

Semester 1 2018 Statistics Short courses

Course: STAA0001 - Basic Statistics

Blackboard Site: STAA0001

Dates: Twelve 2 hourly sessions: Thursdays 1/3-17/5 (5.30 pm – 7.30 pm)

Room: BA513

Assumed Knowledge: None

Software used: IBM SPSS Statistics Version 24

Maximum 20 students

Course Description:

This course develops students' understanding of a range of statistical methods along with their assumptions and limitations of their application. It enables students to develop the capacity to carry out independent statistical analysis of data using a standard statistical software package and also aims to develop students' abilities in effectively communicating the outcomes of statistical investigations.

Students who successfully complete this unit will be able to:

1. Effectively display information in datasets graphically.
2. Select an appropriate descriptive or inferential statistical technique based on the researcher's hypothesis, the level of measurement of the variables and testing of the appropriate assumptions to analyse the data.
3. Select appropriate IBM SPSS Statistics procedures, Java applets on the web and mathematical calculations, to obtain basic statistical test results, including confidence intervals and effect size statistics.
4. Explain the foundations of statistical inference, in particular the role of sampling distributions and the use of the normal distribution as a density curve.
5. Recognize when more advanced techniques are needed.
6. Write interpretive summary reports for both descriptive and inferential statistical analysis.

Online quizzes will be available for self-assessment.

Course: STAA0002 - Simple Linear Regression and ANOVA

Blackboard Site: STAA0002

Dates: Twelve 2 hourly sessions: Tuesdays 27/2-22/5* (5.30 pm – 7.30 pm)

* No class on 3 April – Easter Tuesday

Room: BA513

Assumed Knowledge: Basic Statistics (eg. STAA0001)

Software used: IBM SPSS Statistics Version 24

Maximum 20 students

Course Description:

This course of study aims to extend the ideas developed in Basic Statistics to include more advanced analyses, broaden the range of applications students are familiar with so that they will be able to carry out independent statistical investigations, and develop an awareness of the assumptions and limitations involved in the generalisation of results of such investigations.

Students who successfully complete this unit will be able to:

1. Choose the appropriate statistical analysis based on the researcher's hypothesis, the level of measurement of the variables and the testing of the appropriate assumptions.
2. Select appropriate statistical procedures, for example, using SPSS, Java applets on the web and mathematical calculations, to analyse data in a variety of contexts.
3. Relate the concepts of effect size, sample size, one or two tailed tests, level of significance and power of a statistical test.
4. Write interpretive summary reports for the inferential statistical techniques covered.
5. Judge when more advanced techniques are needed by comparing different statistical techniques for the variety of research questions.

Online quizzes will be available for self-assessment.

Course: STAA0003A - Introduction to R

Blackboard Site: STAA0003

Dates: Six 2 hourly sessions 27/2-10/4* (5.30 – 7.30 pm)

* No class on 3 April – Easter Tuesday

Room: EN409

Assumed Knowledge: None

Software used: RStudio

Course Description:

In this course you will learn how to install and configure R software. You will also learn how to read data into R, access R packages, and organise and comment R code. Furthermore, you will learn how to use R for effective data analysis and visualisation. Some of the most commonly used probability distributions will be introduced. Statistical data analysis will be conducted using working examples. After successfully completing this unit, students will be able to:

1. Arrange and consolidate large datasets.
2. Develop the ability to perform basic programming.
3. Visualise data using R packages.
4. Relate the basics of fundamental probability distributions to different types of data.
5. Formulate practical and user friendly solutions to real life problems in the form of a statistical model in an RStudio software environment.

Online quizzes will be available for self-assessment.

Course: STAA0003B - Using R for Statistical Analysis

Blackboard Site: STAA0003

Dates: Six 2 hourly sessions 17/4-22/5 (5.30 – 7.30 pm)

Room: EN409

Assumed Knowledge: Introduction to R (e.g. STAA0003A)

Software used: RStudio

Course Description:

This course of study aims to extend the ideas developed in Introduction to R. In this course you will learn key programming principles of R and how to develop and perform different types of statistical analyses and data visualisation. You will develop competence in programming in R - essential skill for a statistician or data scientist.

After successfully completing this unit, students will be able to:

1. Write R programs to conduct hypothesis testing and compare means.
2. Perform simple linear regression.
3. Analyse categorical data.

Online quizzes will be available for self-assessment.

