

Annual Report 2008/09



National  
Collaboration  
in the Mathematical  
Sciences

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# AMSI Major Achievements 2008/09

AMSI was awarded the 2008 Fast Thinking and Open Universities National Innovation Award for Science Innovation

## *Facilitating research*

### **SCIENCE**

- Enhancement of Australian mathematical sciences through sponsorship of 45 distinguished international lecturers visits to Australia
- National and International collaboration promoted through support of 21 research workshops

## *Promoting industry partnership*

### **BUSINESS, INDUSTRY AND GOVERNMENT**

- Successful first year for the AMSI internship program with the placement of 13 interns
- Industry workshop on Water Supply and Pricing initiated collaboration between AMSI, MASCOS and UNESCO

## *Providing educational opportunities*

### **EDUCATION**

- Excellent reviews and record sales of ICE-EM Mathematics textbooks
- National collaboration in the delivery of honours mathematics and statistics courses via the Access Grid network

## *Raising the profile of mathematics*

### **OUTREACH**

- AMSI supports the publication of the National Strategy for Mathematical Sciences in Australia
- AMSI facilitates consultation with the Australian Mathematical Sciences community on the national curriculum

# Innovation Award

The award, managed by Fast Thinking Magazine and Open Universities Australia and sponsored by Fuji Xerox, was presented to AMSI Director Prof. Broadbridge on 19th November at Sydney's Powerhouse Museum.

In his opening remarks, chairman of the judging committee Professor Ron Johnston, Executive Director of the Australian Centre for Innovation at the University of Sydney, said that a key component of innovation was to stimulate new collaborators to work together.

AMSI has done that by forging new multi-institutional teams to work together on a range of practical problems such as statistical taste perception analysis as a confectionery marketing tool, mathematical consistency of prudential regulation risk assessment systems and furniture placement optimisation for architects. CEO of Open Universities Australia Stuart Hamilton had earlier said that it was not an easy task to arrange for competing universities to work together. AMSI has been able to form teams from a large pool of mathematical expertise that is not normally available from a single source.

The award was also based on the breadth of AMSI's influence in education, for example running a regular successful annual summer school to improve the education experience of national cohorts of honours students, setting up an Access Grid Room network to support a fledgling program of shared honours courses, and improving school mathematics materials available in all states.

Senator Kim Carr, Minister for Innovation, Industry, Science and Research, applauded all of the outstanding Australian innovators recognised by these awards. He commented that: "Importantly, these awards recognise that innovation is more than just research and development. Innovation is also relevant to society, industry, business and government - it affects the way we work, the way we think, and the way we live."



# About AMSI

The Australian Mathematical Sciences Institute (AMSI) is a national collaborative venture supporting the mathematical sciences, which are critical to Australia's scientific and economic capacity.

AMSI was established in 2002 with initial funding from its member institutions and the Victorian Government's Science, Technology and Innovation Infrastructure grants program. AMSI's mission is to promote and strengthen the understanding and use of the mathematical sciences in Australia's culture, science and economy.

*There are three main programs: Science; Education; and Business, Industry and Government. Each program has an Advisory Committee that provides advice to the Institute's Board. Member meetings held twice a year also inform the Board's deliberations.*



AMSI manages the International Centre of Excellence for Education in Mathematics (ICE-EM), which was funded to May 2008 by the Australian Government through the Department of Education, Science and Training (DEST). A redefined ICE-EM program is now funded as AMSI's educational arm by the Department of Education, Employment and Workplace Relations (DEEWR), commercial generated income and contributions from corporate members.

Many activities in AMSI's Science and Business, Industry and Government programs are collaborative with the Australian Research Council (ARC) Centre of Excellence for Mathematics and Statistics of Complex Systems (MASCOS). AMSI's activities are also enhanced through a partnership with Mathematics of Information Technology and Complex Systems (MITACS), a Canadian Network of Centres of Excellence (NCE) for the Mathematical Sciences.

## Membership

### FULL MEMBERS

The Australian National University  
La Trobe University  
Monash University  
RMIT University  
The University of Melbourne  
The University of New South Wales  
The University of Queensland  
The University of Sydney

### ASSOCIATE MEMBERS

Australian Bureau of Statistics  
Australian Mathematics Trust  
CSIRO  
Central Queensland University  
Charles Sturt University  
Curtin University of Technology  
Deakin University  
James Cook University  
Macquarie University  
Queensland University of Technology  
Swinburne University of Technology  
The University of Adelaide  
University of Ballarat  
University of Canberra  
The University of New England  
The University of Newcastle  
University of South Australia  
University of Southern Queensland  
University of Technology, Sydney  
The University of Western Australia  
University of Western Sydney  
University of Wollongong  
Victoria University

### CORPORATE MEMBERS

#### Gold Membership

BlueScope Steel  
Farrell Family Foundation

#### Silver Membership

Australian Char Pty Ltd



## Chair's Report

Jim Lewis

Once again the past year has been mixed with encouraging progress achieved on some fronts.

A very significant achievement was AMSI being the winner of the 2008 Fast Thinking and Open Universities National Innovation Award for Science Innovation. This was magnificent recognition of AMSI's contribution to the nation's scientific capability. The award recognised the role of AMSI in creating new scientific collaborations, particularly in helping to bridge the links between industry and academia and the extensive AMSI/ICE-EM school and higher educational programs.

The grant awarded to AMSI last year under the government's Collaboration and Structural Reform (CASR) program has allowed us to develop further our industry program and continue many aspects of our important science and education programs. As part of this funding, AMSI launched the Industry Internship program. The scheme has been very successful, with 13 interns placed in many diverse areas, including finance, defence and transport. Schemes such as this really help to highlight the relevance of mathematical sciences to all aspects of industry and allow students to gain valuable industry experience.

*"Schemes such as this really help to highlight the relevance of mathematical sciences to all aspects of industry and allow students to gain valuable industry experience."*

The grant has also enabled the continuation of Summer School, this year held at the University of Wollongong; the Graduate School, again hosted by the University of Queensland; and Vacation Scholarships. This year 21 students from many member universities had the opportunity to come together with CSIRO Vacation Scholars for CSIRO's *Big Day In* at the culmination of their project. We are grateful for CSIRO's continued support of this program.

AMSI once again provided support for a range of applied and pure scientific workshops organised and hosted by AMSI Members. This year's AMSI sponsored Special Theme Program on Group Theory, Combinatorics and Computation was hosted by the University of Western Australia in January. AMSI's support has also helped to attract major annual international conferences to Australia. In July this year the 1st Pacific Rim Mathematics Association (PRIMA) Congress will be held in Sydney and 18th World Congress of the International Association for Mathematics and Computer Simulation/Modelling and Simulation Society of

Australia and New Zealand (IMACS/MODSIM09) will be held in Cairns. The scientific program continues to receive very strong applications for sponsorship.

The schools program has continued to grow. At the very end of the financial year AMSI was awarded \$2 million to be spent by the end of 2010 on programs related to schools. This was very good news indeed. The on-going support of Bluescope Steel for the *ICE-EM Mathematics* program in the Illawarra region has allowed us to further expand the program to include more feeder primary schools. A total of 27 schools are now participating. The program continues to be enthusiastically endorsed by schools.

The Farrell Family Foundation also continued its support of the education program with an untied donation. The Farrell Family Foundation has been a supporter for a number of years and their support is greatly valued. Thanks also to Australian Char Pty Ltd for their contribution. These donations from industry and charitable foundations highlight the increasing recognition of the importance of a good grounding in mathematics for future generations.

*ICE-EM Mathematics* textbook sales continue to grow, with a number of new schools choosing to adopt the texts. The excellent reviews and endorsement from Field's medallist, Terry Tao and the Victorian Teachers Journal *Vinculum* have added critically informed endorsement of the excellence of these texts and added to the success of the program.

AMSI continues to promote and develop communication between the mathematical sciences community, government and the wider community on issues of relevance. In particular it provides support for the Australian Council of Heads of Mathematical Sciences (ACHMS). In February a very successful meeting was organised prior to the ACHMS and AMSI meetings, to provide feedback on the proposed national mathematics curriculum to the Australian Curriculum, Assessment and Reporting Authority (ACARA).

I was delighted to be able to welcome both Prof. Garth Gaudry, AMSI inaugural Director, and Dr Brendan Nelson to the annual ACHMS and AMSI dinner. Dr Nelson remains a strong supporter of mathematics and AMSI and he spoke appreciatively of Garth's contribution to mathematics through AMSI and ICE-EM.

AMSI played a pivotal role in the development of A National Strategy for Mathematical Sciences in Australia, which appeared under the authorship of Prof. Hyam Rubinstein, Chair of the National Committee for Mathematical Sciences. The document raised considerable interest and very likely contributed to the new funding AMSI has received from DEEWR.

Further highlighting the value placed on our experience in mathematics education, our Schools Program Managers, Dr Michael Evans and Ms Janine McIntosh were selected from over 200 applicants to be on the writing committee for the mathematics national curriculum. Writing commenced earlier in the year and is due to be completed for roll out in 2011.

I thank all who have accepted responsibility of being chairs of committees (Prof. Peter Hall – Scientific Advisory Committee, Prof. Peter Taylor – Education Advisory Committee and Dr John Burgess – Industry Advisory Committee) and all committee members for their contributions. Dr Burgess has resigned as Chair of the Industry Advisory Committee and I especially note his contribution.

Our Director, Prof. Philip Broadbridge accepted a position at La Trobe University during the year, but very generously accepted our invitation to continue to give leadership to AMSI until a new Director is appointed. Phil has made a major contribution to AMSI and the mathematical sciences community since his return to Australia and I wish him well in his new role as Head of School of Engineering and Mathematical Sciences at La Trobe. His achievements are evident throughout this annual report.

I am pleased to report that the process of selecting a new Director is well advanced. I look forward to an appointment being made shortly, and to the impetus of new leadership that will come with the appointment of our third Director.

Finally, I wish to acknowledge the support of all who contribute to AMSI's success; the Member Institutions and their Heads of School; the generosity of The University of Melbourne as host institution; the many individuals who give generously of their time serving on the Board, on committees and as interested supporters, providing advice and commentary. Finally, and very importantly, AMSI enjoys the support of a superb staff who work tirelessly for the advance of the discipline and who genuinely deliver outstanding results well beyond their numbers. Thank you to all involved for your contribution in a difficult year.

A handwritten signature in black ink that reads "Jim Lewis". The signature is written in a cursive style and is positioned above a horizontal line that extends to the right.

Jim Lewis  
Chair



## Director's Report

Philip Broadbridge

This has been both an exciting and a challenging year for AMSI.

A major highlight was the presentation to AMSI in November of the 2008 National Innovation Award in the category of Science Innovation. The award managed by *Fast Thinking Magazine* and Open Universities Australia and sponsored by Fuji Xerox recognised AMSI's ability to stimulate new collaborators to work together, as well as the breadth of AMSI's influence in education.

AMSI has played a crucial role in instigating and facilitating communication between mathematicians and the National Curriculum Board (NCB), which has now been subsumed by the Australian Curriculum Assessment and Reporting Authority (ACARA). Preceding the February AMSI Members and Board meetings, AMSI organised a special meeting of the Australian Council of Heads of Mathematical Sciences (ACHMS) at ANU, with representatives from the NCB. This provided an opportunity for feedback from mathematicians. The NCB representatives were impressed by our supportive attitude. From follow-up meetings of our highly able Education Advisory Committee, we submitted to NCB highly appreciated feedback on their mathematics curriculum shaping document. Subsequently, both Michael Evans and Janine McIntosh of AMSI were selected from over 200 applicants to be on the national curriculum writing committee of ten.

*"AMSI's profile in science has been enhanced by many successful events over the last year..."*

The mathematical sciences community continues to benefit from a range of AMSI higher education activities supported by a Collaboration and Structural Reform grant from DEEWR. 21 AMSI undergraduate summer vacation scholarships were funded to work on projects at member institutions. We appreciate the collaboration of CSIRO in inviting these students to join their own vacation scholars at *Big Day In*. Two of the AMSI scholars were voted by peers to be in the top ten for best presentations.

Graduate School was again held in July at the University of Queensland, on the general theme of statistics for environment and resource management. We were fortunate to have eminent course lecturers Prof. Peter Guttorp (University of Washington) and Prof. Vijay Nair (University of Michigan).

