

■ Postgraduate

Applied Statistics

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TECHNOLOGY

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Postgraduate programs in applied statistics



Swinburne's postgraduate program in applied statistics focuses on practical applications, especially in the areas of social science and market research.

Many professionals use statistics for routine data collection and data mining analysis and interpretation in order to assist decision-making and ongoing work-related activities. Others, who rely on research articles and reports to stay ahead of developments in their industry, require an understanding of statistical methods to accurately interpret and comprehend reported results and relationships. Finally, there are those who develop and conduct their own research for which an understanding of statistical methods and tools is a necessity.

The broad application of statistics demands that professionals have a sound knowledge of the statistical methods applicable to their discipline so that the decisions they make are well-informed. Statistical techniques are regularly under review and the technology available to carry out analysis is constantly developing. Postgraduate study in applied statistics at Swinburne provides professionals with the training they need to keep up to date with the latest developments.



Program details

Master of Science (Applied Statistics)

Graduate Diploma of Science (Applied Statistics)

Graduate Certificate of Science (Applied Statistics)

Swinburne's applied statistics programs develop competencies in areas ranging from practical and basic statistical knowledge at the graduate certificate level, to the development of higher level statistical and research skills at the master level.

The program is designed for graduates in any discipline – especially the humanities and social or health sciences – or business graduates who have a professional interest in the use of statistics. The courses are also applicable to other graduates who have a need to use statistics in their work, but have not had sufficient or current training in the area.

Swinburne's applied statistics program aims to produce students with the following attributes.

Graduate certificate students should have:

- proficiency in the IBM SPSS Statistics software package
- understanding of the need for and methods of acquiring good data, achieved through the inclusion of subject matter relating to data screening, survey design, experimental design and the collection of observational data
- well-rounded, competent graduates with adequate quantitative skills in areas such as exploratory data analysis, estimation and hypothesis testing
- good report writing skills honed using assignment work, weekly online quizzes and online discussion
- a flexible approach to problem-solving with an ability to listen to and understand the advice and opinions of domain experts; these skills are developed through the use of actual problems and real data in lectures and assignments.

Graduate diploma students should have graduate certificate skills, plus:

- proficiency in SAS (in addition to SPSS)
- experience in analysing multivariate data sets and analysis of complex sample data
- an understanding of the fundamentals of sampling and data manipulation
- data analysis skills in areas such as dimension reduction and forecasting, complex survey analysis and model building with multiple regression.

Master students should have graduate diploma skills, plus:

- proficiency in at least one additional software package, including AMOS, SAS Enterprise Miner or R (in addition to SPSS and SAS)
- experience in manipulating large data sets
- data analysis skills in advanced statistical modelling and measurement approaches such as structural equation modelling, multi-level modelling, log-linear modelling, neural networks and decision trees, and Markov Chain Monte Carlo simulation methods
- good communication, presentation and interpersonal teamwork skills, developed through assignment work, seminar presentations and class discussion.

Students will have the opportunity to undertake research including an industrial/research project and/or assignments involving practical problems and data of relevance to their work interests. Students will therefore gain experience in the areas of problem formulation, data preparation, data analysis and reporting of results in a work situation.

Career opportunities

Statistics is a much-needed tool in many industries. Graduates from this program may find research, management and consultancy positions in areas such as market research, government agencies, medical and biological sciences, town planning, social research, education, banking and insurance. The SAS Institute often finds summer employment with one of their customers for students who have completed Further Statistical Computing (HMS781).

Admission requirements

Applicants may enter the program at Level 1 (graduate certificate) and progress through to Level 2 (graduate diploma) and Level 3 (master). Applicants are expected to have an undergraduate degree in any discipline, normally including some basic knowledge of descriptive statistics. Non-graduates with a suitable background, such as several years of practical statistical experience in industry, may also be admitted to the graduate certificate or graduate diploma level.

Exemptions

Applicants with equivalent postgraduate studies may gain exemptions for a maximum of 50 per cent of the graduate certificate, graduate diploma or master programs. In most cases, a maximum of one exemption in the graduate certificate, two in the graduate diploma and three at the master level may be granted.

For conditions of Swinburne's Credit Transfer and Exemptions policy, visit <http://policies.swinburne.edu.au/ppdonline>

Program details (continued)

Location

Hawthorn campus, as well as online and distance education delivery, depending on the level of study.

Program length

Graduate certificate: Six months full-time or equivalent part-time

Graduate diploma: One year full-time* or equivalent part-time

Master: One-and-a-half years full-time* or equivalent part-time

*Check units of study table for delivery options.