Course: STAA0003C – Introduction to SAS

Blackboard Site: STAA0003

Dates: Six 3 hourly sessions Mondays 26/2-9/4* (5.30 – 8.30 pm)

* No class on 25 April – Anzac day

Room: EN409

Assumed Knowledge: None

Software used: SAS

Course Description:

This unit is an introduction to one of the leading statistical software packages SAS - a powerful tool for organising and analysing data. Students will use this statistical software to develop their knowledge in data management, data presentation, and statistical analysis.

After successfully completing this unit, students will be able to:

1. Demonstrate professionally relevant SAS programming and data management skills.
2. Write SAS programs to enter, load, and merge different types of data from multiple sources.
3. Visualise data graphically using SAS graphical procedures.
4. Summarise data and perform descriptive statistical analyses using SAS procedures.

Online quizzes will be available for self-assessment.

Course: STAA0004A - Survey Design

Blackboard Site: STAA0004

Dates: Six 2 hourly sessions: Wednesdays 28/2-4/4 (5.30 pm – 7.30 pm)

Room: EN409

Assumed Knowledge: Basic Statistics (e.g. STAA0001)

Software used: None

Course Description:

You will acquire skills and knowledge in the collection of survey, observational, experimental and secondary data; developing a questionnaire, and writing of descriptive reports.

Topics will include:

- Introduction to survey research
- The basics of survey sampling
- How to collect survey data
- Making the most of secondary data
- Developing a questionnaire
- Introduction to scale development
- Coding and cleaning survey data

Online quizzes will be available for self-assessment.

Course: STAA0004B - Research Design

Blackboard Site: STAA0004

Dates: Six 2 hourly sessions: Wednesdays 11/4-23/5* (5.30 pm – 7.30 pm)

*No class on 25 April – Anzac day

Room: EN409

Assumed Knowledge: Basic Statistics (e.g. STAA0001)

Software used: Excel and SPSS

Course Description:

You will acquire skills and knowledge in observational and experimental studies, designing an experiment, incidence and prevalence statistics, different types of study designs including Cohort and Case-control studies.

Topics will include

- The basic concepts of experimental designs
- Common designs used in health statistics and elsewhere
- Incidence, prevalence and fertility statistics
- Mortality Statistics and Standardisation of rates
- Randomized trials and Cohort studies
- Case control studies

Online quizzes will be available for self-assessment.

Course: STAA0005A - Multiple Linear Regression

Blackboard Site: STAA0005

Dates: Two 3 hourly sessions: Thursdays, 1/3-8/3 (5.30 pm – 8.30 pm)

Room: EN409

Assumed Knowledge: Simple Linear Regression and ANOVA (e.g STAA0002)

Software used: IBM SPSS Statistics Version 24

Maximum 20 students

Course Description:

In Multiple Regression you will look at simple linear regression and multiple regression using three different strategies (standard regression, stepwise regression and hierarchical regression). Particular attention is paid to report writing, assumption checking, outlier checking and tests for mediation. Make sure that you have access to SPSS and please revise the relevant material for the simple linear regression and ANOVA short course beforehand.

Online quizzes will be available for self-assessment.

Course: STAA0005B - Factor Analysis and MANOVA

Blackboard Site: STAA0005

Dates: Six 3 hourly sessions: Thursdays, 12/4-17/5 (5.30 pm – 8.30 pm)

Room: EN409

Assumed Knowledge: Simple Linear Regression and ANOVA (e.g. STAA0002)

Software used: SPSS

Maximum 20 students

Course Description:

Factor Analysis covers exploratory factor analysis (EFA). The various methods for extracting and rotating factors are discussed as are the interpretation of factors and the creation of factor scores and summated.

EFA is a descriptive technique. That is, it is designed to help us understand and explain patterns in the data, without making any formal predictions about what results will look like. However, it is not our data's job to tell us what its underlying structure is and a sound factor analytic study will begin with a great deal of prior thinking about the nature of the concept that we want to understand, appropriate indicators of that concept, appropriate population, and how results of factor analysis will be used. So even before we begin data collection, let alone data analysis, we will have an expectation about what the results might look like. The job of the data is then to show us how well our expectations are reflected in the 'real world'. The results of exploratory factor analysis can then be used inform future hypotheses. These hypotheses are subsequently tested using confirmatory factor analysis (CFA), which is conducted within the structural equation modelling framework (not covered in this subject).

MANOVA examines between subjects, within subjects and mixed multivariate analysis of variance. Particular attention is paid to assumption checking, the testing of specific contrasts and report writing. Make sure that you have access to SPSS and please revise the relevant material for the ANOVA and Simple Linear Regression short course beforehand.