AMSI Summer School ran very successfully at the University of Wollongong. A new feature was the interaction between the summer school and the Mathematics in Industry Study Group (MISG). As further support of postgraduate students training in industrial applications, as well as strengthening our ties with MITACS, in June six AMSI students attended the PIMS Graduate Industrial Mathematical Modelling Camp (GIMMC) in Calgary.

Despite some technical and organisational challenges, the program of shared Honours courses via the AMSI/ICE-EM Access Grid Room (AGR) network continues to broaden educational opportunities. The University of Auckland's course offering signals the start of New Zealand's participation.

My main aim over the past year was for AMSI to establish the Industry Internship program by reaching a sustainable level of activity. I am very pleased to report that this has been achieved, with 13 interns now successfully placed. Projects have covered a range of applications, including transport modelling, finance, defence technology and nutrition statistics. This has enhanced our credibility, with positive feedback coming from influential individuals in government, academia and industry.

Our successful format of combined industry short course and workshop continued in July in Surfers Paradise, with the AMSI/MASCOS/ICEWARM event *Mathematics of Water Supply and Pricing*. The most important outcome of this was a decision by UNESCO Hydrology for Environment, Life and Policy (HELP) to jointly host a future event.

AMSI continued to support most of the workshop applications received by the Scientific Advisory Committee, partly because of that committee's excellent suggestions for quality improvement. AMSI's profile in science has been enhanced by many successful events over the last year. Many sites and conferences were enlivened by follow-up visits by AMSI Lecturer Linda Petzold, an eminent computational scientist. Following our theme program, *Concepts of Entropy and their Applications*, the journal *Entropy* published a special edition guest-edited by Prof. Tony Guttmann and myself.

The AMSI/ICE-EM Schools Program continues to grow in strength and in national recognition. Textbook sales have been very gratifying, as has been the feedback on associated professional development sessions for teachers. I gratefully acknowledge corporate sponsorship from BlueScope Steel, the Farrell Family Foundation and Australian Char Pty. Ltd. The Victorian Partnership for Advanced Computing (VPAC) provided technical advice and assistance, and McKinsey and Co. provided marketing advice and assistance.



All of the above gains could have taken place without me, but none could have taken place without the hard working and dedicated AMSI staff, the advisory committees and their Chairs and the Board. I hope that none of them take offence that I haven't mentioned all their names here individually, to give them due credit would have necessitated at least 20 pages of writing.

Congratulations to our Chair, Dr James Lewis, who received an Australian Learning and Teaching Council (ALTC) Citation for Outstanding Contributions to Student Learning 2008 for "... sustained, innovative teaching of MBA students, with emphasis on integrating personal values, ethical decision making and social responsibility in their negotiation and influence experiences."

Unfortunately, the Chair of our Industry Advisory Committee Dr John Burgess has had to step down because of too many other interesting and worthy commitments in industrial science and environment. We have benefited greatly from having a person of his experience and stature, able to give practical advice in corporate planning. I hope that some of you may know of possible candidates to serve on the Industry Advisory Committee.

I welcome my alma mater, the University of Adelaide, as AMSI's ninth joint venture partner. Some members' mathematics units are experiencing hard times. Many of us inside and outside AMSI, some even outside of Australia are devoting a lot of time to helping turn around those parts of the web of mathematical

science activities that are in decline. I encourage you to consult the blog site <http://austmaths.wordpress.com/> that is kindly administered by our great supporter Prof. Terry Tao.

The mathematical sciences community is made up of an interesting group of people with a range of motives, interests and priorities, Many of them have been very supportive, for which I will always be grateful. Given the constraints on AMSI funds, it has been an enjoyable exercise trying to satisfy this range of appetites. The President and the Immediate Past President of the Australian Mathematical Society (AustMS), as well as the Chair of the National Committee for the Mathematical Sciences, have given some constructive advice on how to find a balance, which has led to some very promising developments. I hand over to the new Director with confidence, despite an educational and economic environment that will continue to generate some challenges. Thanks, my AMSI friends, for the stimulating ideas, the Friday afternoons and the laughs.



Philip Broadbridge  
Director

# Science Program

## Highlights

- *AMSI Lecturer Linda Petzold plenary speaker at Computational Techniques and Applications Conference and member universities*
- *21 research workshops and other events supported*
- *45 distinguished international researchers sponsored by AMSI to visit Australia*

## The Scientific Advisory Committee

*The Scientific Advisory Committee reviews and approves sponsorship by AMSI of a diverse range of symposia, workshops, theme programs and lecture tours. Prof. Peter Hall (The University of Melbourne) is Chair of the Scientific Advisory Committee, which comprises eminent national and international mathematical scientists (see page 29).*

## Workshops, conferences and seminars

AMSI continues to sponsor a very successful scientific program of meetings and workshops organised by AMSI members. Workshops usually run from one day up to a week, and address a specific field, or even a particular research problem. Special Theme Programs support relatively long periods of research interaction involving both workshop-type activity and collaborative research, as well as addressing diverse research topics in theoretical mathematics. These are listed on page 8.

AMSI's funding usually supports reimbursement for the travel expenses of international and national keynote speakers, and travel grants for students and early career researchers. Details may be found at [www.amsi.org.au/travel.php](http://www.amsi.org.au/travel.php).

Proposals for workshops and Special Theme Programs can be submitted throughout the year. Assessment of proposals is based on scientific merit and likely national impact. Applicants are encouraged to use AMSI premises if practicable, as they are well equipped and centrally located. See [www.amsi.org.au/proposals.php](http://www.amsi.org.au/proposals.php).



## AMSI Lecturers

### Prof. Linda Petzold

The 2008 AMSI Lecturer, Dr Linda Petzold, University of California Santa Barbara, visited Australia in July 2008. She was plenary speaker at the 14th Biennial Computational Techniques and Applications Conference (CTAC) and completed an AMSI-sponsored lecture tour of Australia, speaking at a number of member institutions. Her interesting multidisciplinary talks included Computational Methods for Phase Response Analysis of Circadian Clocks, Multiscale Simulation of Copper Electrodeposition and Multiscale Simulation of Biochemical Systems. She will return to Australia in July 2009 to speak at the 1st PRIMA Congress.

Dr Petzold is Professor in the Department of Computer Science (Chair 2003–2007) and in the Department of Mechanical Engineering, and Director of the Computational Science and Engineering Program at UC, Santa Barbara. She is a member of the US National Academy of Engineering, a Fellow of the American Society of Mechanical Engineers (ASME) and of the American Association for the Advancement of Science (AAAS), and a former Vice President of the Society for Industrial and Applied Mathematics (SIAM).

### Prof. Xiaoli Meng

The 2007 AMSI Lecturer Dr Xiaoli Meng, Harvard University, visited the University of Wollongong and the University of NSW in July. He gave seminars and collaborated with staff.

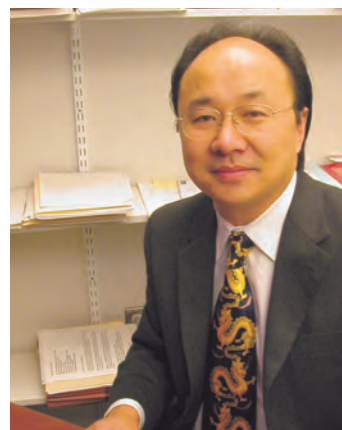
Dr Meng is Professor of Statistics and Chair of the Department of Statistics at Harvard University, Massachusetts. In 2001 he received the prestigious Committee of Presidents of Statistical Societies (COPSS) award. His research interests are statistical inference under complex settings.

### Visiting lecturers

In 2008/09 AMSI hosted two visiting lecturers on sabbatical from member universities. Assoc. Prof. Paul Kabaila from La Trobe University for the second half of 2008 and Dr Paul Abbott from the University of Western Australia from January to June 2009.



Prof. Petzold visiting Koorungal High School



Prof. Xiaoli Meng, AMSI lecturer for 2006–07

### Other guest lecturers

- Prof. Tom Wigley, National Center for Atmospheric Research, Boulder, CO, USA  
*Simple climate models*
- Prof. Bill Barton, Head of Mathematics, University of Auckland  
*The Klein Project: A living and connected view of mathematics for teachers*
- Dr Tony Gardner, University of Birmingham  
*Engaging the more mathematically able students*
- Dr Jim Brookes, Mathematics of Information Technology and Complex Systems (MITACS)  
*Industry internships, the MITACS experience*

### Entropy journal

Following last years interesting and vigorous 2007 AMSI-MASCOS Theme Program: *Concepts of Entropy and their Applications*. Prof. Tony Guttmann and Prof. Philip Broadbridge were guest editors of a special issue of the Zurich-based journal *Entropy*. The special issue comprised papers from speakers at *Concepts of Entropy and their Applications*. Readers have commented that there is nowhere else to find such a range of applications of entropy concepts. Papers may be accessed at <http://tiny.cc/entropy158>.



**Prof. Tom Wigley of the National Center for Atmospheric Research speaking at the Simple Climate Models seminar**

## Special Theme Program

The 2009 AMSI Theme Program, Group Theory, Combinatorics and Computation, was held 5–16 January 2009 at the University of Western Australia. The international event attracted 97 participants, with feedback noting “the whole event when exceptionally well”.

The first week brought together world experts, early career researchers and graduate students in the three areas Group Theory, Combinatorics and Computation. The intention was to foster research interaction between people working in these areas. Experts were able to exchange research ideas, and early career researchers and students were able to interact with world experts in their area and in related areas. Invited speakers included Marcel Herzog (Tel-Aviv University, Israel), Sasha Ivanov (Imperial College London, UK), Tim Penttila (Colorado State University, USA) and William Kantor (University of Oregon, USA)

The second week was specifically geared towards early career researchers and graduate students. It consisted of a series of four workshops, run by Rosemary Bailey (Queen Mary, University of London, UK), Peter Neumann (Queen’s College, University of Oxford, UK), Eamonn O’Brien (University of Auckland, NZ) and Akos Seress (Ohio State University, USA), each consisting of four lectures and addressing a particular topic. The topics were chosen to cover all the three areas; Group Theory, Combinatorics and Computation. The intention of the problem session during the second week was to open up problems in one of the three areas to a wider audience and foster research interaction.



**Participants at The 2009 AMSI Theme Program, Group Theory, Combinatorics and Computation**



**Invited speaker Prof. Charles Leedham-Green speaking at the 2009 AMSI Theme Program**

## AMSI Science Program workshops

Modelling and Data Analysis for Infectious Disease Control	Murramarang Resort, Durras NSW 9–12 March 2009
Workshop on Nonlinear Analysis	Australian National University 18–19 March 2009
Special Theme Program on Group Theory, Combinatorics and Computation	The University of Western Australia 5–16 January 2009
Operations Research in Radiation Oncology Workshop	Deakin University 16–18 February 2009
Workshop on Complex Geometry	University of Adelaide 16–20 February 2009
Algebras, Operators and Non-Commutative Geometry	Australian National University, University of Newcastle and University of Wollongong 1–5 December 2008
Simple Climate Models	AMSI and School of Earth Sciences, University of Melbourne 5 December 2008
Workshop on Sequence Design and its Applications in Communications and Cryptography	University of Melbourne 4–6 December 2008
Workshop on Advanced Stochastic Methods with Applications to Finance	Monash University 8–9 December 2008
Monash-Ritsumeikan Symposium on Probability and Related Fields	Monash University 10–12 December 2008
ICTAM 2008: International Conference on Theoretical and Applied Mechanics	Adelaide Convention Centre 24–30 August 2008
International Workshop on Complex Systems and Networks 2008	Australian National University 1–3 October 2008
Workshop on Geometric Analysis	University of Wollongong 2–3 October 2008
International Conference on Similarity, Generalisations, Applications and Open Problems	University of British Columbia, Canada 11–15 August 2008
ISBA 2008 Satellite Short Course: Introduction to Practical Bayesian Statistics	Queensland University of Technology 4–9 August 2008
ISBA 2008 Satellite Workshop: Bayesian Environmetrics	Queensland University of Technology 17–18 July 2008
AMSI 2008 Australian Graduate Theme Program in Mathematical Sciences	University of Queensland 7–18 July 2008
Mathematical General Relativity	Swinburne University, held at AMSI 7–9 July 2008

### AMSI/MASCOS

International Conference on Engineering and Computational Mathematics (ECM2009)	Hong Kong Polytechnic University 27–29 May 2009
Third Workshop on High Dimensional Approximation	University of New South Wales 16–20 February 2009
Industry Workshop and Short Course on the Mathematics of Water Supply and Pricing	AMSI, Holiday Inn, Surfers Paradise 14–16 July 2008

## Host Visitors

AMSI has sponsored the following distinguished academics to visit Australia to present their research.

