions of random variables: Common discrete distributions; Common continuous distributions.

Multivariate random variables: Joint probability functions; Conditional distributions; Covariance and correlation; Independent random variables; Sums and products of random variables.

Sampling distributions of statistics: Random samples; Statistics and their sampling distributions; Sampling distribution of a statistic; Sample mean from a normal population; The central limit theorem; Some common sampling distributions; Prelude to statistical inference.

Point estimation: Estimation criteria: bias, variance and mean squared error; Method of moments estimation; Least squares estimation; Maximum likelihood estimation.

Interval estimation: Interval estimation for means of normal distributions; Use of the chi-squared distribution; Confidence intervals for normal variances.

Hypothesis testing: Setting p-value, significance level, test statistic; t tests; General approach to statistical tests; Two type of error; Tests for normal variances; Comparing two normal means with paired observations; Comparing two normal means; Tests for correlation coefficients; Tests for the ratio of two normal variances

Analysis of variance: One-way analysis of variance; Two-way analysis of variance.

Linear regression: Simple linear regression; Inference for parameters in normal regression models; Regression ANOVA; Confidence intervals for E(y); Prediction intervals for y; Multiple linear regression models.