Course content for MT2300, Statistical Methods

Prerequisites:
MT2320 recommended

Aims:
To study important aspects of statistical modelling in an integrated way and develop some expertise both in the theory and applications of linear models.

Learning outcomes:
On completion of the course, students should be able to

- demonstrate familiarity with the main methods based on linear models;
- apply these methods to analyse data and interpret the results from such analysis;
- understand and apply non-parametric methods;
- use R effectively in the analysis of relevant data.

Course content:
Principles of statistical modelling and terminology: Systematic and random components, types of variables.
Simple and multiple linear regression: Matrix notation, fitting the model, inferences about individual regression parameters, prediction, assessing the regression.
Some special cases: Polynomial models, models that incorporate factors.
Model building: Testing significance of specified subsets of variables, examining all subsets.
Model validation and comparison of regressions: Examination of residuals, influential observations, some possible problems and remedial actions, dummy variables.
Qualitative explanatory variables - analysis of variance: One-way and two-way ANOVA, point estimation, linear contrasts, a general approach via multiple regression.
Some non-parametric methods: The sign test, the Wilcoxon test, the Kolmogorov-Smirnov goodness-of-fit test.