### EUROPE

NAME	UNIVERSITY	EXPERTISE
Rosemary Bailey	Queen Mary and Westfield, University of London	Design of experiments, particularly those with one or more nuisance factors and in which the treatment factors are qualitative
Susie Bayarri	University of Valencia	Objective Bayesian methods
Tom Britton	University of Stockholm	Stochastic infectious disease models and the use of martingales to construct estimating equations for infectious disease parameters
Freddy Delbaen	ETH, Zurich	The mathematical theory of arbitrage and the study of risk measures
Franc Forstneric	Univerza v Ljubljani	Geometric analysis
John Head	Max-Planck-Institut	Geometric analysis and gravitation
Tor Helleseth	University of Bergen	Coding theory and cryptology, weight hierarchy of codes and the information function of codes
Tom Hoholdt	Technical University of Denmark, Lyngby	Coding theory, signal analysis, sequence design, and other areas of applied (discrete) mathematics
Sasha Ivanov	Imperial College, London University,	Sporadic groups and their geometries, distance-regular and distance-transitive graph, monstrous moonshine
Saul Jacka	Warwick University	Probability theory
Shahbaz Khan	UNESCO, Paris	Land-use management, surface and groundwater hydrology, mathematical models for groundwater flow and contaminant transport, surface-groundwater interactions, tile drainage, flood forecasting and storm drainage
Jürgen Kurths	University of Potsdam	Nonlinear dynamics
Matilde Marcolli	MPIM-Bonn	Noncommutative geometry
Kristen Moore	Max-Planck-Institut	Geometric analysis and gravitation
Ryszard Nest	University of Copenhagen	Noncommutative geometry
Christian Robert	Université Paris, Dauphine	Bayesian analysis, computational statistics, latent variable models, applied modelling
Jan Saxl	University of Cambridge	Groups, algebraic groups, representation theory
Oliver Schnürer	Freie Universität Berlin	Geometric analysis, geometric evolution equations, partial differential equations, differential geometry
Felix Schulze	Freie Universität Berlin	Geometric variational problems and evolution equations
Albert Shiryayev	Moscow State University	Probability theory, statistics and its applications
Valentina Vulcanov	Freie Universität Berlin	Geometric analysis, gravitation and string theory

### ASIA/PACIFIC

NAME	UNIVERSITY	EXPERTISE
Guanrong Chen	City University of Hong Kong	Nonlinear systems control and dynamics
Jörg Frauendiener	University of Otago	Computational and gravitational physics
C.K. Michael Tse	Hong Kong Polytechnic University	Complex network applications, power electronics and chaos-based communications
Xiaofan Wang	Shanghai Jiao Tong University	Control and synchronisation of complex dynamical systems and networks
Toshio Yamada	Ritsumeikan University, Kyoto	Probability theory

## AMERICA

NAME	UNIVERSITY	EXPERTISE
James Berger	Duke University	Bayesian statistics, foundations of statistics, statistical decision theory, simulation, model selection, and various interdisciplinary areas of science and industry, especially astronomy and the interface between computer modelling and statistics
Carlos Castillo-Chavez	Arizona State University	Modelling infectious disease
Matthew W. Choptuik	University of British Columbia	Numerical general relativity and computational physics
James Clark	Duke University	Statistics of environmental science
Mohammed Dore	Brock University Canada	Resource management issues and sustainability
Robert Elliott	University of Calgary	Stochastic processes and their applications in finance and engineering
John-Erik Fornæss	The University of Michigan	Higher dimensional complex analysis
Peter Guttorp	University of Washington	Stochastic models in scientific applications in hydrology, atmospheric science, geophysics, environmental science and hematology
William Kantor	University of Oregon	Finite geometries, applications of finite groups to computer science (group-theoretic algorithms), combinatorics, coding theory and geometry
P. Vijay Kumar	University of Southern California	Distributed space-time codes for cooperative communication, space-time codes for multiple-antenna communication, sensor networks, low-correlation sequence design for multiple-access communication
Barbara Lence	The University of British Columbia	Methods of optimising design and operational strategies of water resources projects
Tim Penttila	Colorado State University	Geometry, algebra and combinatorics and their applications, including the theory of error-correcting codes and cryptology
Linda Petzold	University of California, Santa Barbara	Numerical ODEs, DAEs and partial differential equations, parameter estimation and optimal control for PDEs, scientific computing, problem-solving environments
Akos Seress	Ohio State University	Algorithms for computing with finite groups, cayley graphs, extremal graph theory, extremal set theory, combinatorics, group theory
Ljiljana Trajkovic	Simon Fraser University	Communication networks, nonlinear circuits and systems
Joseph Varilly	Universidad de Costa Rica	Noncommutative geometry, phase-space quantisation
Tom Wigley	National Center for Atmospheric Research	Climate, sea level and carbon cycle modeling, climate data analysis
Robert Wolpert	Duke University	Statistics (theoretical, applied, and methodological)
Chai Wah Wu	IBM T. J. Watson Research Centre	Foundations of nonlinear circuits & systems theory, dynamics in coupled networks of oscillators, synchronisation of chaos, application of chaos to information processing, digital halftoning, document and multimedia security



# Business, Industry and Government Program

## Highlights

- *13 AMSI Industry Internship projects successfully completed*
- *The Mathematics of Water Supply and Pricing Industry workshop attracts UNESCO sponsorship*
- *Kann Finch project culminates with the successful development of software to optimise the use of space in commercial buildings*

## The Industry Advisory Committee

*New and stronger links with business, industry and government are being established under the guidance of the Industry Advisory Committee. Dr John Burgess (Scena Consulting) chaired the Industry Advisory Committee until June 2009, our thanks to Dr Burgess for his support and guidance over the years.*

*The AMSI program seeks to identify industry needs and opportunities that can be addressed using the mathematical sciences, promoting collaboration between mathematicians from member institutions, industry and government. The program demonstrates the relevance of the mathematical sciences to Australian industry through the industry internship program, industry forums, workshops and short courses and consulting projects.*

## Consulting

This year an AMSI team successfully completed a risk related project for the Australian Prudential Regulation Authority (APRA). The success of the project is attributed to the joint collaboration between Dr Dimetre Triadis (AMSI/MASCOS), Dr Harald Scheule (University of Melbourne), Prof. William Dunsmuir and Dr Scott Sisson (University of New South Wales). We have also recently commenced a project for Dairy Australia with Prof. David Steel (University of Wollongong) and Mr Carl Obst (ABS). Consulting projects promote collaboration between our members, business, industry and government, and help demonstrate the relevance of the mathematical sciences to all Australians.





## Internships

The AMSI Internship program is designed to promote collaboration between academia and industry. AMSI offers industry partners the opportunity to use an intern’s mathematical and statistical skills and an academic mentor to facilitate research relevant to the industry partner. Launched in 2008, the AMSI Industry Internship program has grown in popularity over the year, with strong demand from interns, AMSI member institutions, business, industry and government, and 13 interns have now been successfully placed. Industry partners have included those from defence, finance, transport, health and resource management. Feedback from participating parties is very positive, recognising the mutual benefits of such collaboration for students, supervisors and industry partners.

*“The internship has allowed my group to better use limited financial resources. At the same time, the candidate has provided an alternative, and useful, perspective of the problem in question.”*

*Dr Ross A. Antoniou, Industry Partner, Defence Science Technology Organisation (DSTO), 2009*



**Dr Ross Antoniou, Dr Con Lozanovski, Dr Bill Blyth, Dr Tom Montague, Dr Tony Galati, Squadron Leader Brian Rowe and Mr Glen Rowlinson**

## Internship project profiles

### Trends and patterns emerging from National Dairy Farmer surveys 2004–2009

Mentor: Prof. Panlop Zeepongsekul - RMIT University

Intern: Dr Sandamali Dharmasena

Industry partner: Joanne Bills - Dairy Australia

Project duration: 5 months

Each year since 2004, Dairy Australia has conducted a National Dairy Farmer survey that has been used to produce an annual Industry Situation and Outlook report. This project examines longer-term trends, and profiles farmer responses by combining survey data from all years. Findings will be used to improve industry planning and development.



**Prof. Panlop Zeepongsekul (RMIT), Sandamali Dharmasena and Joanne Bills (Dairy Australia)**

## Internship project profiles—*continued*

### Analysis of traffic flow in urban road networks

Mentor: Dr Tim Garoni and Dr Jan de Gier - MASCOS, The University of Melbourne  
 Intern: Mr Omar Rojas  
 Industry partner: Mr Andrew Wall - VicRoads  
 Project duration: 6 months

This project will identify the best measures of road network performance and measure any under performance of the existing road network using cellular automata models. These models help to characterise the features of road networks and estimate potential gains when controlling traffic dynamically.



Mr Omar Rojas, Ms Michelle Su, Mr Sameem Moslih, Dr Tim Garoni, Mr Hoan Ngo and Mr Mahes Mahesan

### Profiles for health and safety - a preliminary analysis of work and safety

Mentor: Prof. Panlop Zeepongsekul - RMIT University  
 Intern: Ms Rashmi Udugampola  
 Industry partners: Mr Howard Cameron - QBE Workers Compensation (VIC) Ltd and Mr Frank Mielke - Victorian Department of Human Services  
 Project duration: 3 months

QBE manage workers compensation claims on behalf of the Victorian Department of Human Services (DHS). The project analyses Workcover claims data held by QBE and seeks to identify patterns and trends in workplace accidents. This will assist DHS to improve workplace practices and worker safety.



Mr Michael Burnett, Mr Frank Mielke, Mr Howard Cameron, Ms Rashmi Udugampola and Prof. Panlop Zeepongsekul

## The Mathematics of Water Supply and Pricing

In July 2008 our annual industry event focused on a topic of relevance to virtually all Australians - *The Mathematics of Water Supply and Pricing*. The event attracted 40 delegates from destinations as far away as Denmark and Canada. Prof. David Fox, Prof. Barbara Lence and Prof. Shahbaz Khan delivered short courses each morning, with invited and contributed talks in the afternoons. Topics of discussion included *Estimating demand; Sampling strategies and uncertainty considerations; Mathematics for cutting the water cake* and *Modelling water demand and infrastructure investment*. The event was co-sponsored by ICE-WaRM, MITACS and MASCOS. For more information and speaker presentations see: <http://www.amsi.org.au/water.php>

The success of this event prompted UNESCO to sponsor the 2009 event on *Future Models for Energy and Water Supply under a Regulated Environment* to be held 20–22 July 2009. See: <http://www.amsi.org.au/energy.php>.



Participants at the industry workshop and short course on the Mathematics of Water Supply and Pricing

**putting a price on it?**



Water practitioners are invited to an Industry Workshop  
& Short Course **14–16 July 2008**

**Water Supply & Pricing**

*"The breadth of discussions were all relevant to the topic. Presenters brought an interesting range of experiences to the conference."*

*"Contributed talks presented by Graeme Dandy and Quentin Grafton (on water demand, pricing and desalination plants) were particularly engaging and interesting."*

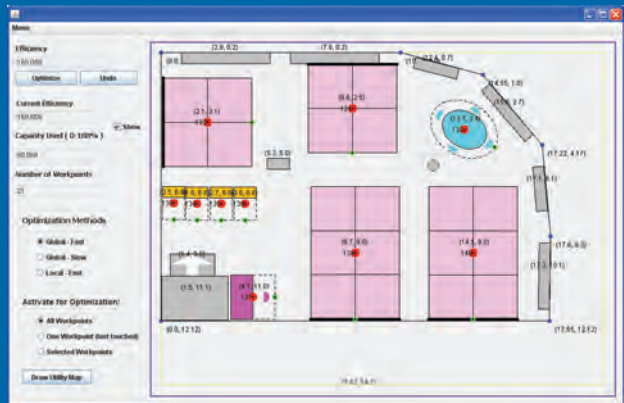
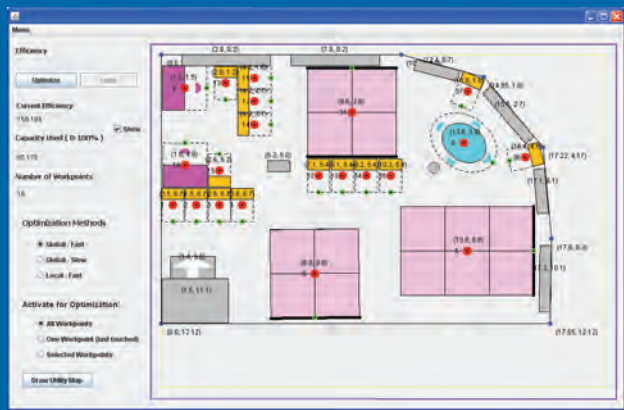
*"Short courses run by David Fox and Shahbaz Khan were interesting and potentially very useful."*

## Finding a better place – the Kann Finch–ARC Linkage Project

This AMSI-assisted ARC Linkage Project collaboration is in its third and final year. The project sought to develop mathematical solutions and software for optimising the use of space in commercial buildings. Paul Bondin, a Director at Kann Finch Pty Ltd, teamed up with staff from the Centre for Informatics and Applied Optimisation at the University of Ballarat. The partnership has resulted in the development and beta testing of a new application called UFAST. The team is now looking at funding opportunities to support further development of UFAST.