Time commitment

One credit point is deemed equivalent to one hour of student work per week, whether in contact with staff or private study. A student's typical weekly workload is expected to be 50 hours (full-time) or 25 hours (part-time) per semester. This may vary for master students when completing their industrial/research project.

Assessment

Assessment normally consists of online quizzes, assignments and tests or exams.

Single units of study

If places are available, applicants may undertake a particular unit or units from the program on a single-unit basis. The cost of individual units is available on request.

Program structure

All units of study are valued at 12.5 credit points unless otherwise stated. Students may negotiate to replace one unit of study from Level 1 and/or Level 2 with a suitable unit of study from the next level.

Graduate Certificate of Science (Applied Statistics)

Successful completion of the graduate certificate requires students to complete two core units, Statistical Practice 1 (HMS770) and Statistical Practice 2 (HMS771), plus two additional Level 1 units. With the approval of the course convenor, Level 2 units may be taken. Students must complete units to the value of 50 credit points. For students studying part-time, it is recommended that they complete HMS770 and HMS772 in their first semester.

Graduate Diploma of Science (Applied Statistics)

Successful completion of the graduate diploma requires students to complete eight units of study: in addition to the requirements of the graduate certificate, students must complete the core unit Multivariate Statistics (HMS780) plus three additional units. Students must complete units to the value of 50 credit points.

Master of Science (Applied Statistics)

Project master (option one)

Successful completion of the project master degree requires students to complete 10 units of study plus two project units. A distinction average is required for students taking this option. Students must complete units to the value of 150 credit points.

Non-project master (option two)

Successful completion of the non-project master degree requires students to complete 12 units of study. Students must complete units to the value of 150 credit points.

Units of study

Level 1 units [#]	
HMS770	Statistical Practice 1 (compulsory)
HMS771	Statistical Practice 2 (compulsory)
HMS772	Basic Statistical Computing
HMS777	Research Design
Level 2 units	
HMS780	Multivariate Statistics (compulsory)
HMS781	Further Statistical Computing
HMS782	Forecasting
HMS786	Survey Sampling
Level 3 units	
HMS790A	Industrial/Research Project A (part-time)
HMS790B	Industrial/Research Project B (part-time)
HMS791	Structural Equation Modelling**
HMS793	Advanced Topics in Regression*
HMS794	Statistical Marketing Tools**
HMS796	Using R for Statistical Analysis*

Note: All units are available online. The on-campus delivery option for level 2 and 3 units may not be available in any given semester.

*Unit is only offered during Semester 1

**Unit is only offered during Semester 2

[#]Level 1 units are available online only

Units of study outlines

HMS770 Statistical Practice 1

Prerequisite: Some knowledge of basic statistics

This unit aims to provide students with a computer-based introduction to the basic concepts and practice of data collection, analysis and presentation, including statistical estimation and testing. It aims to use data that relates to real situations where students will have to decide which methods to apply and how to report the results. It also teaches students how to use appropriate methods for finding relationships, how to establish whether groups differ significantly on particular characteristics and to estimate population parameters.

HMS771 Statistical Practice 2

Prerequisite (part-time students):
Statistical Practice 1 (HMS770)
Co-requisite (full-time students):
Statistical Practice 1 (HMS770)

This unit builds on the set of statistical analyses covered in Statistical Practice 1 (HMS770). The comparison of the means of two populations is extended to three or more populations using one-way analysis of variance (ANOVA). The analysis of variance technique is studied in detail with the following methods covered: between subjects ANOVA, within subject ANOVA, mixed design ANOVA and randomised factorial ANOVA. This unit concentrates on testing the assumptions of these techniques, running the appropriate analysis using SPSS statistical software and writing detailed reports which communicate effectively the statistical findings. The study of regression is extended to include an in-depth look at the theory behind simple linear regression and the assumptions underlying the technique. Data transformations are also covered. The unit finishes with a detailed look at a number of non-parametric tests.

HMS772 Basic Statistical Computing

In this unit, students will develop competence in the use of personal computers and associated statistical packages. They will also obtain a level of statistical computing literacy necessary for applied statistical research. Students are introduced to, and explore features of, IBM SPSS Statistics for Windows (PASW statistics), the mainstream statistical software package. Basic descriptive statistical techniques are used as applications. Topics covered include setting up SPSS data files and tables, data definition, analysing categorical and metric variables, descriptive statistics, graphing data, computing new variables, recoding, selecting data, SPSS syntax, and importing, exporting and merging SPSS data files.

