STATISTICS DEPARTMENT REPORT

FOR

2002

Department of Statistics
School of Mathematics
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http://www.maths.unsw.edu.au/statistics/statshome.html

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1. INTRODUCTION

1.1 Activities in 2002

- William Dunsmuir returned in June after 18 months at the Division of Biostatistics at the University of Minnesota.
- Estate Khmaladze was appointed as Professor of Statistics at Victoria University of Wellington.
- Sally Galbraith joined us as Lecturer.
- Donna Mary Salopek joined us as Senior Lecturer
- Sally Wood and David Nott became Senior Lecturers.
- The Summer Statistics Workshop jointly with Sydney and Macquarie universities was held at UNSW.
- The Department continued its success in attracting research funds (details later).
- The Department continued its high level of research activity (details later).

2. STAFF

Professors

W.T.M. Dunsmuir, F.Dip. Math *R.M.I.T.*, BSc Hons *LaTrobe*, PhD *ANU.*

Senior Lecturers

P.J. Cooke, BSc Hons, MSc *NE*, MS PhD *Stanford.*
B. Goldys, MSc, PhD *Warsaw.*
D. Nott, PhD, *University of Queensland*
S.I. Penev, MSc PhD *Humboldt*.
D.M. Salopek PhD *Carleton University, Canada*
S. Wood PhD, *UNSW*.

Lecturers

S. Galbraith, B.Math (Hons), Mstats, FIAA

Associate Lecturers

D. Combe, BSc *Sydney*, MSc *London*, PhD *Sydney*.
S. Middleton, BSc *Monash* MSc *Dalhousie*.

Honorary Associate

J.B. Douglas, BSc MA DipEd *Melbourne. F.Aust.M.S.*

Visiting Lecturers

M. Hanke.

Emeritus Professors

M Hasofer*, BEE Faruk, Bec* PhD *Tas., MIEAust.*
C McGilchrist*,* BSc *BEd Qld.,* MSc PhD *UNSW.*

3. ADMINISTRATIVE RESPONSIBILITIES

Head of Department

Dr Peter J Cooke (January - June)

Professor William T.M. Dunsmuir (July - December)

PhD Program
Dr Ben Goldys

Postgraduate coursework (Master of Statistics Graduate Diploma in Statistics)
Dr Spiridon Penev

Honours Program
Dr Peter Cooke

Administrative Assistant
Nefertity Narouz

4. Journal Editorships and other Professional Service

Staff contributed editorships and professional services as follows.

4.1 Associate Editorships

ANZJS	William Dunsmuir (1995 – present)
Applied Statistics (JRSSC)	David Nott
Journal of the American Statistical Association	William Dunsmuir (2001 – present)
Methodology and Computing in Applied Prob.	William Dunsmuir (1997 – present)

4.2 Refereeing

Annals of Probability	Ben Goldys
Communications in Partial Differential Equations	Ben Goldys
Finance and Stochastics	Ben Goldys
Mathematical Finance	Ben Goldys
SIAM Journal on Control and Optimisation	Ben Goldys
Stochastic Processes and their Applications	Ben Goldys
Australian Journal of Combinatorics	Diana Combe
Bernoulli Journal	Spiro Penev
Journal of Algebraic Combinatorics	Diana Combe
Mathematical Finance	Donna Salopek
Parabola	Peter Cooke
Statistica Sinica Journal	Spiro Penev
Test Journal	Spiro Penev
The American Statistical Association and Australian & New Zealand Journal of Statistics	David Nott
The American Statistical Association & JCGS	Sally Wood

The Journal of the Royal Statistical Society	David Nott
Field Studies	Diana Combe

4.3 Conference Organizations

Australian Statistical Conference 2004	William Dunsmuir

4.4 Workshop Organization

Summer Statistics Workshop	Peter Cooke (22 February 2002)

4.5 Professional Societies

Society	***Person***	***Role***
Scholarship interviews held by NSW Department of Education	Diana Combe	Member
NSW Board of Studies Mathematics	Diana Combe	Member