Make sure that you have access to SPSS and please revise the relevant material for the ANOVA and Simple Linear Regression short course beforehand.

Online quizzes will be available for self-assessment.

Course: STAA0010A - Advanced Topics in Regression A:
Generalised Linear Model

Blackboard Site: STAA0010

Dates: Five 3 hourly sessions during period Mondays 26/2-26/3 (5:30pm – 8:30pm)

Room: BA513

Assumed Knowledge: Multiple Linear Regression (e.g. STAA0005A)

Software used: SPSS

Maximum 20 students

Course Description

Course Description

Statistical techniques as listed below will be covered with an emphasis on the interpretation and reporting of these results.

A review of multiple linear regression with special attention to assumptions, unusual point identification and multicollinearity. Different regression techniques are introduced and tests for mediation and moderation are illustrated. A variety of methods for improving the fit of regression models are provided. Methods for weighted regression, nonlinear regression methods and the General Linear Model are then introduced, always assuming that residuals are independent and normally distributed.

When normal assumptions are no longer valid the Generalised Linear Model is used. These models are introduced and then we look particularly at categorical variables. Starting with Crosstab analyses we learn how to define residuals that help us to interpret relationships between categorical variables. Special measures of association are developed for particular types of categorical variables. Finally multi-order crosstab tables are introduced together with the loglinear analyses required to test for multi-way interaction effects.

Binary logistic regression is a special generalised linear model for binary response variables which uses a logistic link function. We learn how to interpret odds and odds ratios and then show how binary logistic regression is used in practice to fit models with more than one predictor variable. Univariate binary logistic regression models are first fitted using each predictor in turn with a multiple binary logistic regression model to follow. This allows us to test for mediation. Finally, ROC curves and the Hosmer-Lemeshow test are used to assess goodness of fit.

Ordinal logistic with an ordinal response variable are then introduced and tested for “parallel lines”. Nominal logistic regression does not assume parallel lines and can be used with categorical response variables which are not ordinal but have more than two categories, requiring the choice of a reference category.

Online quizzes will be available for self-assessment.

Course: STAA0010B - Advanced Topics in Regression B:

Mixed Models, Generalised Estimating Equations, Multi-level Models and Survival Analysis.

Blackboard Site: STAA0010

Dates: Five 3 hourly sessions Tuesdays 11/4-9/5 (5.30 – 8.30 pm)

Room: BA513

Assumed Knowledge: Multiple Linear Regression (eg STAA0005A)

Software used: IBM SPSS Statistics Version 24

Maximum 20 students

Course Description:

Statistical techniques as listed below will be covered with an emphasis on the interpretation and reporting of these results.

When observations are clustered or auto-correlated conventional methods cannot be used. Such data is very common in practise and one of the advantages of these models is the way in which missing values can be handled. Generalised Estimating Equations and Mixed Linear Models are initially introduced to solve this problem. For more sophisticated problems HLM7 is a free student software package can be used. This software allows the fitting of longitudinal models and can handle response variables with a variety of distributions. Models are fitted separately for each subject and then combined to produce a population averaged model.

Survival analysis follows. Kaplan Meier, Cox regression and Covariate dependent Models.

Online quizzes will be available for self-assessment.

STAA0013A The Basics of Scale Development

Blackboard Site: STAA0013

Dates: Six 3 hourly sessions Tuesdays 27/2-27/3 (5.30 – 8.30 pm)

Room: ATC325

Assumed Knowledge: Multiple Linear Regression (e.g. STAA0005A)

Software used: SPSS Version 24 and MPLUS

Course Description:

Introduction to types of scales and their development

Reliability

Validity

Exploratory factor analysis

Confirmatory factor analysis

Online quizzes will be available for self-assessment.

STAA0013B Rasch Modelling

Blackboard Site: STAA0013

Dates: Six 3 hourly sessions Tuesdays 10/4-15/4 (5.30 – 8.30 pm)

Room: ATC325

Assumed Knowledge: The Basics of Scale Development and Evaluation (STAA0013A)

Software used: IBM SPSS Statistics Version 24 and RUMM2030

Course Description:

Rasch modelling. Lab: Rasch analysis using RUMM2030

Individual items and person analysis. Lab: Creating data file and analysis

Fit statistics, DIF and construct validity Lab: Analysis and interpretation of data

Dimensionality and scale targeting. Lab: Reading and critique articles

Issues in the use of scales in clinical and research settings; Lab: Develop and Evaluate a scale from a given data set

Online quizzes will be available for self-assessment.