

Statistics Lent

16 lectures

There are two quite separate approaches to statistical inference. This course will concentrate on classical methodology, although the alternative Bayesian approach will be considered. The gap between the uncertainty of the real world and precise mathematics is bridged by assuming that the data come from manageable probabilistic distributions involving unknown parameters so that questions of statistical inference can be precisely posed.

Building on the Part IA Probability course, this course presents the standard elementary statistical tool chest and explains how and why it works. It covers estimation, hypothesis testing, linear normal models and linear regression using least squares analysis.

For revision of probability Meyers Introductory Probability and Statistical Applications (Addison-Wesley, 1965) omitting chapters 11, 13, 14 and 15. For the course, read Lindgrens Statistical Theory (Collier-Macmillan, 1976) without worrying too much about technical detail.

Learning outcomes

By the end of this course, you should:

1. understand the concepts involved in estimation, including confidence intervals and Bayesian inference.
2. understand and be able to apply the basic ideas of hypothesis testing, including the Neyman- Pearson lemma, likelihood ratio and goodness of fit tests;
3. understand and be able to apply tests using χ^2 , t and F distributions;
4. understand and be able to apply the basic theory of linear regression.