4.6 Other Services

Honorary Associate, University of Sydney	Diana Combe
Reviewer of Books for Kluwer	Ben Goldys
Reviewer of grant applications for ARC	Ben Goldys
Reviewer of Netherlands Mathematics Research Foundation	Ben Goldys
Reviewer of Netherlands Organisation for Scientific Research	Ben Goldys
Reviewer of Czech Academy of Sciences	Ben Goldys
Reviewer of Science Foundation Ireland	Ben Goldys
Invited Discussant	Sally Wood

5. RESEARCH

5.1 Research Groups

The Department of Statistics has an active program of research in contemporary fields of statistical modelling and stochastic processes including:

- Spatio-temporal modelling
- Statistical Methods
- Stochastic Processes
- Stochastic Modelling in Finance

Spatio-temporal Modelling

Group Members in 2002 were *William Dunsmuir, Ben Goldys, and David Nott.*

This group is concerned with the study of random processes which evolve in time, space or both with particular applications to:

- modelling meteorological and pollution fields

- image analysis
- simulation and estimation of random fields and their characteristics
- analysis of random sets and change set problems
- time series modelling
- partial differential equation models for space-time random phenomena

Statistical Methods

Group Members in 2002 were *Diana Combe, Peter Cooke, Spiro Penev, Sue Middleton, and Sally Wood.*

This group is concerned with developing theory and methods in statistical analysis for:

- extreme events
- binary, categorical and survival data
- nonparametric methods
- goodness of fit theory
- rare events
- survey data
- longitudinal and Clustered Data
- structural equation models
- wavelet methods in statistics
- efficient estimation for dependent data.

Stochastic Processes and Financial Analysis

Group Members in 2002 were *William Dunsmuir, Ben Goldys, and Spiro Penev.*

Areas of interest include:

- theory and implementation of term structure models
- pricing and hedging of exotic options
- stochastic volatility models
- portfolio optimisation
- Poisson processes and their extremes
- extremes of time series.
- time series of counts
- fractal processes
- processes with long range dependence
- limit theorems for stochastic processes
- set and function - parametric empirical processes
- scanning martingales
- point processes

Bayesian Methods

Group Members in 2002 were *Sally Wood, David Nott, and Ben Goldys.*

Areas of interest include:

- Nonparametric regression
- Variable selection
- Finite mixture model
- Space-time models

5.2 Research Activities of staff and postdoctoral researchers

During 2002 members of the department worked on a wide range of research problems. The main research activities are given below.

Diana Combe continued research on combinatorial designs and on generalised Bhaskar Rao designs, and on regular labellings of graphs and digraphs over abelian groups.

Peter Cooke continued research on extreme value theory. In particular, inference in the model of maxima as opposed to the model of extremes. Applications to ecology and sporting records are being pursued.

Jim Douglas continued further investigation of mixture distributions, especially relating to discrete distributions. Small sample confidence intervals from Jackknife and Bootstrap procedures. Modelling "repeated offenders" data.

William Dunsmuir continued joint research with David Nott on spatio-temporal modelling of meso-scale weather with a particular focus on modelling wind fields in the Sydney area. Other collaborators included Ms Elly Spark (Manager of the Sydney 2000 Olympic Weather Services), Professor Robert Kohn of the AGSM, Dr Chris Wikle of University of Missouri. During 2001 he expanded his research in time series methods for counts with applications to public health.

Sally Galbraith continued her research on Biostatistics, particularly biostatistical methodology for longitudinal and missing data in clinical trials. Specific areas of research related to PhD include random effects models, interim analysis and group sequential methods surrogate outcomes, & design & analysis issues for clinical trial substudies.

Ben Goldys continued his research on analytic properties of transition semigroups corresponding to solutions of stochastic partial differential equations. The results obtained were applied to the analysis of ergodic properties of some infinite dimensional diffusions. Commenced research on optimal ergodic control of stochastic partial differential equations, and on stochastic volatility models in Finance.