**UFAST software optimises office layouts to improve efficiency (right)**

Paul Bondin of Kann Finch Pty Ltd meets with member staff from the University of Ballarat at AMSI (below)



## International collaboration

### Graduate Industrial Mathematics Modelling Camp

Six students were funded by AMSI and member universities to attend the 12th Graduate Industrial Mathematics Modelling Camp (GIMMC) and the 13th Industrial Problem Solving Workshop (IPSW), hosted by the Pacific Institute for the Mathematics Sciences (PIMS) in May 2009 at the University of Calgary, Canada.

At GIMMC experienced mentors work with groups of students on industrial problems. Students learnt about industrial modelling techniques and use these techniques to work on real-world problems at IPSW with industry partners.



Photos by Christing Selinger

### MITACS visit

Following the Industry event, Mr Jim Brookes, Chief Operating Officer at MITACS Canada came to Melbourne to discuss how MITACS manages its internship program *Accelerate Canada*. The MITACS program has greatly expanded and now covers all disciplines, and places 1200 students per annum. Mr Brooks demonstrated his support of our internship program by attending meetings with representatives from the Office of Science and Technology, Department of Innovation Industry and Regional Development and the Department of Education and Early Childhood Development. We thank Mr Brooks for his support as he continues to offer further advice for our internship program.



Mr Jim Brookes speaking at the industry workshop

# Education Program

## Highlights

- Record sales of ICE-EM Mathematics textbooks for 2008/09
- Excellent reviews for ICE-EM Mathematics textbooks
- Successful introduction of honours courses via Access Grid Room program
- Continuing success of AMSI/ICE-EM Summer School and Graduate School

## The Education Advisory Committee

*The Education Advisory Committee provides general program advice on education-related activities carried out under the auspices of the International Centre of Excellence for Education in Mathematics (ICE-EM), the education division of AMSI. The Committee is chaired by Prof. Peter Taylor (Australian Mathematics Trust) and comprises distinguished mathematics educators (see page 29).*

*The ICE-EM program is currently funded by a combination of a grant from the Department of Education, Employment and Workplace Relations (DEEWR) for 2007–2009, commercially generated income, and contributions from Corporate Members.*

## New funding for mathematics in schools

AMSI has received funding from the Australian Government for a national collaborative project targeting school mathematics education – referred to as The Improving Mathematics Education in Schools (TIMES) project. The purpose of the project is to provide an integrated approach to increasing mathematics achievement, especially in low socioeconomic status communities; develop innovative resources to support the national mathematics curriculum; and raise awareness of career opportunities in occupations and professions requiring mathematics skills.

## **ICE-EM Mathematics – The schools mathematics program for upper primary to secondary year 10**

The ICE-EM Mathematics program continues to grow nationally, with many new schools adopting the textbooks in 2008/09. The comprehensive series caters for upper primary to senior secondary students, with teacher resource CD-ROMs available for all levels. These contain additional material to help teachers provide a large range of exercises and thus cope with different levels of ability within the classroom.



## BlueScope Steel—Supporting the teaching and learning of mathematics

The BlueScope Steel Pty Ltd sponsored project in the Illawarra continues, with additional schools joining the project in 2009. AMSI staff continued the program of school visits and professional development with positive reactions from teachers and strong anecdotal indications of improved learning.



### Review by Terry Tao



*ICE-EM Mathematics* textbooks have received very positive press. Internationally renowned mathematician and Fields medallist Prof. Terry Tao, UCLA, considers the books to be:

*"...serious and substantial textbooks; the focus is on content, concepts, and computation, with "bells and whistles" in the presentation definitely being a secondary concern, particularly at the secondary level. It covers all the important core topics in the Australian curriculum thoroughly, carefully, correctly, coherently, and efficiently ... In my opinion, they are eminently suitable for general use in Australian schools, and I endorse them for this purpose."*

To read the full review see: <http://tinyurl.com/terrytao>.

### Review in teacher journal

A very positive review of Secondary 3A and 3B appeared in the Mathematics Association of Victoria (MAV) magazine, *Vinculum*. It is a comparative review against other Victorian Year 9 texts. It recommends the use of the *ICE-EM Mathematics* textbooks above all others. The review by Dr Marty Ross and Mr David Treeby compared the treatment of irrational numbers, arithmetic, algebra, Pythagoras' Theorem, geometry and trigonometry across four textbooks used in Victoria.

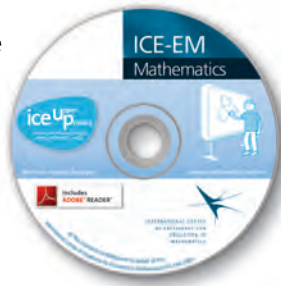
*"In a famous essay, the great mathematician and educator Georg Polya wrote: 'I am concerned here with mathematics in the high school curriculum and I have an old fashioned idea about its aim: first and foremost, it should teach those young people to THINK.' We agree wholeheartedly with Polya, and consequently our advice to teachers is obvious: use ICE-EM textbooks."*

To read the full review see [www.amsi.org.au/vinculum.php](http://www.amsi.org.au/vinculum.php).

## ICE-UP

A new product has been released in the *ICE-EM Mathematics* range. The ICE-UP CD-Rom contains a PDF version of each of the ICE-EM Transition textbooks. This makes the books affordable for schools with a limited budget and can be used with a computer, data projector or interactive whiteboard.

Ms Jan Chantry and Ms Janine McIntosh have been visiting primary schools in the Melbourne metropolitan area to showcase ICE-UP. Teachers are very impressed with the materials.



## National curriculum

In February AMSI/ICE-EM organised a meeting between the Australian Council of Heads of Mathematical Sciences (ACHMS) and representatives of the National Curriculum Board at ANU. The representatives of the NCB included Prof. Peter Sullivan (Monash University), lead writer of the National Mathematics Curriculum Framing paper, Mr John Gougoulis, Project Manager Curriculum and Ms Emily Sangster, Project Officer.

By 2010, the Australian Curriculum Assessment and Reporting Authority (ACARA), previously known as the National Curriculum Board (NCB) must finalise a national K–12 curriculum in English, mathematics, science and history.

## Research into school mathematics

Dr Frank Barrington updated the Year 12 mathematics figures. The good news was that the number of Year 12 Advanced Mathematics students in Australia showed modest positive growth. However the number of Intermediate Mathematics students showed a small drop that constituted a significant decline relative to the increasing total Year 12 population. There was a further increase in the number of Elementary students. Details at [http://www.amsi.org.au/2009\\_Y12\\_maths.php](http://www.amsi.org.au/2009_Y12_maths.php).

## Seminar with Assoc. Prof. Bill Barton

In August Assoc. Prof. Bill Barton, President-elect of the International Commission on Mathematical Instruction (ICMI) and Head of Mathematics at the University of Auckland spoke at AMSI about the Klein Project. The Project aims to consider the relationship between learning mathematics and the nature of disciplinary mathematics, and relate this to the content and approaches of senior secondary and undergraduate mathematics curricula. The project aims to produce resources for teachers of mathematics at these levels.

## Review of Mathematics in Group of Eight

AMSI Director, Prof. Phil Broadbridge's presentation at the INFORMA conference Science and Engineering: Skills for Australia's Future, prompted Alan Mackay, Director of Information Strategy for the Group of Eight (Go8) universities, to initiate a review of mathematics. The review will cover factors affecting the quality of mathematics and related education in Australia, and implications for Go8 universities. It will be chaired by Prof. Gavin Brown. The reference committee includes Prof. Phil Broadbridge, Prof. Jim Denier, Prof. Peter Dowd, Prof. William Dunsmuir, Prof. Cheryl Praeger, Prof. Peter Hall, Prof. Hyam Rubinstein, Prof. Nalini Joshi and Mr Dennis Trewin.

## Professional development session by Dr Tony Gardiner

In February, over 140 mathematics educators from upper primary through to the senior years of secondary school attended an AMSI sponsored session presented by Dr Tony Gardiner from the University of Birmingham on the topic of engaging the more able mathematics students.

Tony spoke about using ideas in mathematics taken from the mainstream curriculum, and adapting the questions to provide talented students with activities that engage them in solving problems that are cognitively demanding. He focused on how teachers can provide opportunities for students to develop good problem-solving skills.



Dr Tony Gardiner speaks to mathematics educators from upper primary through to senior secondary

## AMSI 2008 Australian Graduate Theme Program in Mathematical Sciences

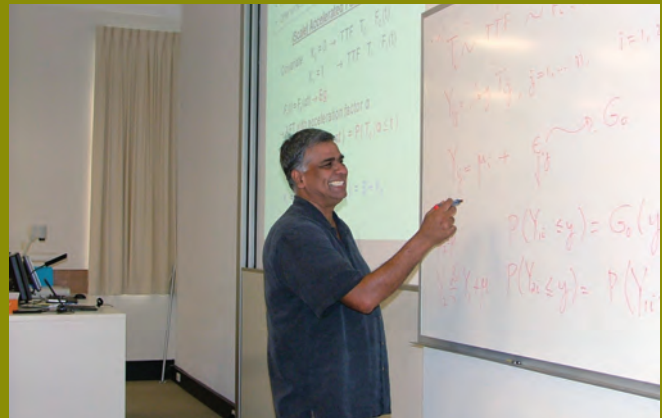


Participants in the 2008 Graduate Theme Program

The 2008 Graduate Theme Program, which focused on Statistics for Resource Management and Environmental Science, was the fourth program for postgraduate students and early career researchers in mathematics, hosted for AMSI/ICE-EM by the University of Queensland. Two eminent statisticians Prof. Peter Guttorp of the University of Washington and Prof. Vijay Nair of the University of Michigan led the courses. The UQ organising committee, Prof. Geoff McLachlan, Dr Ian Wood and Ms Glynnis Richardson, provided an excellent and well-run program that was appreciated by all attendees.



Prof. Peter Guttorp of the University of Washington



Prof. Vijay Nair of the University of Michigan

## AMSI Summer School

The University of Wollongong hosted the seventh annual AMSI Summer School January to February 2009. The organising committee, Assoc. Prof. Jacqui Rammage, Ms Sue Denny, Ms Joell Hall and Mr Chris Agnew, presented an excellent program offering six subjects: Linear Analysis, Measure Theory, Groups of Lie Type and their Geometries, Data Analysis, Nanomathematics and Industrial Mathematics.

Excellent feedback has been received from the 68 honours and postgraduate students hosted by the school. In addition to the intensive summer school subjects, impromptu late night gatherings were arranged which groups of students attempted to prove somewhat nontrivial results.

The organising committee also provided a number of social events including rock climbing, barbecues and lawn bowls, which were thoroughly enjoyed by students.



