Online quizzes are available for each course. To pass the course you are expected to attend most of the classes and pass the quizzes.

Course: STAA0001 - Basic Statistics
Dates: 30/08-15/11  Thursdays 5.30-7.30pm  Twelve sessions
Location: EN409
Software: IBM SPSS

Limit: Maximum 20 students

Course Description:

Part 1: Exploratory Data Analysis
- Levels of measurement of data
- Graphical Analysis: bar charts, pie charts, boxplots, histogram, stem and leaf, scatterplot, clustered and stacked bar charts
- Descriptive Statistics: mode, mean, median, standard deviation, range, IQR.
- Introduction to basic bivariate regression

Part 2: Introduction to Inference
Introduction to the basic concepts of inference: confidence interval, significance, p-values, effect size statistics
- Sampling distribution of the mean and the proportion
- Confidence interval and hypothesis test for a single proportion
- z-test and confidence interval for the mean when the population standard deviation is known
- t-tests: one sample, paired and independent
- chi-square test
Course: STAA0002 - Simple Linear Regression and ANOVA

Dates: 28/08-20/11\(^1\)  5.30-7.30pm Tuesdays Twelve sessions

Location: BA513

Software: IBM SPSS

Limit: Maximum 20 students

Pre-requisite: Basic Statistics (e.g. STAA0001)

An emphasis of this unit is on the interpretation and reporting of the results.
- Introduction to statistical power.
- Identifying and reducing bias including data transformation and checking normality.
- Nonparametric models.
- Basic categorical data analysis, including chi square, Fisher’s exact test, Lambda, Odds Ratio, Chi-square goodness of fit.

Course Description:

Simple Linear Regression
- Correlation: Pearson, Spearman and Kendall’s tau-b
- Power Analysis for Pearson correlation
- Simple linear regression analysis
- Multiple linear regression analysis
- Assumptions and inference for regression
- Common pitfalls of regression

ANOVA
- One way analysis of variance (ANOVA)
- Factorial analysis of variance for two factors
- Repeated measures analysis of variance
- Mixed Design Analysis of Variance
- Reporting of ANOVA results
- Power analysis and effect size statistics such as eta squared and omega squared

\(^1\) There is no class on Melbourne Cup day: 6 November 2018
Course: STAA0003A – Introduction to R

Dates: 29/08-3/10   5.30-7.30pm   Wednesdays   Six sessions

Location: EN409

Software: R and RStudio

Limit: Maximum 20 students

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 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.

Course: STAA0003B – Using R for Statistical Analysis

Dates: 10/10-21/11   5.30-7.30pm   Wednesdays   Six sessions

Location: EN409

Software: R and RStudio

Limit: Maximum 20 students

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

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. 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.
Course: STAA0004A - Survey Design

Dates: 27/08-1/10  5.30-7.30pm  Mondays  Six sessions

Location: ATC325

Software: None

Pre-requisite: Basic Statistics (e.g. STAA0001)

Limit: Maximum 20 students

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.

- 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

Course: STAA0004B - Research Design

Dates: 5.30-7.30pm  Tuesdays  Six sessions

Location: ATC325

Software: Excel and SPSS

Limit: Maximum 20 students

Pre-requisite: Basic Statistics (e.g. STAA0001)

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.

- 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
Course: STAA0005A - Multiple and Logistic Regression

Dates: Saturday-Sunday two sessions 15/09 and 16/09  9am-4.30pm

Location: EN409

Software: IBM SPSS (R optional)

Pre-requisite: Linear Regression and ANOVA (e.g. STAA0002)

Limit: 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. In logistic regression we will cover the binary logistic regression where we will demonstrate the circumstances under which logistic regression should be used instead of multiple regression. Logistic regression is a specialized form of regression that is formulated to predict and explain a binary (two-group) categorical variable rather than a metric dependent variable. Make sure that you have access to SPSS and please revise the relevant material for the simple linear regression and ANOVA short course beforehand.

Course: STAA0005B - Factor Analysis and MANOVA

Dates: Saturday-Sunday two sessions 13/10 and 14/10  9am-4.30pm

Location: EN409

Software: IBM SPSS (R optional)

Pre-requisite: Linear Regression and ANOVA (e.g. STAA0002)

Limit: 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 scales. 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 factory 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).

Multivariate Analysis of Variance (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 Analysis of Variance (ANOVA) and Simple Linear Regression short course beforehand.
Course: STAA0006 - Introduction to SAS

Dates: 28/08-2/10  5.30-8.30pm Tuesdays  Six sessions

Location: EN409

Software: SAS

Pre-requisite: Linear Regression and ANOVA (e.g. STAA0002)

Limit: Maximum 20 students

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.

Students who successfully complete this unit will be able to:

1. Write SAS programs to enter, load, and merge different types of data from multiple sources.
2. Visualise data graphically using SAS graphical procedures.
4. Conduct parametric and non-parametric analysis of variance for balanced and unbalanced study designs using SAS and interpret the results.
5. Perform linear regression analysis using SAS and interpret the results.
6. Analyse count data using generalised linear model (GLM) techniques using SAS.
Course: STAA0007 - Forecasting

Dates: 27/08-1/10   5.30-8.30pm Mondays   Six sessions

Location: EN409

Software used: Excel and SPSS (R optional)

Pre-requisite: ANOVA and Simple Linear Regression (e.g. STAA0002).