David Nott's research interests are in spatio-temporal modelling and Bayesian computation. Recent work has been concerned with space-time regression methods for correction of deterministic environmental models. Another area of interest has been Markov chain Monte Carlo sampling schemes for Bayesian variable selection.

Spiridon Penev continued research on wavelet-based methods for non-parametric curve estimation. His attention has been on improving inference when additional information about the curve is available. A suitable modification of the standard cross-validation method for choosing resolution level for nonlinear wavelet curve estimators has been developed. Another area of interest has been defining latent individual residuals in Structural Equation Models and investigating their properties. He has also renewed his interest in efficient estimation for models with dependent data.

Donna Mary Salopek continued her work on Weighted local times for fractional Brownian motion and applications to finance (with Y. Hu & B. Oksendal). Saddlepoint approximations to option price in a general model (with J. Xiong & A. Wong)

Sally Wood's research interests are in Bayesian methods & Markov chain Monte Carlo sampling schemes. Finite mixture models: In particular finite mixture models are used to make non-parametric regression inferences in a flexible manner.

5.3 Research Grants And Scholarships

Research Grants for 2002

D. Combe	\$15,000	Combinatorial Designs	URSP Grant
D. Nott	\$15,000	Bayesian Approaches to rainfall-runoff model selection in hydrology	URSP Grant
D. Nott		Bayesian inference for complex regression models using mixture	ARC Grant
S. Penev & B. Goldys	\$15,000	Asymptotically optimal estimation for ergodic Markov chains	URSP Grant
Department	\$35,000	Various projects	Research Support Scheme

The current level of ARC funding is approximately \$150,000.

6. PUBLICATIONS APPEARING IN 2002

6.1 Refereed papers

Nott, D.J, and Dunsmuir, W.T.M., Estimation of nonstationary spatial covariance structure, *Biometrika*, **89**(4) (2002), 819-829.

Galbraith, S., and Marschner, I.C., Guidelines for the design of clinical trials with longitudinal outcomes. *Controlled Clinical Trials*, **23** (2002), 257-273.

Goldys, B., and Maslowski, B., Parameter estimation for controlled semilinear stochastic systems: identifiability and consistency, J*. Multivariate Analysis* **80** (2002), 322-343

Chojnowska, A. and **Goldys, B**., Symmetric Ornstein-Uhlenbeck Semigroups and their Generators, *Probability theory and Related Fields,* **124** (2002), 459-486

Da Prato, G., Debusche, A. and **Goldys, B.,** Some Properties of Invariant Measures of Non-Symmetric Dissipative Stochastic Systems, *Probability Theory and Related Fields*, **123** (2002), 355-380.

Marshall, L., Sharma, A., and **Nott, D.J**., Applications of Bayesian methods in conceptual rainfall-runoff modelling in: *Proceedings of the 27th Hydrogology and Water Resources Symposium* (2002).

Raykov, T., and **Penev, S.,** Exploring structural equation model misspecifications via Laten individual residuals, George A. Marcoulides, Irini Moustaki (ed), *Latent Variable and Latent Structure Models. Lawrence Erlbaum Associates, Inc.,* (2002), 121-134.

Raykov, T., **Penev, S.**, Interval estimation of latent correlations in structural equation models with a priori restricted parameters, *Understanding Statistics*, **1(3)** (2002), 139-155.

Salopek, D.M., A new class of nearly self-financing strategies, *Statistics and Probability Letters*, **56**, (2002) 69-75.

Salopek, D.M., Estimating the P-variation index of a sample function: An application to financial data set, *Methodology and Computing in Applied Probability*, **4**, (2002) 27-53.

Wood, S.A., Jiang, M., and Tanner, M., Bayesian mixture of splines for spatially adaptive nonparametric regression, *Biometrika,* **89(3)** (2002), 513-528.