Participants at the seventh annual AMSI Summer School

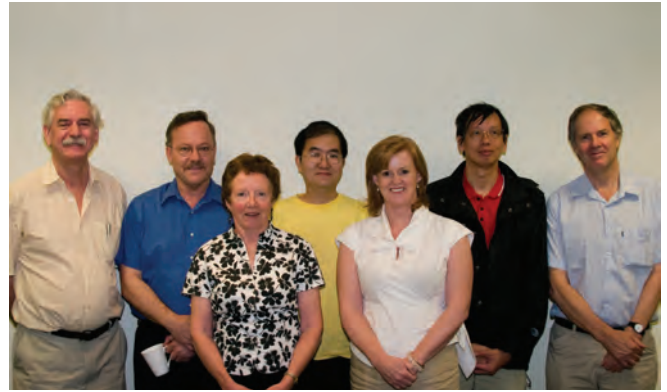
Course	Lecturer
Advanced Data Analysis	Matt Wand (University of Wollongong)
Groups of Lie Type and their Geometries	James Parkinson (University of Sydney)
Industrial Mathematics	Glenn Fulford (Queensland University of Technology)
Linear Analysis	David Pask (University of Wollongong)
Measure Theory	Iain Raeburn (University of Newcastle)
Nanomathematics	Barry Cox and Jim Hill (University of Wollongong)
Maths and Industry Study Group	Tim Marchant (University of Wollongong)

## International collaborations

### Hong Kong Curriculum Development Institute visit

In November Dr NG Yui-kin and IP Wing-tong from the Curriculum Development Institute of the Special Administrative Region Education Bureau, Hong Kong, met with AMSI to discuss the development, design and use of classroom-based assessment in senior secondary mathematics.

Assoc. Prof. Blyth gave an informative presentation on the major commercial Computer Aided Assessment (CAA) system, Maple TA, and the major open-source system, System for Teaching and Assessment using a Computer Algebra Kernel (STACK). Lively discussion about the use of CAA in teaching and learning followed.



AMSI Staff with Hong Kong delegates

### Collaboration with PIMS

In May 2009 AMSI and member universities sponsored six students to attend the 2009 Pacific Institute for Mathematical Sciences (PIMS) Industrial Problem Solving Workshop (IPSW) and Graduate Industrial Mathematics Modelling Camp (GIMMC) held at the University of Regina, Canada. For more information and student reports see [www.amsi.org.au/IPSW08.php](http://www.amsi.org.au/IPSW08.php).

In August, Prof. Broadbridge visited PIMS (Vancouver), attending and speaking at a jointly organised AMSI-PIMS conference, Similarity: Theory, Applications and Generalisations. With two Canadians, he will be guest editor for a special issue of *Journal of Engineering Mathematics*, on this topic.

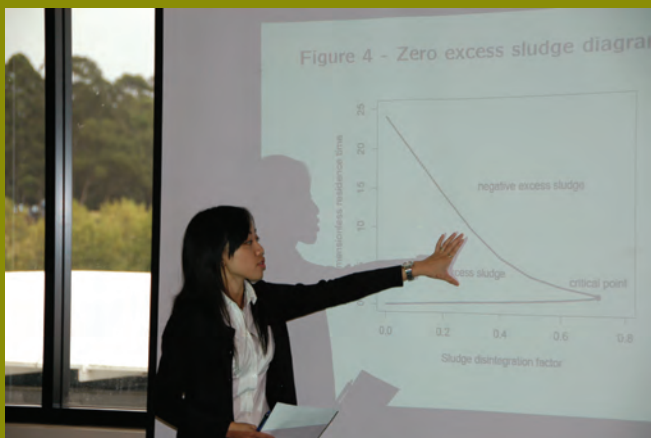
The PIMS Director has invited AMSI to sponsor some Australian students to attend the 2010 PIMS Summer School, which will focus on probabilistic modelling.

## 2009 AMSI Vacation Scholarships

AMSI funded 21 competitively selected scholarships to students from member institutions. At the end of the project students were supported by AMSI and CSIRO to attend CSIRO's annual *Big Day In* with more than 100 of their peers who had CSIRO Vacation Scholarships.

At *Big Day In* students give presentations about their research project, hear from scientists about career opportunities and network with their peers. Two AMSI sponsored students, Michael Albanese (University of Adelaide) and Adela Pucea (Deakin University), were among the top 10 students in the peer vote for best presentation.

Summaries of the projects are available [www.amsi.org.au/vs09.php](http://www.amsi.org.au/vs09.php).



Yuen Yi Lee of the University of Wollongong presented on cleaning industrial wastewaters using a sludge disintegration system



Lachlan Smith of Monash University presented on Bernstein's theorem in higher dimensions project: Spinors, minimal surfaces and isometric embedding



## Access Grid Room (AGR) network

The AGR network provides high-end video-conferencing, which facilitates access by the mathematics postgraduate community and professionals to international experts who are visiting and lecturing in Australia. It also provides a means of carrying out collaborative research with peers within Australia and internationally. AMSI member institutions with AGRs present seminars, lectures, honours and masters courseware, and multimedia resources remotely and interactively, and in return participate in events presented by other AMSI institutions.

In 2008 Assoc. Prof. Bill Blyth was appointed as AGR coordinator. This part-time position, based at AMSI, is supported by the University of Sydney's CASR-funded extension to the AMSI/ICE EM AGR project, *National Collaboration in Higher-Level Mathematics Instruction using High-Speed High-Bandwidth Internet-Based Communication Technology*.

Honours courses in the mathematical sciences delivered over the AG continue to be successful. Australia and the UK are the international leaders in the collaborative teaching of advanced mathematics via AGRs. In the past year, 18 Honours courses were offered via the AGR in Australian universities with AMSI/ICE-EM AGRs participating. In the same period 20 universities in the UK used AGRs to provide 50 taught courses for PhD students in the mathematical sciences. In 2009 the Australian scheme extended to include collaboration between Australian and New Zealand universities. For further details see [www.amsi.org.au/agr.php](http://www.amsi.org.au/agr.php)

Members are increasingly using the AG network, with many seminars from international visitors now offered over the AG. In August school teachers were also introduced to the benefits of AGR technology, when AGRs were used to bring together lecturers and audiences from Wollongong and Melbourne for part of the AMSI-run series of free professional development events for school maths teachers - *What's Happening In Mathematics?* In September, as part of the 2009 Clay-Mahler lectures, Prof. Terry Tao and Prof. Mohammed Abouzaid will deliver lectures over the AG from various locations.

International collaboration allows better understanding and utilisation of the AG technology. In September 2008 Assoc. Prof. Blyth visited the UK to speak on eTeaching, with reference to AGRs, at the Continuing Excellence in the Teaching and Learning of Mathematics, Statistics and Operations Research (CETL-MSOR) Conference 2008 at the University of Lancaster. During this trip Assoc. Prof. Blyth gave a seminar over the AG

from the University of Birmingham and visited the AGR at the University of Oxford. Also in 2008, he was invited to give presentations about AGR capabilities at two universities in Durban that are considering adopting the AG technology.

Other software has the potential to increase the accessibility of the AG. Assoc. Prof. Blyth and IT staff from several of the AMSI AGRs participated in a workshop on AG and Enabling Virtual Organisations (EVO), run by the Australian Research Collaboration Service (ARCS) in Adelaide and Melbourne in August. While the Access Grid provides many extra capabilities for collaboration which are beyond the usual video-conferencing, it requires high bandwidth internet connections, EVO is lower bandwidth video-conferencing that can be used in conjunction with the AG, but does not require a high bandwidth connection.



**View from the Victoria University AGR of Prof. Jonathan Borwein presenting from the University of Wollongong AGR**

### Articles on AGR published

1. Bill Blyth, Access Grid Retreat 2008 Report, *AustMS Gazette*, 35, 4 (September), 254–257, 2008.
2. Bill Blyth, Access Grid: enabling e-Collaboration, International Mathematical Union on the Web, 29, (November), 2008.
3. Bill Blyth, The Access Grid: What is the Access Grid? ... and what is it good for?, *AustMS Gazette*, 35, 5 (November), 311–314, 2008.
4. Bill Blyth, The Access Grid: Australia-New Zealand collaboration and eTeaching with pdf, *AustMS Gazette*, 36, 1 (Mar), 17–21, 2009.
5. Bill Blyth and Jason Bell, The Access Grid: AG on a personal computer; and using VPCScreen, *AustMS Gazette*, 36, 2 (May), 105–109, 2009.
6. Bill Blyth, The Access Grid: AG seminars: protocols and using VLC media player, *AustMS Gazette*, 36, 3 (July), 183–187, 2009.

# Outreach Program

## Highlights

- *Chief Scientist for Australia, Prof. Penny Sackett meets with the ACHMS at annual meeting*
- *AMSI provides support for the production of a national strategy for mathematical sciences in Australia*
- *AMSI facilitated consultation with the Australian Mathematical Sciences community on the national curriculum*

## AMSI and the future of the mathematical sciences

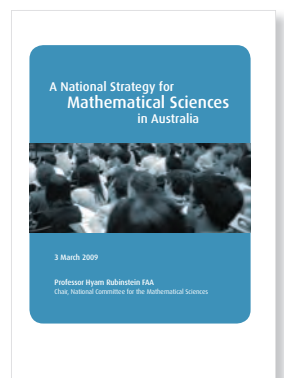
AMSI was originally funded as part of an infrastructure grants program. It now provides critical support for education in schools, honours and postgraduate students in universities, and has a diverse industry program. These programs will continue and a new Director will no doubt bring new ideas.

Now, more than ever before, Australia needs a proactive, collaborative institute for the mathematical sciences, AMSI is moving forward to meet the challenges.

A National Strategy document under the authorship of Prof. Hyam Rubinstein, Chair of the National Committee for Mathematical Sciences, documented evidence showing the need for coordinated national action to address perceptions of the usefulness of mathematics and statistics, teacher supply, mathematics in the universities and mathematical and statistical infrastructure.

See [http://www.amsi.org.au/national\\_strategy.php](http://www.amsi.org.au/national_strategy.php).

AMSI provided support for Prof. Rubinstein and for the printing of the National Strategy. In the eyes of many of our members, a key aspect of AMSI is the policy work providing a voice for the mathematical sciences community and support for bodies such as the National Committee and Australian Council of Heads of Mathematical Sciences (ACHMS). The benefits of AMSI's support for national collaboration is exemplified by the way the mathematical sciences community has been able to respond to the proposed national curriculum. The curriculum for mathematics has so far been free of the tensions that have been the subject of considerable media coverage in both science and English.





## Australian Council of Heads of Mathematical Sciences (ACHMS)

AMSI manages and supports the ACHMS group as a service to the broader mathematical sciences community. The ACHMS is currently chaired by Prof. Cheryl Praeger, who is a member of the International Mathematical Union executive. A key event in the ACHMS calendar is the Annual meeting held prior to the AMSI Members and Board meetings in February. This year the meeting was preceded by an afternoon devoted to the proposed national curriculum, and the meeting itself included a presentation to the new Chief Scientist and a talk by Liz Yuncken, project officer for the Scientists in Schools program.

### Chief Scientist at the ACHMS meeting

Prof. Cheryl Praeger welcomed the new Chief Scientist for Australia, Prof. Penny Sackett, to the annual meeting and congratulated her on her appointment. Prof. Rubinstein presented a summary of the challenges facing the mathematical sciences in Australia and some possible solutions. Prof. Sackett was generous with her time and stayed to make comments and answer questions.

A major item for discussion was the National Strategy that was then still being drafted and had formed the basis of the presentation to Prof. Sackett. The National Strategy document was sent to key Ministers and other significant players in the science and innovation policy arena. It was supported by local action in some parts of Australia.

In the afternoon Ms Liz Yuncken, project officer for the *Scientists in Schools* program, described the *Scientists in Schools* project and the proposed *Mathematicians in Schools* project. Prior to the ACHMS meeting Prof. Broadbridge and Ms Thomas had met with Ms Liz Yuncken and Ms Marian Heard at AMSI and had facilitated the presentation to a wider audience. AMSI will have ongoing involvement in the *Mathematicians in Schools* project through the funding received late in June. A further presentation on the project has been arranged for the annual meeting of the Australian Mathematical Society in Adelaide in September 2009.

### ACHMS/AMSI Dinner

A highlight of the annual ACHMS/AMSI dinner was the attendance of AMSI's inaugural Director, Prof. Garth Gaudry, and the Hon. Dr Brendan Nelson MP. Dr Nelson is a long-time supporter of AMSI and its objectives, and gave an informal address in which he acknowledged the work of AMSI. He particularly noted Prof. Gaudry's contribution.

Dr Nelson visited Ms Thomas at AMSI late in 2008, and he subsequently wrote to Minister Gillard and others concerning AMSI and the state of mathematical sciences. AMSI will miss his support in Canberra and we wish him well in his new challenges in Brussels.