HMS777 Research Design

This unit provides an overview of the steps in designing a social survey, including survey planning and preparing a survey proposal. Procedures used in survey research include question and questionnaire design, and survey data collection techniques: mail surveys, telephone and face-to-face interviews, and online data collection methods. An introduction to sampling will expose students to probability and non-probability methods of sampling and associated issues. Other topics include data editing, coding and quality control of survey data in preparation for processing and analysis, plus an introduction to scale development and the analysis of secondary data. This unit also introduces students to processes used to collect observational and experimental data and the calculation of measures used to describe incidence and prevalence, an introduction to rate standardisation and the different types of study designs commonly used in health statistics and elsewhere. Examples are drawn from sociology, market research, psychology, medical sciences and other areas as appropriate.

HMS780 Multivariate Statistics

Prerequisite: Statistical Practice 2 (HMS771)

This unit aims to identify and apply appropriate multivariate statistical techniques to problems that are commonly encountered in social research. Topics include multiple regression, factor analysis, multivariate analysis of variance, logistic regression and discriminant analysis. Data screening techniques and testing the assumptions underlying particular techniques are an integral part of the unit. Emphasis is placed on analysing real data using the SPSS statistical package, with particular focus on communicating and reporting the results from multivariate analysis, and understanding the strengths and limitations of the various techniques.

HMS781 Further Statistical Computing

Prerequisite: Statistical Practice 1 (HMS770)

In this unit, students learn how to use the SAS programming language in order to accomplish typical data processing tasks and simple statistical analyses. It focuses on the key areas of reading raw data files and SAS data sets, writing results to SAS data sets, subsetting data, combining multiple SAS data files, creating variables and recoding data values, creating listing and summary reports, summarising data, processing data iteratively with DO loops and arrays, and performing data manipulation and transformations. Students will expand their knowledge and skills in the development, management and manipulation of databases, especially in regard to relational database management systems (RDBMS).

Units of study outlines (continued)

HMS782 Forecasting

Prerequisite: Statistical Practice 1 (HMS770)

This unit introduces index numbers and forecasting methodologies used to facilitate managerial planning and decision-making. It covers time series forecasting where the emphasis is on prediction using extrapolative methods, allowing for trend, seasonality or cyclic behaviour. Decomposition and exponential smoothing plus judgemental techniques are introduced, as well as regression methods. The unit also explores the Box–Jenkins methodology covering autoregressive (AR) models, moving average (MA) models, autoregressive integrated moving average (ARIMA and SARIMA) models and AutoReg models.

HMS786 Survey Sampling

Prerequisite: Statistical Practice 1 (HMS770)

This unit introduces the theory and practice of sampling methods used for social surveys, including designing samples, obtaining estimates and sampling errors. Emphasis is placed on basic probability methods such as simple random sampling, stratified sampling, cluster sampling and multi-stage sampling, and non-probability sampling methods will also be discussed. Use of SAS software allows students to analyse the resulting data using appropriate complex sample methods.

HMS790A and HMS790B Industrial/ Research Project (part-time)

Prerequisite: Graduate Diploma of Science (Applied Statistics)

The industrial/research project assists students to draw together and utilise the techniques and skills presented in other parts of the course. The unit content varies from student to student, depending on the project undertaken. Students choose and apply appropriate statistical analysis to a realistic problem and write a report on the results. The topic may be of the student's own choosing or obtained from a supervisor.

HMS791 Structural Equation Modelling

Prerequisite: Multivariate Statistics (HMS780)

Structural equation modelling (SEM) is a powerful technique used to test complex relationships between observed and unobserved variables across a range of discipline areas. In this unit, the underlying theory and principles of SEM are demonstrated and students will become familiar with a variety of applications through the use of the AMOS computer package. Specified models allow confirmatory factor analysis, higher-order models, invariance testing, path analysis, mediational models and full measurement and structural models. Problems frequently encountered in SEM are explored and students are expected to read and critically evaluate journal articles reporting the results from SEM analysis.

HMS793 Advanced Topics in Regression

Prerequisite: Multivariate Statistics (HMS780)

This unit familiarises students with additional advanced statistical modelling techniques, including the generalised linear model (GLIM) which underlies many of the statistical analyses used in applied research. Topics include multiple regression, non-linear regression, multi-level regression, logistic regression (binary, ordinal and multinomial), log-linear modelling and survival analysis.