6.2 Books

6.3 Book Reviews

6.4 Other publications

6.5 Research Reports

Cripps, E., Nott, D., Dunsmuir, W.T.M., and Wikle C., Space-time modelling of Sydney harbour winds, *Report S02-1*.

Leonte, D., Nott, D., Dunsmuir, W.T.M., Smoothing and change point detection for Gamma ray count data, Report *S02-2*.

Nott, D., Leonte, D., Sampling schemes for Bayesian variable selection in generalized linear models, *Report S02-3*.

Goldys, B., Van Neerven, J.M.A.M., Analyticity of Ornstein-Uhlenbeck semigroups and invariance for reproducing Kernel Hilbert spaces, *Report S02-4*.

Davis, R.A, **Dunsmuir, W.T.M**. and Streett, S.B., Observation driven models for Poisson counts, *Report S02-5*.

Dunsmuir, W.T.M., Meyn, S.P., and Roberts, G., Memorial article Richard Lewis Tweedie, *Report S02-6*.

Dunsmuir, W.T.M., Spark, E., Kim, Sung-Kwan and Chen, S., Statistical prediction of sea breezes in Sydney Harbour, *Report S02-7.*

Cripps, E., and **Dunsmuir, W.T.M.,** Modelling the variability of Sydney Harbour wind measurements, *Report S02-8*.

Goldys, B. and Van Neerven, J.M.A.M., Transition semigroups of Banach space valued Ornstein-Uhlenbeck processes, Report *S02-9*.

Nott, D.J., Kuk, A.Y.C. and Duc, H., Efficient sampling schemes for Bayesian mars models with many predictors, *Report S02-10*.

Brace, A., **Goldys, B.**, Van Der Hoek, J. and **Womersley, R.**, Markovian models in the stochastic implied volatility framework, *Report S02-11*.

Kawai, A., Analytical and Monte Carlo swaption pricing under the forward swap measure, *Report S02-12*.

Kawai, A., A new approximate swaption formula in the libor market model: An asymptotic expansion approach, *Report S02-13*.

Tiplea, C., On the super-replication approach for American multiasset derivatives, *Report S02-14*.

7. CONFERENCES, SEMINARS AND PUBLIC PRESENTATIONS

D. Combe

At the Australian Mathematics Society annual conference in Newcastle held in September spoke on “Magic labellings of graphs over finite abelian groups”.

At the 27ACCMCC (27^{th} Australasian Conference on Combinatorial Mathematics and Combinatorial Computing) in Newcastle held in December spoke on “Edge-magic total labellings of graphs over abelian groups”.

Also, joint author of presentation on “Bhaskar Rao designs and dihedral groups”.

Ed Cripps

RSSS 2001 Theme Conference of the Royal Statistical Society on Spatial Modelling, Glasgow, UK.

B. Goldys

Invited to give talks at the
Summer Statistics Workshop, Sydney.
Stochastic Evolution Equations and Applications, Oberwolfach
Infinite Dimensional Systems, Pisa, Italy
Mathematic of Finance, Bedlewo, Poland

Seminars and Lectures
Seminar at Scuola Normale Superiore
Mini courses on transition semigroups of Ornstein-Uhlenbeck processes, The University of Trento, Italy and Eurandom, Netherlands.
Mini course on stochastic control of diffusions, Delft University.

S. Penev

- “Choosing primary resolution level for nonlinear wavelet curve estimators” talk presented at UNSW 20/03/01.
- Attended the 24^{th} European Meeting of Statisticians and 14^{th} Prague Conference on Information Theory, Statistical Decision Functions and Random Processes. Gave a talk: B. Goldys and S. Penev, MLE estimation in a mixture of Ornstein-Uhlenbeck processes.