Prof. Cheryl Praeger chairs the ACHMS meeting



ACHMS/AMSI attended by Prof. Garth Gaudry and the Hon. Dr Brendan Nelson MP

## National curriculum

On the afternoon prior to the ACHMS, AMSI facilitated a meeting of mathematical scientists with an interest in the proposed national mathematics curriculum. Representatives from across Australia, including the President of the Mathematics Education Research Group of Australasia, Assoc. Prof. Judy Mousley, and the President of the Australian Association of Mathematics Teachers, Dr Judy Anderson, attended a very productive meeting. Prof. Broadbridge, Dr Evans and Dr Frank Barrington were also involved in previous discussions with the Victorian Curriculum and Assessment Authority. Mathematical scientists from around Australia have welcomed the subsequent appointment of both Ms McIntosh and Dr Evans as writers for the national mathematics curriculum.

## Reviews and submissions

Prof. Broadbridge and Ms Thomas completed a submission to the Flinders University mathematical sciences review chaired by Dr Ron Sandland, a senior member of the Australian mathematical sciences community and former CSIRO deputy head. The submission supported an earlier submission by Prof. Peter Hall as President of AustMS. Prof. Broadbridge was a member of the mathematics review committee at University of Tasmania.

Prof. Rubinstein, Prof. Hall and Ms Thomas made a submission concerning the National Collaborative Research Infrastructure Strategy (NCRIS) arguing for funding to support mathematical infrastructure, especially AMSI.

Prof. Broadbridge and Prof. Rubinstein provided input to the Review of Higher Education citing evidence "in regard to the failure of the current higher education system to provide the mathematical and statistical capability a modern technological society needs".

Prof. Broadbridge is a member of the committee investigating mathematics in the Group of Eight universities. Ms Thomas has provided some background material to the committee.

Ms Thomas met with Dr Daniel Edwards from the Australian Council for Educational Research to discuss a report he was completing on the demand for higher degree (research) mathematics and science graduates.

## Meetings

Ms Thomas and Dr Montague accompanied Jim Brookes from MITACS to a meeting with Senator Carr's industry adviser to discuss internship programs. Mr Brookes has greatly assisted AMSI in establishing its internship program.

Prof. Broadbridge, Ms Thomas and Dr Evans travelled to Canberra in August and met with DEEWR and DIISR representatives. They also met with the acting Branch Manager of the Teaching Reforms Branch in Canberra meeting to discuss the national curriculum. They were very pleased to be asked back for further discussions after the meeting.

Prof. Praeger, Dr Evans, Ms Thomas and Prof. Rubinstein met with Minister Gillard's higher education advisor after the ACHMS meeting.

In January Prof. Hall, Prof. Rubinstein and Ms Thomas met with DEEWR representatives to discuss issues in the mathematical sciences and the 2009 budget. This led to the subsequent development of the National Strategy.

In May Prof. Broadbridge and Ms Thomas met with Dr Terry Cutler, Chair of the Government's review of innovation. He was very knowledgeable about the state of mathematical sciences and has been very supportive of action for improvements in the public domain.

## In the broader community

In December 2008 both Prof. Broadbridge and Dr Evans presented at an event at La Trobe in honour of Prof. Peter Stacey's retirement. The event had a theme of transition from school to university mathematics.

In February Dr Tony Gardiner visited AMSI to discuss developments in mathematics education in the UK. As well as discussions at the AMSI offices, he also presented to teachers at Ivanhoe Girls Grammar.

AMSI was privileged to host, in conjunction with Dr David Karoly from the Department of Earth Sciences at The University of Melbourne, a well-attended seminar on climate change given by Dr Tom Wigley. Dr Wigley, a Fellow of the American Association for the Advancement of Sciences, is one of the world's foremost experts on climate change and one of the most highly cited scientists in the discipline.

## Phil Broadbridge's farewell

A mini-symposium was held on 15 June in recognition of Prof. Phil Broadbridge's contribution to the mathematical sciences, especially as Director of the Australian Mathematical Sciences Institute. The event included talks from a number of Phil's former colleagues and students, encompassing both the serious and the amusing, recounting Phil's significant and broad range of contributions to mathematics with some personal anecdotes and some embarrassing photographs. The event concluded with dinner at University House.

## Our AMSI-MASCOS Industry Research Fellow talks chocolate



### Dr Dimtre Triadis smooth-talks the audience about chocolate

Last August as part of Science Week, Dr Dimetre Triadis, AMSI/MASCOS Research fellow, delivered talks on the mathematics of chocolate to residents at two Rylands Retirement villages in Melbourne. The talks were part of our community outreach activities. Plenty of taste comparisons were made and those attending said Dimetre's talks on the sensory aspects of chocolate "went down a treat".

## Use of AMSI premises for meetings and seminars

The AMSI premises were used for meetings and seminars for the following organisations:

- Australian Society for Operations Research (ASOR)
- Australian Mathematics Trust (AMT)
- Joint Associations Meeting of the Mathematics Education Research Group of Australasia (MERGA), Australian Mathematics Society (AustMS), Australian Association of Mathematics Teachers (AAMT)
- Melbourne Joomla User Group (MJUG)

We invite other mathematical societies or groups to also consider making use of this resource.

## Promoting careers in the mathematical sciences

AMSI and ICE-EM are committed to providing young people and their parents with well-informed advice on careers in the mathematical sciences. We have two main objectives: that young people appreciate mathematics as a discipline and that they are aware of the career options that emanate from the study of mathematics and statistics. AMSI has received a grant from DEWR that will support mathematics in schools, including careers awareness. See [www.times.org.au](http://www.times.org.au).

### Careers Pack

AMSI has developed a Careers Pack containing the following products produced by AMSI and ICE-EM. The Careers Pack is available to all members and may be ordered from the ICE-EM website. See [www.amsi.org.au/careers\\_resources.php](http://www.amsi.org.au/careers_resources.php).



### Maths ad(d)s

ICE-EM publishes *Maths ad(d)s* annually in conjunction with La Trobe University. The booklet contains job advertisements from newspapers and the internet that require mathematics or statistics, and illustrates the great variety of rewarding careers requiring these skills. We print and distribute 12,000 copies via our members, at careers expos and to secondary school teachers. It is a very successful and popular product.

### Maths and you

ICE-EM also produces a careers brochure *Maths and you* targeted at senior high school students and undergraduates. This brochure encourages students to continue their study of mathematics for the benefit and rewards it brings to their careers. There is also a series of four A3 colour posters suitable for notice boards. See [www.amsi.org.au/careers.php](http://www.amsi.org.au/careers.php) for details.



### Careers DVD

The careers website with interviews of 10 young mathematicians talking about their careers continues to provide a useful resource, encouraging students to continue their study of mathematics for the benefit and rewards it brings to their careers. See [www.mathscareers.org.au](http://www.mathscareers.org.au).

### Mathematicians in Schools

The highly successful *Scientists in Schools* project, initiated by Dr Jim Peacock when he was Chief Scientist, has been now expanded to include *Mathematicians in Schools*. Both projects are managed by the CSIRO. AMSI met with Dr Peacock and the project leaders. Presentations were made at the ACHMS meeting in February and at the AustMS meeting in September. The scheme aims to promote the relevance and importance of mathematics and statistics in future working life. The partnerships are flexible and can take a variety of forms. For more details visit <http://www.mathematiciansinschools.edu.au>

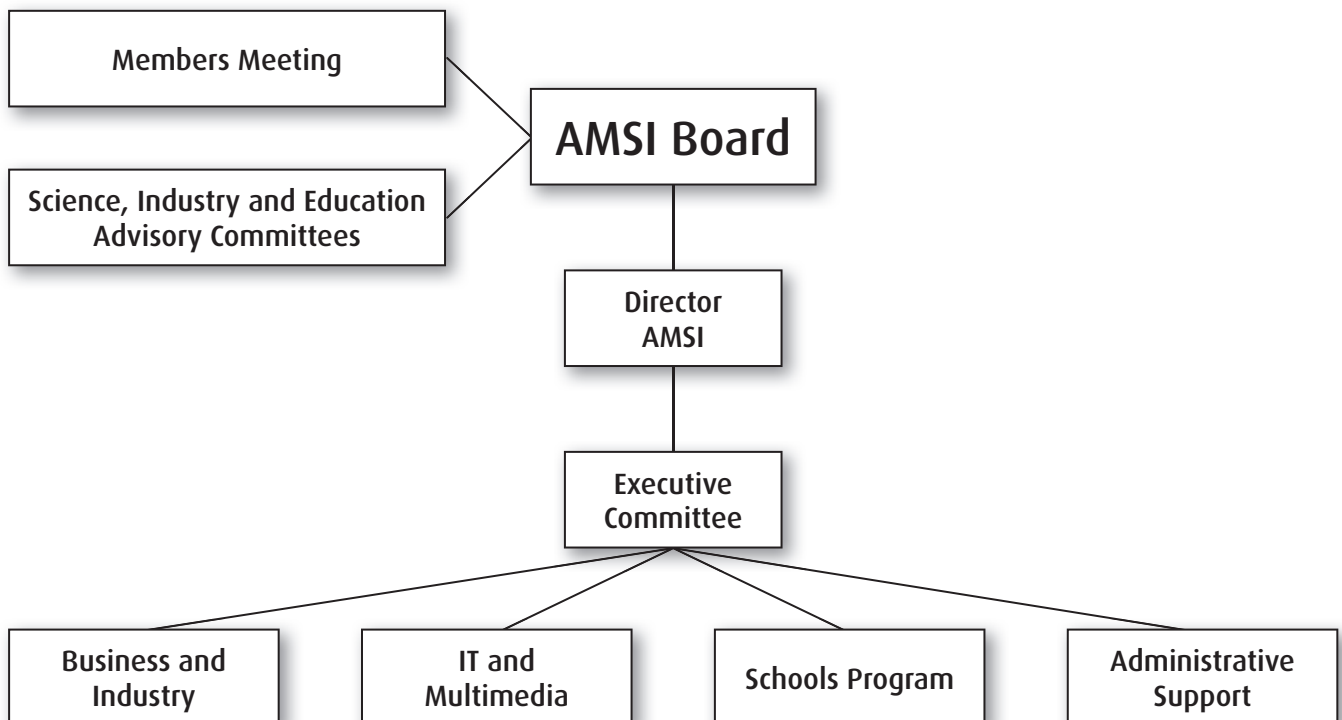
AMSI will continue to promote this project and advertise to potential schools and mathematicians the benefits of participation. It will be linked to careers awareness that forms part of the new grant from DEWR.

# Governance

## Structure of AMSI

AMSI is a collaborative unincorporated joint venture involving universities and other bodies related to the mathematical sciences. A Joint Venture Agreement (JVA) was signed by six Full Member universities in 2002, with a further two Full Members joining in 2004. A complete list of AMSI members appears on page iii of this report.

## Organisation structure





## Management of AMSI

The JVA empowers the AMSI Board to be responsible for the overall direction of the Institute, formulation of policies, and management of activities in the areas of:

- Science
- Business, government and industry
- Education

External advice is provided by three high profile Advisory Committees.

Activities are detailed in the Business Plan and Budget document as authorised annually by the Board on behalf of the Full Members. Management of the Institute and its activities as detailed in the Business Plan and Budget document is the responsibility of the Executive Committee authorised to perform such functions by the Board. (Members of the Executive Committee are listed on page 29.)

## The AMSI Board

### Composition

The Board representation comprises of:

- an independent Chair appointed by the Full Members
- the Institute Director
- the Deputy Director appointed by the Full Members
- one person representing The University of Melbourne
- one person representing the Full Members appointed by mutual agreement of the Full Members
- one person representing the Associate Members appointed by mutual agreement of the Associate Members
- two or three independent members representing business and industry appointed by mutual agreement of the Full Members.

No non-executive members of the Board are remunerated.

### Term of Board Members

The persons comprising the Board are appointed for terms of one year but are eligible to serve for one or more further terms if re-appointed in accordance with clause 18.2 of the Joint Venture Agreement.

# The Board Members 2008/09



**Dr James E. Lewis** BE, BA, PhD, FIChemE

Independent member and Chairman

Jim is President of the Parkview Group Pty Ltd and Director of several other companies. He has had a long career in industry and for a significant period was responsible for the research effort of one of Australia's major corporations.



**Ms Judith S. Downes** BA (Hons), Dip Ed, Grad Dip Acc, FCPA

Independent member

Judith is Chief Financial Officer at Alumina Limited, which she joined in January 2009. Previously she was Chief Financial Officer and Chief Operating Officer, Institutional Division at Australia and New Zealand Banking Group Limited (ANZ). She is also a member of the Standards Advisory Council of the International Accounting Standards Board and a past Director of ING Australia.



