COMPLEX SYSTEMS
BEYOND THE METAPHOR
Your Mathematical Toolset
One-Week Intensive Course
5-9 February, 2007
University of New South Wales

A techniques based rather than applications based course, using theory to cast light on simulations.
Supplying more tools for your toolset ... for today and the future.

This course is designed for:

Topics:
- Complexity theory
- Non-linear dynamics
- Artificial intelligence
- Networks and Graphs
- Statistical learning
- Complexity modeling

Speakers:
- Professor David Green, Monash University
- Associate Professor Bruce Henry, UNSW
- Professor David Hill, Federation Fellow, ANU
- Professor Robert Marks, AGSM
- Professor Matthew Wand, UNSW
- Professor Janet Wiles, Queensland University

Program includes tutorials and computer workshops

Registration:
Mayda Shahinian
Email: m.shahinian@unsw.edu.au
Telephone: 02 9385 7037

Course Fees:
Full week: $650
Early Bird: $600 (Closing date 22 December, 2006)
2 participants from the same company: $1,100
Postgraduate Students: limited places.

Contact for more information:
Associate Professor Bruce Henry
School of Mathematics and Statistics
University of New South Wales
Sydney NSW 2052
Email: B.Henry@unsw.edu.au
Telephone: 02 9385 7044

Venue: AGSM, UNSW
Travel Support and Reduced Registration:
PhD students and early career researchers may be eligible for travel support and/or reduced registration. For details see the website.

Website:
http://www.maths.unsw.edu.au/complexity.html
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Speakers & Topics:

David Green
- introduction to complexity definitions, measures
- complexity paradigms in nonlinear dynamics, networks, computation
- emergence, self-organisation, criticality, modularity, feedback,
- simulations, applications

Bruce Henry
- chaos
- fractals
- anomalous diffusion
- fractional calculus

Janet Wiles
- genetic networks
- cellular automata
- neural nets

Robert Marks
- the science and art of modelling
- generative social science theory and techniques
- agent-based models in designing markets, including learning

David Hill
- complex networks introduction
- random graphs, small world, scale free
- network dynamics, synchronization, collapse
- network control

Matt Wand
- elements of statistical learning
- cross-validation, curse of dimensionality
- support vector machine classification
- semiparametric regression

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# COMPLEX SYSTEMS - BEYOND THE METAPHOR

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Speaker Profiles:

Prof Green came to Monash following eight years as Professor of Information Technology at Charles Sturt University. Before that, he worked at ANU for 16 years, including an ARC Senior Fellowship, and played a leading role in setting up the Australian Government’s Environmental Resources Information Network.

In a research career spanning more than thirty years, he has applied computers to problems as diverse as starfish, bushfires, DNA, and social issues. He is editor of the journal Complexity International and author of several books on the new field of complexity. His research has also included online GIS and distributed information systems.

In the early 1990s, he established several pioneering online information services, such as the Guide to Australia and the New South Wales HSC Online. He also played a key role in international efforts to compile comprehensive databases of the world’s biodiversity.

A/Prof Bruce Henry received his PhD in 1985 from UNSW for his thesis on the dynamics and statistical mechanics of nonlinear lattices. Following appointments as a Postdoctoral Fellow at the University of Waterloo, Canada, and Queen Elizabeth II Fellow at the Australian National University, he was appointed Lecturer in Applied Mathematics at UNSW. His teaching covers calculus, differential equations, mathematical modelling, biomathematics, nonlinear dynamics and chaos.

A/Prof Henry was co-organizer of: the Summer School on Nonlinear Dynamics and Chaos at the ANU in 1991, the International Conference on Pattern Formation, Fractals and Statistical Mechanics, at UNSW in 1996, and the International Conference on Complex Systems at UNSW in 1998.

His research interests include pattern formation, random walks, anomalous diffusion, non-equilibrium growth, fractional calculus, applications of chaos and fractals, and neuronal degeneration. He is a Fellow of the Australian Institute of Physics, Member of the American Physical Society, Member of the Australian Mathematical Society and node co-ordinator for COSNET.

Prof Hill received undergraduate degrees from the University of Queensland, in 1972 and 1974. He received a PhD in Electrical Engineering from the University of Newcastle in 1976. He is currently a Professor and Australian Research Council Federation Fellow in the Research School of Information Sciences and Engineering at ANU. He is a Fellow of the Institution of Engineers, Australia and the Institute of Electrical and Electronics Engineers, USA (FIEEE); he is also a Foreign Member of the Royal Swedish Academy of Engineering Sciences.

His research interests are in network systems, circuits and control with particular experience in stability analysis, non-linear control and applications. His Federation Fellowship supports five years of full-time research devoted to the topic: Complex Networks: Dynamics, Optimization And Control. This work is motivated by complex networks such large power grids, the Internet, transportation networks and cooperation networks of all kinds. The recent spate of collapses in power grids and virus attacks on the Internet illustrate the need for research on modelling, analysis of behaviour, systems theory, planning and control in large infrastructure networks.

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Prof Marks studied structural engineering at Melbourne University before studying economics at Cambridge and completing a Ph.D. in Engineering-Economic Systems at Stanford in 1978. He has taught at Stanford (Visiting Assistant Professor) and the Australian Graduate School of Management (from 2002 as a Professor) in economics. He has visited UC Berkeley, MIT, the Santa Fe Institute, and INSEAD.


Prof Wand is Professor of Statistics at UNSW. He has held faculty appointments at Harvard University, Rice University, and Texas A&M University. Professor Wand is a Fellow of the American Statistical Association and has served as an associate editor for the Journal of the American Statistical Association and Biometrika. His 1995 book Kernel Smoothing is highly cited. Amongst his recent publications, he is a co-author of the book Semiparametric Regression and is a lecturer in the UNSW Master of Statistics course, 'Data Mining and its Applications'. He is a winner of the P. A. P. Moran Medal for statistical research.

Prof Wiles received her PhD from Sydney University. She is Professor in the School of Information Technology and Electrical Engineering (Complex & Intelligent Systems Research Division) and the School of Psychology at the University of Queensland. Her research interests are in complex systems biology, computational neuroscience, evolution of language, computational modeling methods, artificial intelligence and artificial life, human memory, language and cognition. With Judith Wiles she is the author of The Memory Book, on practical strategies for overcoming forgetfulness.