S. Wood

Conference presentation at Mathematical Sciences Research Institute, Berkeley California on nonlinear estimation and classification

8. VISITS AND VISITORS

8.1 Special Studies Program

8.2 Visits

B. Goldys, visited
Polish Academy of Sciences
Scuola Normale Superiore, Italy
The University of Trento, Italy
Delft University

8.3 Visitors

Professor Frank Bennet visited Dr D. Combe from 2/12/02 – 6/12/02.
Professor Rame Gupta visited Dr P Cooke from 18/03/2002 – 21/03/2002.
Professor Last visited Dr Peter Cooke from 8/04/2002 – 10/04/2002.
Professor Nanuli Lazrieva visited Dr E Khmaladze from 1/12/2001 – 15/01/2002.
Professor Yoshihiko Maesono visited Dr S Penev from 16/07/2002 – 19/07/2002.
Dr William Palmer visited Dr D Combe from 1/07/2002 – 31/12/2002.
Dr Shafiqur Rahman visited Dr P Cooke from 17/04/2002 – 17/04/2002.
Professor Michael Rockner visited Dr B Goldys from 6/10/2002 – 14/10/2002.
Dr Martin Skold visited Dr D Nott from 24/09/2002 – 26/09/2002.
Miss Camelia Tiplea visited Dr B Goldys from 3/02/2002 – 20/03/2002.

9. RESEARCH WORKSHOPS

The Inaugural Macquarie University/UNSW/Sydney University Summer Statistics Workshop on “Probability and Statistics” on Friday 22 February 2002. Approximately 60 people attended the workshop from various institutions around Sydney.

Speakers and topics were:

Mary Phipps, Sydney University: Quasi-Exact Tests.

Jun Ma, Macquarie University: Multiplicative Correction Algorithms for Positive MPL in Large Linear Inverse Problems.

Ben Goldys, University of NSW: Ergodic Properties of Some Stochastic Dissipative Systems.

Marc Raimondo, Sydney University: Periodic Boxcar Deconvolution and Diophantine Approximation.

Andrzej Kozek, Macquarie University: On a Class of M-Estimators of Quantiles.

Donna Mary Salopek, University of NSW: Estimating the p-variation Index of a Sample Function: An Application to a Financial Data Set.

Alex Novikov, University of Technology, Sydney: Pricing of Discretely Monitored Financial Options.

Shelton Peiris, Sydney University: Autoregressive Conditional Duration (ACD) Models and their Applications in Finance.

Malcolm Hudson, Macquarie University: Risk Models in Individual Decision Making.

Chris Lloyd, Australian Graduate School of Management: Estimating False Negative Fraction for a Multiple Screening Test When Individuals Negative on all Tests are not Verified.

10. DEPARTMENTAL SEMINARS

The Department has three seminar series. The first is designed for general talks on mathematical statistics and applications; the second is concerned with financial mathematics while the third is our "in-house" research seminar.

10.1 Statistics Seminars (joint with Australian Graduate School of Management)

Organizer: *Dr S Wood*

1. Bayesian P-Splines
   Dr Stefan Lang, Institute for Statistics, Ludwig-Maxillians-Universitat Muenchen
   March 6.

2. Fisher information in terms of the (reversed) hazard rate
Professor Rameshwar D. Gupta, Department of Math., Stat. & Comp. Sc., University of New Brunswick
March 20.

3. An introduction to generalized AR(1) models and applications
Dr Shelton Peiris, School of Mathematics and Statistics, The University of Sydney
March 21.

4. Statistical inference under inequality constraints in parametric models: An overview
A/Professor Mervyn J. Silvapulle, Department of Statistical Science, La Trobe University
March 22.

5. Contact distribution of Boolean models
Professor Gunter Last, Technische Universitat Karlsruhe (TH)
April 9.

6. Algorithms for Bayesian computation and an application in final offer arbitration
Time Swartz, Simon Fraser University, Canada
April 10.

7. Generalized model selection criterion
Dr M.S. Rahman, Department of Mathematics, University of Papua New Guinea
April 17.

8. Hierarchical functional data in colon carcinogenesis
Distinguished Professor Raymond J. Carroll, Department of Statistics, Texas A&M University, USA
June 5.

9. Higher order normalizing transformation for asymptotic U-statistics
Associate Professor Yoshihiko Maesono, Faculty of Economics, Kyushu University, Fukuoka, Japan
July 17.