HMS794 Statistical Marketing Tools

Prerequisite: Multivariate Statistics (HMS780)

Investigating the underlying structure of market research and social science data, this unit uses a number of dimensional analyses, segmentation and preference mapping techniques. Topics include conjoint analysis, cluster analysis, correspondence analysis and multi-dimensional scaling techniques. The philosophy, techniques and implications of data mining approaches are explored and practical problems will be used to illustrate the application of association analysis, with market basket analysis and sequence analysis. The unit also covers prediction and classification analysis using regression, decision trees, neural networks and other methods. Students will use appropriate data mining software such as SAS Enterprise Miner.

HMS796 Using R for Statistical Analysis

Prerequisite: Multivariate Statistics (HMS780)

This unit provides knowledge and skills to help students to understand basic syntax and programming in the statistical language R and to learn how to apply methods of data analysis using R software. Methods include advanced graphical representations, simulation and probability models, classical hypothesis testing, R modelling syntax, maximum likelihood estimation and Bayesian analysis using Markov Chain Monte Carlo simulation methods.

General information

Key staff

Associate Professor Brian Phillips,
BSc, BEd, MSc (SocSci)

Dr Denny Meyer, BSc (Hons), MBL, DBL

Dr Jahar Bhowmik, BSc (Hons),
MSc, MPhil, PhD

Dr Alec Stephenson, BSc (Hons),
MSc, PhD

Professor Stephen Clarke, DipEd,
BSc (Hons), MA, PhD

Professor Peter Jones, DipEd, BSc, PhD

Ms Diane Mainwaring, BSc (Hons),
MSc, DipEd, BLetters

Ms Neela Khan, BSc (Hons), MSc

Ms Vida Weiss, BSc (Maths) (Hons)

Other specialist lecturers are involved
in these programs as necessary.

Facilities

As a Swinburne student you will automatically gain access to a range of facilities. These include a well-resourced library, computer laboratories, fitness and health facilities, personal and career counselling, housing, and employment and financial advice.

Fees

In 2012, tuition fees for this program are based on \$1950 per 12.5-credit-point unit of study. In the event that a unit of study is derived from another program, the applicable fee will be that of the other program. All fees are reviewed each year and may increase without notice.

For all fee enquiries and up-to-date information, visit www.swinburne.edu.au/studentoperations/fees

FEE-HELP

FEE-HELP is a government-funded loan that helps eligible fee-paying students to pay their tuition fees. FEE-HELP is available to Australian citizens and holders of a permanent humanitarian visa. It is not available to New Zealand citizens and most holders of Australian permanent visas.

For further information, visit www.goingtouni.gov.au

Application procedure

You may lodge your application at any time, but each intake period has an application submission closing date. To obtain an application form, phone 1300 275 794 or visit www.swinburne.edu.au/postgrad/apply

Applications must be accompanied by a certified copy of your passport or birth certificate, a certified copy of academic transcripts and a current résumé.

To view current closing dates, visit www.swinburne.edu.au/postgrad

International students

If you want to study at Swinburne but are not an Australian resident, contact Swinburne International on +61 3 8676 7002 or 1800 897 973 within Australia, or visit www.swinburne.edu.au/international

Recognition of Prior Learning

Recognition of Prior Learning (RPL) allows students to be granted credit or partial credit towards a qualification in recognition of skills and knowledge gained through work experience, tertiary qualifications and/or formal training.

For more information, visit www.swinburne.edu.au/postgrad

Application closing dates

Study in applied statistics programs follows the Open Universities Australia (OUA) calendar, not the Hawthorn campus calendar, for all units offered in 2012.

Semester 1 – 17 February 2012
Semester 2 – 17 August 2012

Note: Dates are correct at the time of printing, but are subject to change. Visit www.swinburne.edu.au/studentoperations/calendar for current semester dates.

Further information

Telephone: 1300 275 794
Email: postgrad@swinburne.edu.au
Website: www.swinburne.edu.au/postgrad

Information sessions

Information sessions are held regularly throughout the year. They are a great opportunity to meet and talk to staff about your postgraduate study options.

The sessions help you understand what your chosen postgraduate program entails – what you can learn, what your study options are and where your qualification may take you.

For session dates visit www.swinburne.edu.au/postgrad

■ ANY QUESTIONS?

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■ CAMPUSES

Hawthorn campus
John Street, Hawthorn

Prahran campus
144 High Street, Prahran

Lilydale campus
Melba Avenue, Lilydale

Croydon campus
12-50 Norton Road, Croydon

Wantirna campus
369 Stud Road, Wantirna

Sarawak campus
Kuching, Sarawak, Malaysia



CRICOS Provider Code: 00111D

The information contained in this course guide was correct at the time of publication, September 2011. The university reserves the right to alter or amend the material contained in this guide. The information in this guide does not apply to international students. For information about courses for international students please go to www.swinburne.edu.au/international

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