**Prof. John Hearne** BSc (Hons), MSc, PhD

Deputy Director to 12 February 2009

Representative of the Full Members to 12 February 2009

John has been Head of the School of Mathematical and Geospatial Sciences at RMIT since its formation in 2004. He is former president of the Resource Modelling Association and the Operations Research Society of South Africa. He has editorial responsibilities with *Ecological Modelling*, *Natural Resource Modelling*, *ORION* and *International Abstracts in Operations Research*.



**Prof. Kate Smith-Miles** BSc (Hons), PhD, FIEAust, FAustMS

Deputy Director from 12 February 2009

Kate Smith-Miles is Professor and Head of the School of Mathematical Sciences at Monash University. Her research interests are combinatorial optimisation, meta-heuristics, operations research, neural networks, intelligent systems, data mining, machine learning, meta-learning and applications of intelligent techniques and optimisation methods. She is on the editorial board of several international journals and has been a Senior Member of the IEEE since 2001.



**Prof. Philip Broadbridge** BSc (Hons), DipEd, PhD

Director of AMSI

Prior to joining AMSI, Philip was Chair of the Department of Mathematical Sciences at the University of Delaware, USA (2002–05) and Professor of Applied Mathematics at the University of Wollongong, NSW (1991–2001). His research interests involve applied nonlinear partial differential equations. He is a member of the editorial board of *Journal of Mathematical Analysis and Applications*, *Mathematical and Computer Modelling*, *Applicable Analysis* and *Lecture Notes of the Australian Mathematical Society*.



**Prof. Peter Taylor** BSc (Hons), PhD

Nominee of The University of Melbourne

Peter is Head of the Department of Mathematics and Statistics at The University of Melbourne, which is the host department of AMSI. He is internationally known for his research in applied probability and stochastic modelling. He is Editor-in-Chief of *Stochastic Models* and an associate editor of *Queueing Systems*. He is also a member of the INFORMS Applied Probability Awards Committee, whose duty is to select, worldwide, the best young researcher and the best publication in alternate years.



**Prof. Neville Webber** BSc, PhD

Representative of the Full Members to 12 February 2009

Neville is Professor of Mathematical Statistics in the School of Mathematics and Statistics and Associate Dean (Postgraduate Research) in the Faculty of Science at The University of Sydney. His research interests are U-statistics and exchangeable arrays, asymptotic approximations in statistics, and generalised linear models. He is an associate editor for the *International Statistical Review*.



**Prof. Geoff McLachlan** BSc(Hons), PhD, DSc

Representative of the Full Members from 12 February 2009

Geoff is Head of Mathematics at the University of Queensland. His research interest is statistics with a focus on statistical computation and bioinformatics. He also has a joint appointment in the Institute for Molecular Bioscience, where he is a Chief Investigator in the Australian Research Council (ARC) Centre of Excellence in Bioinformatics. Geoff serves on a number of editorial boards.





**Assoc. Prof. Jim Denier** BSc (Hons), PhD

Representative of the Associate Members to 12 February 2009

Jim is Head of the School of Mathematics at The University of Adelaide. His research interest is fluid mechanics. Jim was the Secretary-General for the International Congress of Theoretical and Applied Mechanics, ICTAM2008. He chairs the Australian Academy of Science's National Committee for the Mechanical Sciences, and is the Australian representative on the General Assembly of the International Union of Theoretical and Applied Mechanics. He is a member of the National Computing Infrastructure Merit Allocation Committee and a founding member of the Executive of the Australasian Fluid Mechanics Society.



**Prof. Tim Marchant** BSc (Hons), PhD, FAustMS

Representative of the Associate Members from 12 February 2009

Tim is Head of the School of Mathematics and Applied Statistics at the University of Wollongong. Tim's research interests are nonlinear optics, nonlinear waves and combustion theory. He is Deputy Chair of Australian and New Zealand Industrial and Applied Mathematics (ANZIAM), a fellow of the Australian Mathematical Society (AustMS) and an Endeavour Awards panel member. He was Director of the Mathematics and Statistics in Industry Study Group (MISG) from 2007 to 2009.

## Board Observers

The Chairs of the three Advisory Committees and Director of MASCOS are also invited the Board as observers.



**Prof. Peter Hall** BSc (Hons), MSc, DPhil, DHC, DSc, FAA, FAustMS, FRS, FRSE

Chair of the Scientific Advisory Committee

Peter was Professor of Statistics at The Australian National University from 1987 to 2006, moving during that year to The University of Melbourne as a Federation Fellow. His research interests include theoretical statistics and applications of statistics. During 2006 he was Vice-President, and later President, of the Australian Mathematical Society.



**Prof. Peter J. Taylor** FACE, CMath, FIMA, FTICA BSc, PhD

Chair of the Education Advisory Committee

Peter is Executive Director of the Australian Mathematics Trust and is a Professor of Mathematics and Adjunct Professor of Education at University of Canberra. He co-Chaired the International Commission on Mathematical Instruction (ICMI) Study 16 *Challenging Mathematics in and beyond the Classroom* and is a former President of the World Federation of National Mathematics Competitions, an affiliated study group of ICMI.



**Dr John Burgess** FTSE, BE, ME, PhD, DEng, CPEng, FICChemE, FIEAust

Chair of the Industry Advisory Committee to 30 June 2009

Previously Vice-President Safety, Environment and Technology, BHP Ltd, John has wide-ranging experience as a senior executive and research leader in industry in strategy development and functional leadership, as an academic in chemical engineering and as a member of various advisory boards and committees. In 2003 John was awarded a Centenary Medal.



**Prof. Tony Guttmann** MSc, PhD, FAustMS

Director of MASCOS

Tony was Interim Director of AMSI upon its foundation. He is currently Director of MASCOS, a past President of the AustMS and an organiser of the BHP Billiton/University of Melbourne School Mathematics Competition. His research interests are in mathematical models of phase transitions, enumerative combinatorics and critical phenomena in general.

## Board Meetings

Dr James E. Lewis	4 of 4	Prof. John Hearne (to 12 February 2009)	1 of 2
Ms Judith Downes	4 of 4	Prof. Kate Smith-Miles (from 12 February 2009)	2 of 3
Prof. Peter G. Taylor	2 of 3	Prof. Neville Webber (to 12 February 2009)	2 of 2
Assoc. Prof. Aleks Owczarek	1 of 1	Prof. Geoff McLachlan (from 12 February 2009)	3 of 3
Prof. Phil Broadbridge	4 of 4	Assoc. Prof. Jim Denier (to 12 February 2009)	2 of 2
Prof. Tim Marchant (from 12 February 2009)	3 of 3		

## Committee Membership

### Scientific Advisory Committee

Prof. Peter Hall (*University of Melbourne*) (*Chair*)  
 Prof. Phil Broadbridge (*Director, ex officio*)  
 Prof. Frances Kirwan (*University of Oxford*)  
 Prof. Terry Speed (*University of California, Berkeley; Walter and Eliza Hall Institute*)  
 Prof. Terence Tao (*University of California, Los Angeles*)  
 Prof. Neil Trudinger (*Australian National University*)  
 Prof. Ezra Getzler (*Northwestern University, Chicago*)

### Education Advisory Committee

Prof. Peter Taylor (*Australian Mathematics Trust*) (*Chair*)  
 Dr Frank Barrington (*University of Melbourne*)  
 Mr Peter Brown (*University of New South Wales*)  
 Ms Elizabeth Burns (*Loreto Mandeville Hall*)  
 Ms Jill Charker (*Australian Bureau of Statistics*)  
 Prof. Peter Galbraith (*University of Queensland*)  
 Prof. Cheryl Praeger (*University of Western Australia*)  
 Ms Jan Thomas (*Executive Officer, AMSI*)  
 Dr Leigh Wood (*Macquarie University*)  
 Dr Steve Barry (*Australian National University*)  
 Assoc. Prof. Jacqui Ramagge (*University of Wollongong*)

### Industry Advisory Committee

Dr John Burgess (*Chair until May 2009*)  
 Prof. Bill Appelbe (*Victorian Partnership for Advanced Computing*)  
 Dr James E. Lewis (*Parkview Group*)  
 Dr Thomas Montague (*AMSI and MASCOS*)

### Executive Committee

Prof. Phil Broadbridge (*AMSI Director*)  
 Prof. John Hearne (*Deputy Director to 12 February 2009*)  
 Prof. Kate Smith-Miles (*Deputy Director from 12 February 2009*)  
 Ms Jan Thomas (*Executive Officer*)  
 Mr Richard Barker (*Business Development/Marketing Manager*)  
 Dr Thomas Montague (*Industry/Marketing Manager*)  
 Dr Michael Evans (*Schools Project Manager, ICE-EM*)

### Advanced Coursework Committee

Prof. Neil Trudinger (*Chair*) (*Australian National University*)  
 Prof. Michael Eastwood (*University of Adelaide*)  
 Prof. Garth Gaudry (*Director ICE-EM*)  
 Prof. Mark Gould (*University of Queensland*)  
 Dr Markus Hegland (*Australian National University*)  
 Prof. Kathy Horadam (*RMIT University*)  
 Prof. Nalini Joshi (*University of Sydney*)  
 Prof. Matt Wand (*University of New South Wales*)

### ICE-EM International Advisory Committee

Prof. Hung Hsi Wu (*University of California, Berkeley*)  
 Prof. Jonathan Borwein (*Dalhousie University, Canada*)  
 Prof. Yongwimon Lenbury (*Mahidol University, Thailand*)

## Stakeholders

### Members

Full Members and Associate Members are listed on page iii. They meet as a group twice a year, normally in February and June or July. In the 2008–09 year, the meetings were:

- 12 February 2009 at The Australian National University
- 16 June 2009 at The University of Melbourne

### Other stakeholders

AMSI was established through a grant from the Victorian Government and with in-kind input by The University of Melbourne. Funding through this grant ceased on 30 June 2005.

AMSI won a tender from the Department of Education, Science and Training (DEST) for an International Centre of Excellence for Education in Mathematics (ICE-EM) in January 2004. This project was funded for four years until July 2008.

AMSI has received funding from the Department of Education, Employment and Workplace Relations (DEEWR) under the Collaboration and Structural Reform Fund (CASR), enabling AMSI to establish an Industry Internship Program and schedule a number of important events and activities over the period to June 2010. Comprehensive progress reports and updated business plans are presented to DEST and DEEWR in accordance with the Funding Agreement.

### Communication with stakeholders

All Full and Associate Members of AMSI have nominated a person to be their representative to communicate with AMSI. In the case of member universities, this is almost always the Head of the Department or School or Discipline of Mathematics and Statistics. These 'member representatives' or their proxies are invited to meet as a group every six months to hear reports of progress on current matters and to raise matters of common interest and concern.

The AMSI Directors' monthly reports on activities are emailed to Board members, committee members and AMSI member representatives.

The Joint Venture Agreement members do not meet separately as a group. Their interests are catered for through the Deputy Director of AMSI, one other representative on the Board and the AMSI Deputy Director on the Executive Committee.

## Employees

### Policies and procedures

Staff are employed on fixed term contracts through The University of Melbourne, and its policies and procedures are followed.

### Senior staff

Director of AMSI, Prof. Philip Broadbridge, was profiled in the Board section on page 27.



**Ms Jan Thomas** BSc (Hons), DipEd, BEd (TESOL)

Executive Officer, AMSI

As Executive Officer for AMSI, Jan's principal responsibilities are policy analysis and response. In this role she assists both the Director and Board Chair as well as key people in the wider mathematical sciences community. She manages the Australian Council of Heads of Mathematical Sciences, which AMSI supports as a service to the mathematical community.



**Dr Thomas Montague** BSc, MSc, DipEd, DPhil

Industry/Marketing Manager

Thomas coordinates the industry outreach program for AMSI. This includes identifying and promoting partnerships between users and providers of the mathematical sciences. His prior experience includes Science Advisor to the Victorian Government, private consultant on environment and resource management, company director, research scientist and academic.



**Dr Michael Evans** PhD, DipEd

Schools Project Manager, ICE-EM

Before coming to ICE-EM, Michael was Head of Mathematics at Scotch College, Melbourne, and involved with the Victorian Curriculum and Assessment Authority in various capacities. In 1999 he was awarded an honorary Doctor of Laws by Monash University for his contribution to mathematics education, and in 2001 he received the Bernhard Neumann award for contributions to mathematics enrichment in Australia.