10. Statistical model selection: comparing AIC and BIC
Associate Professor Paul Kabaila, Department of Statistical Science, La Trobe University
August 24.

11. Lies, damn lies, and dimension estimate: towards a coherent value of d_2
Dr Leonard A. Smith, Pembroke College, Oxford and London School of Economics
August 13.

12. Interim analysis of continuous long-term endpoints in clinical trials with longitudinal outcomes
    Ms Sally Galbraith, Department of Statistics, University of New South Wales
    August 23.

13. Are normal kidneys Gaussian
    Dr Inge Koch, University of Newcastle
    August 26

14. Asymptotics for self-normalized sums with applications in statistics
    Dr Qiying Wang, Australian National University, Centre for Mathematics and its Application
    August 27

15. Some recent results on spatial data modeling by MCMC methods by Fuchun Huang
    Dr Fuchun Huang, School of Information Technology, Deakin University, Melbourne
    August 27

16. Graphical models for autoregressions
    Dr Marco Reale, Mathematics and Statistics Department, University of Canterbury, Christchurch, New Zealand
    August 27

17. Multivariate conditional independence models
    Ms Helen Armstrong, Department of Statistics, University of New South Wales
    September 4

18. Continuous-time models and kernel smoothing to center or not: How and when
    Dr Martin Skold, Cisiting Scholar at Australian National University
    September 25

19. l_p -Analysis for the Kolmogorov operators
    Professor Michael Roeckener, School of Mathematics, Bielefeld University, Germany
    October 9

20. Testing for equality of distributions in very high dimensions
    Professor Peter Hall, Australian National University, Canberra
    October 10

21. Testing the diffusion coefficient
    Dr Torsten Kleinow, Ulm University, Germany
    October 11

22. Nonparametric estimation of component distributions in multivariate mixture
    Professor Peter Hall, Australian National University, Canberra
    October 11

23. The Geometry of Generalized Linear Models
Professor Graham Wood, Macquarie University
November 20

24. Examining time-invariance of reliability in repeated assessment studies with multiple measures: A covariance structure modeling approach accounting for observed variable specificity
Professor Tenko Raykov, Department of Psychology, Fordham University, New York
December 2

25. On the effective dimension of some high dimensional financial problems
Dr Xiaoqun Wang, Tsinghua University and University of NSW
December 4

26. An extension of vector autoregressions
Professor G. Tunnicliffe-Wilson, University of Lancaster
December 11

27. A valuation algorithm for incomplete markets
Professor Marek Musiela, BNP Paribas London
December 17

28. A random pattern-mixture model for longitudinal data with dropouts
A/Professor Sarah Ratcliffee, Department of Biostatistics and Epidemiology, University of Pennsylvania School of Medicine
December 18

10.1 Other Seminars

"Existence of pairwise balanced designs with block size 5"
Professor Frank Bennett
December 6

11. STATISTICAL CONSULTING

Consulting to the University Community.

A major activity of the Department has always been to assist student and staff colleagues, throughout the University and its associated teaching and research hospitals, with advice on statistical questions which arise in their research endeavours. This has been a particularly rewarding activity for the Department and its clients. It provides this service through direct contact with Department staff and through the Master of Statistics consulting class.

An associated activity was continuation of presenting the subject "Statistical Methods for Research Workers". Sue Middleton led the design, marketing and delivery of this important activity. In 2002 over thirty postgraduate students and research staff attended and rated it very highly.

Consulting to the Wider Community

Statistical consulting to commerce and government is an important service that the staff of the department provides. The expertise of the staff is put to work through statistical consulting which often also provide the impetus for further research. The following is a list of some of the consulting projects undertaken in 2002 by members of the Department.

P. Cooke

- Water usage predictions, Caroma International P/L.
- Expert witness and consultant.

J. Douglas

- Analyses of patterns of child abuse (DOCS).