Limit: Maximum 20 students

Course Description:

This unit aims to introduce students to various forecasting methods and their application in business and industry using time series data. The advantages and disadvantages of naïve, moving average, exponential smoothing and decomposition forecasts will be covered. Participants who successfully complete this Unit should be able to:

- extract time series data from web sites
- compute indices based on time series data
- plot time series and describe their characteristics
- understand the time series and identify the properties like trend, seasonality or cyclic behaviour relevant to the time series under investigation
- use various methods to obtain short-term forecasts
- compare the accuracy of these forecasts using appropriate measures.
Course: **STAA0008A - Intro to SPSS**

**Dates:** Wednesdays 29/08-19/09  5.30-8.30pm  4 sessions

**Location:** EN207

**Software:** IBM SPSS

**Limit:** Maximum 30 students

**Course Description:**

On completion of this course, students should be able to use the menus and SPSS syntax in the data analysis package IBM SPSS Statistics to take data such as that obtained from questionnaires and administrative records or from existing electronic formats and establish appropriate computer files from which basic statistical summaries, graphs and reports can be produced. It will also show the importance of integrating the development of your data collection instrument, such as a questionnaire, with your computer program.

- Introduction to IBM SPSS Statistics
- IBM SPSS Statistics data definition
- Establishing an SPSS data file from a questionnaire.
- An introduction to SPSS syntax
- Basic data analysis in SPSS
- Analysing categorical variables.
- Merging variables.

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Course: **STAA0008B - Further SPSS**

**Dates:** Wednesdays 26/09-17/10  5.30-7.30pm  4 sessions

**Location:** EN207

**Software:** IBM SPSS

**Pre-requisite:** Intro to SPSS (e.g. STAA0003A)

**Limit:** Maximum 30 students

**Course Description:**

On completion of this course, students will become more efficient in their use of SPSS and expand their knowledge of SPSS data handling procedures.

- Computing new variables
- Recoding and selecting data.
- Graphing in SPSS and control charts.
- SPSS Tables
- Working between SPSS and files in other formats.
- Dates in SPSS
- Investigating missing values in SPSS
- Managing complex file structures.

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2 This is a paid face-to-face course: we offer a discounted rate for Swinburne postgraduate students $240 per course
Course: STAA0009A – Introductory Structural Equation Modelling with AMOS

Dates: 29/08-26/09 5.30-8.30pm Wednesdays Five sessions

Location: ATC325

Software used: AMOS

Pre-requisites: Multiple Linear Regression (e.g. STAA0005A) and Factor Analysis and MANOVA (e.g. STAA0005B)

Limit: Maximum 20 students

Course Description:

This course is designed as an introductory, applied course in the use of Structural Equation Models (SEM) in research. The aim of this subject is to provide students with a broad understanding of structural equation modelling, its underlying theory and potential uses in research, as well as an awareness of its strengths and limitations. It is designed to give students the skills to competently design, assess, and interpret simple research models across multiple discipline areas using structural equation modelling techniques.

- Review Exploratory Factor Analysis (SPSS).
- Introduction to AMOS and Confirmatory Factor Analysis (CFA)
- Confirmatory Factor Analysis (CFA)
- Review Multiple Regression (SPSS) and Path Analysis in AMOS
- Full Structural Models
- Using SEM to assess measures (Congeneric Confirmatory Factor Analysis, Scale Reliability and Validity, Higher Order Confirmatory Factor Analysis)
Course: STAA0009B – Advanced Structural Equation Modelling (SEM) with MPLUS

Dates: 10/10-7/11  5.30-8.30pm  Wednesdays  Five sessions

Location: ATC325

Software used: MPLUS

Pre-requisite: Introduction to SEM using AMOS (e.g. STAA0009A)

Limit: Maximum 20 students

Course Description:

This course is designed as an extension to introductory SEM using AMOS. The aim of this subject is to introduce students to the MPLUS software and more advanced SEM models. It is designed to give students the skills to competently design, assess, and interpret more advanced models across multiple discipline areas using structural equation modelling techniques.

Introduction to MPLUS and Model Issues:

- Formative vs. Reflective Indicators
- Item parcelling including Munck’s method
- Using ordinal indicators
- Multi-sample models and invariance testing using MPLUS
- Mean structure models using MPLUS
- Longitudinal models using MPLUS
- Assumptions, missing data and model issues
Course: STAA0010 - Introduction to Bayesian Statistics

Dates: 30/08-1/11  5.30-8.30pm  Thursdays  Six sessions

Location: ATC325

Software used: R and R Studio

Pre-requisites: Multiple Linear Regression (e.g. STAA0005A), Introduction to R (e.g. STAA0003A)

Assumed knowledge: Basics of multivariate statistical modelling including GLMs.

Limit: Maximum 20 students

Course Description:

This short course introduces the fundamentals of Bayesian statistical modelling. Students will learn the importance of subjective beliefs in Bayesian statistics. Important concepts such as prior distributions, likelihood functions, and posterior distributions will be discussed at length. Numerical estimation techniques will be introduced. Empirical applications of Bayesian analysis will be performed in an R software environment.
Course: STAA0011 -Data Mining with SAS Enterprise Miner (SASEM)

Dates: 27/08-5/11  5.30-8.30pm  Mondays  Eleven sessions

Location: BA513

Software used: SAS Enterprise Miner

Pre-requisites: Multiple Linear Regression (e.g. STAA0005A) and Factor Analysis and MANOVA (e.g. STAA0005B)

Limit: Maximum 20 students

Course Description:
This short course provides an introduction to data mining using SAS Enterprise Miner. In particular it introduces market basket analysis, sequence analysis, link analysis and text analysis before comparing classification methods such as Classification Trees and Logistic Regression, and comparing prediction methods such as Regression and Regression Trees. In addition it describes the use of neural network methods for classification, prediction and segmentation. Cluster Analysis is used to create homogeneous groups of people or objects that can be used for strategic and other purposes. Text Mining is used to create text topics and to cluster respondents based on their textual responses. Visualisation is key for many of these methods, as is the ability to get various tools to work together.