**Ms Janine McIntosh** DipT

Schools Project Officer, ICE-EM

Janine McIntosh is the ICE-EM Schools Project Officer. Her role is to develop primary school mathematics material and to work with teachers to enhance the mathematics experiences of the children they teach. Janine is an experienced primary teacher who has also worked as curriculum writer for the VCAA, in mathematics education at The University of Melbourne and is a member of the Maths Challenge committee of the Australian Mathematics Trust.



**Assoc. Prof. Bill Blyth** BSc (Hons), DIC, PhD

Access Grid Coordinator

Bill is the national coordinator of Access Grid Room activities. These focus on collaborative teaching of Honours level courses and national presentation of seminars. Bill was previously Associate Professor of Computational Mathematics, and was Head of the Department of Mathematics at RMIT University. He is Chair of the Engineering Mathematics Group of Australia, a Centre Affiliate at the International Centre for Classroom Research at The University of Melbourne, and led the design, construction and initial delivery phases of the RMIT University AGR. His research interests are in mathematics education in technology-rich classrooms and the numerical solution of differential and integral equations.

# Financial Statements

Financial records are administered by AMSI staff in conjunction with, and using the facilities of, The University of Melbourne. All financial statements are reconciled to the university's integrated system – Themis, to ensure compliance and to verify the unspent AMSI funds held by the university.

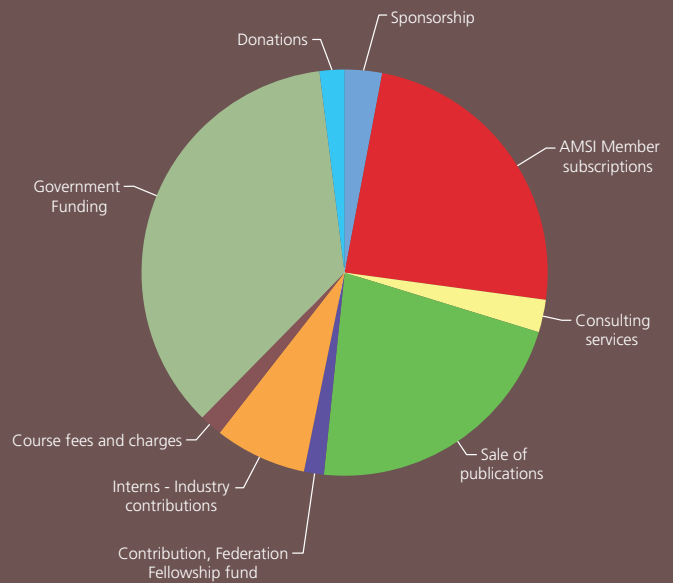
During 2008/09, AMSI became increasingly reliant on incomes derived from commercial activities, Member subscriptions and corporate support. This follows an extended period of substantial support from the Australian Government for the International Centre of Excellence for Education in Mathematics (ICE-EM) and a Discipline-Based Initiative Project - Mathematics for 21st Century Engineering Students, both having been fully acquitted in 2007/08. Funding for a project of National Collaboration in the Mathematical Sciences: Integrating research, industry and education, continues to support major initiatives, including the highly successful internship program, and will do so until 2010.

In this environment every effort was made in 2008/09 to ensure that costs remained within funding limitations while still sustaining key activities. The Statement of Financial Performance demonstrates that this was achieved.

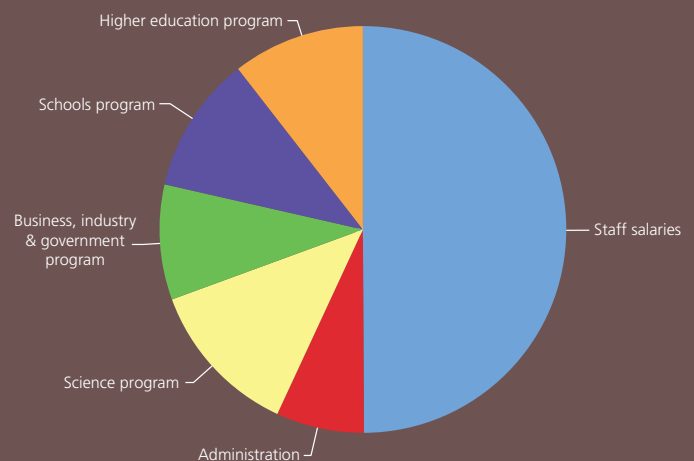
The University of Melbourne undertakes to provide audited financial statements for contractually funded activities but not for the overall AMSI Group. In the absence of such audit statements, the following certification is provided:

We hereby certify that the funds received by the AMSI Group during 2008/09 and the expenditure incurred during that period were in accordance with relevant funding agreements, with the AMSI Joint Venture Agreement, and with approved Business Plans. The balance of unspent funds as at 30 June 2009 is in agreement with the records of The University of Melbourne.

## AMSI group income 2008/2009



## AMSI group expenditure 2008/2009



Phil Broadbridge  
Director

Richard Barker  
Business Manager

# Statement of Financial Performance

	July 2008 to June 2009		July 2007 to June 2008	
	\$	\$	\$	\$
<b>Income</b>				
<b>Funding</b>				
Australian Government - DEST				
Carrick Institute for Learning and Teaching	0		110,100	
Australian Government - DEEWR				
Equity and Structural Reform Branch (formerly CASR)	900,000		500,000	
<b>Donations</b>				
Australian Char Pty Ltd	0		12,500	
Farrell Family Foundation	50,000		50,000	
<b>Sponsorship</b>				
BlueScope Steel Limited - Schools program	75,000		75,000	
ICE-Warm - Water Workshop	0		15,000	
<b>Course fees and charges</b>				
	45,833		12,459	
<b>Sale of publications</b>				
	546,990		364,089	
<b>Internships - industry contribution</b>				
	185,000		15,000	
<b>Consortium member contributions</b>				
	610,000		615,000	
<b>Consulting services</b>				
	65,593		162,348	
<b>Collaboration partner (MASCOS) contribution</b>				
	0		250,000	
<b>Contribution - Federation Fellowship Fund</b>				
	40,000		0	
<b>Other income</b>				
	5,502		212	
<b>Total Income</b>		<u>2,523,918</u>		<u>2,181,708</u>
<b>Expenditure</b>				
<b>Personnel</b>				
Salaries, permanent and casual	1,277,638		2,036,655	
External salary support	-61,387		-112,500	
		1,216,251		1,924,155
<b>Materials, supplies and services</b>				
<b>Scholarships</b>				
Undergraduate vacation scholarships	48,460		16,836	
Top-up scholarships, AMSI Members	20,000		24,000	
<b>Internships</b>				
	144,788		20,000	
<b>Supplies</b>				
Consumable materials	10,640		33,780	
<b>Services</b>				
Contracted, professional services	61,989		108,677	
Internal services - University of Melbourne	28,422		23,434	
Utilities	9,130		12,639	
<b>Sponsorship</b>				
Workshops, seminars - Member Institutions	97,454		60,558	
Research Fellows at MASCOS nodes.	120,000		220,000	
<b>General expenses</b>				
Printing, photocopying, subscriptions	204,165		200,972	
Freight, cartage	34,147		64,045	
<b>Grants</b>				
Access Grid Rooms - Member Institutions	46,001		162,485	
<b>Public relations and promotion</b>				
Domestic advertising & promotion	6,609		14,059	
Entertainment	9,577		23,580	
<b>Collaboration partner contribution</b>				
MASCOS	0		100,000	
ACERA	0		85,000	
<b>Finance - FBT</b>				
	3,169		4,232	
<b>Equipment</b>				
Computer software & services	4,817		3,976	
Expenses Assets	20,017		4,624	
<b>Travel and Conferences</b>				
Travel & accommodation - domestic	76,461		135,879	
Travel & accommodation - international	23,003		63,019	
Conducting/attending seminars, conferences	229,095		359,853	
AMSI Members' travel allowance	21,999		0	
		<u>1,219,943</u>		<u>1,741,648</u>
<b>Total Expenditure</b>		<u>2,436,194</u>		<u>3,665,803</u>
<b>Net of actual income over expenditure</b>		<u>87,724</u>		<u>-1,484,095</u>

## Expenditure by Program

<b>Personnel</b>				
Salaries, permanent and casual	1,277,638		2,036,655	
External salary support	-61,387		-112,500	
		1,216,251		1,924,155
<b>Administration</b>				
		170,283		195,530
<b>Collaboration contributions</b>				
MASCOS	0		100,000	
ACERA	0		85,000	
		0		185,000
<b>Programs</b>				
<b>Science</b>				
Sponsorship of workshops, conferences, seminars, guest lecturers and visiting fellows	304,437		366,516	
<b>Business, industry and government</b>				
Internship program, focused workshops, costs re consulting projects	222,954		52,049	
<b>Education</b>				
Schools - teacher PD, promotion of careers, schools materials for students and teachers	266,074		373,472	
Higher Education - summer school, graduate theme program, AGRs, vacation scholars	256,195		550,867	
Carrick project expenses - Mathematics for 21st Century Engineering Students	0		18,214	
		<u>1,049,660</u>		<u>1,361,118</u>
		<u>2,436,194</u>		<u>3,665,803</u>

## Statement of Financial Position

	30 June 2009		30 June 2008	
	\$	\$	\$	\$
<b>Assets</b>				
<b>Funds on hand</b>				
AMS/ICE-EM and AMS/MASCOS	509,694		563,481	
Project 80005 - National Collaboration in the Mathematical Sciences: integrating research, industry and education. Funded by DEEWR through the Equity and Structural Reform Branch	611,744		320,012	
International Centre of Excellence for Education in Mathematics (ICE-EM)	<u>0</u>		<u>118,119</u>	
		1,121,438		1,001,612
<b>Stock on hand</b>				
<i>ICE-EM Mathematics textbooks</i>	<u>149,540</u>		<u>181,642</u>	
		149,540		181,642
		<u><b>1,270,978</b></u>		<u><b>1,183,254</b></u>
<b>Equity</b>				
<b>As at 1 July 2008</b>		1,183,254		2,667,347
<b>Net of actual income over expenditure 2008/09</b>				
AMS/ICE-EM and AMS/MASCOS		-204,008		-730,011
Project 80005 - National Collaboration in the Mathematical Sciences: integrating research, industry and education. Funded by DEEWR through the Equity and Structural Reform Branch		291,732		320,012
International Centre of Excellence for Education in Mathematics (ICE-EM)		<u>0</u>		<u>-1,074,094</u>
		87,724		-1,484,093
		<u><b>1,270,978</b></u>		<u><b>1,183,254</b></u>

# Acronyms

AAAS	American Association for the Advancement of Science
AAMT	Australian Association of Mathematics Teachers
AARMS	Atlantic Association for Research in the Mathematical Sciences
ACARA	Australian Curriculum, Assessment and Reporting Authority
ACERA	Australian Centre of Excellence for Risk Analysis
ACHMS	Australian Council of Heads of Mathematical Sciences
AGR	Access Grid Room
AMSI	Australian Mathematical Sciences Institute
AMT	Australian Mathematics Trust
ARC	Australian Research Council
ASME	American Society of Mechanical Engineers
ASOR	Australian Society for Operations Research
AustMS	Australian Mathematical Society
CASR	Collaboration and Structural Reform Fund
CIAO	Centre for Informatics and Applied Optimization
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CTAC	Computational Techniques and Applications Conference
DEST	Department of Education, Science and Training
DEEWR	Department of Education, Employment and Workplace Relations
GIMMC	Graduate Industrial Mathematical Modelling Camp, held by PIMS
ICE-EM	International Centre of Excellence for Education in Mathematics
IPSW	Industrial Problem Solving Workshop, held by PIMS
JVA	Joint Venture Agreement
MASCOS	ARC Centre of Excellence for Mathematics and Statistics of Complex Systems
MDPI	Molecular Diversity Preservation International, Zurich
MERGA	Mathematics Education Research Group of Australasia
MITACS	Mathematics of Information Technology and Complex Systems: a Network of Centres of Excellence for the Mathematical Sciences
NCB	National Curriculum Board
NCE	a Canadian Network of Centres of Excellence
PIMS	Pacific Institute for Mathematical Sciences
PRIMA	Pacific Rim Mathematical Association
SIAM	Society for Industrial and Applied Mathematics
TIMES	The Improving Mathematics in Schools Project



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[www.ice-em.org.au](http://www.ice-em.org.au)