12. PROFESSIONAL DEVELOPMENT COURSES

Statistical methods for research workers course attracted lots of people from various research fields throughout the academic, medical and business communities. This course is designed to help researchers to understand the fundamentals of using statistical techniques in their research. The course was offered twice this year with about 30 students participating each time.

13. GRADUATE PROGRAM

Scholarships

H. Armstrong	APA
E. Cripps	APA

13.1 PhD Program

The department provides an excellent environment for pursuit of a research postgraduate degree in applied and theoretical statistics and probability. PhD research can range from development of theory and methods to novel applications and extensions of existing methods to practical problems of interest in a range of disciplines. Joint supervision is possible with other faculties in areas such as science, engineering, commerce, or the Australian Graduate School of Management.

Daniela Leonte was awarded the Australian Statistical Society's (NSW Branch) "Award for postgraduate excellence" for her presentation in November 2001 of her PhD work. In 2000, Ed Cripps was awarded the inaugural such award.

Current PhD Students

Student	Supervisor	Topic
H. Armstrong	P Cooke	*Causality*
S. Chen	B. Goldys/ W.T.M. Dunsmuir	*Statistical analysis of interest rate models*
E. Cripps	D. Nott/R. Kohn	*Hierarchical models with application to Sydney Harbour winds*
D. Leonte	D. Nott/ W.T.M. Dunsmuir	*Statistical analysis of spatial environmental information.*
K. Dharmawan	B. Goldys	*Robustness of exotic options*
G. Harris	R. Kohn	*Statistical approach to modelling financial asset returns*
J.S. Park	R. Kohn	*Stochastic volatility models*
E. Spark	W.T.M. Dunsmuir/ L. Leslie	*The mesometeorology of Sydney*

Graduating

Student	Supervisor	Topic
A. Kawai	B. Goldys	*Pricing swaptions in LIBOR rate model*

13.2 M.Stats Program

The Master of Statistics Course covers a wide range of statistical theory and practice and provides advanced training for those who are currently or are aiming to become, practising statisticians. The course may be completed in one and a half years of full-time or three years of part-time study.

Entry is available to graduates with a pass degree in Statistics or an honours degree in a related field (commonly Mathematics) with supporting studies in statistics. Honours graduates in Statistics may be exempted from a maximum of one third of the lecture subjects and could complete the degree with one year of full time study. Graduates from other suitable fields of study such as engineering, commerce or business studies can be admitted to the program via an individually specified qualifying program of study.

Graduate Diploma in Statistics is intended for graduates with a background in Statistics wishing to further develop their knowledge and skills in Statistical science. It offers the opportunity to undertake advanced training in areas such as medical statistics, financial mathematics and industrial statistics. The course may be completed in one year of full-time or by part-time study over a longer period.

Entry is available to graduates with a pass degree in fields such as Statistics, Econometrics or Commerce or Business Studies with a major in statistics. Graduates from other suitable fields of study with a strong quantitative foundation, such as engineering or science, can be admitted to the program via an individually specified qualifying program of study.

Graduates in Masters of Statistics

Student	Supervisor	Topic
A. Jiams	P. Cooke	*Financial Mathematics*

Mathematics and Finance Projects

L. Tierney	B. Goldys	*Pricing options using control theory*

14. UNDERGRADUATE PROGRAM

Honours graduates

Student	Supervisor	Topic
A. Barber	R. Womersley	*Discretization methods for diffusion equations with an application to options pricing under stochastic volatility*
S.L.W. Chan	B. Goldys	*On the convergence of hedging strategies*
P. Goodman	B. Goldys	*Firm valuation approach to pricing corporate bond options using Barrier options, (first class)*
Zhi Guo	Ben Goldys	*A Heston-type implied volatility model, (first class)*
S. Yeung Lamko	S. Penev	*Bootstrap Methods with Time Varying Volatility*

Vacation Scholars

Student	Supervisor	Topic
Nancg Guo	D. Nott	A*nalyses of Gene Expression Microarray Data*

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