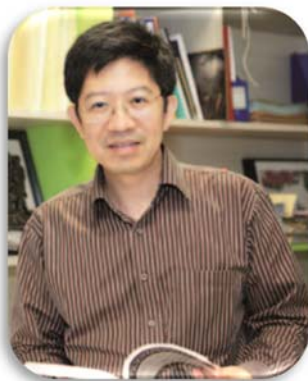


# Department of Mathematics

*An online publication for Mathematics Students & Alumni (Issue 5 / Aug 2013 to June 2014)*

## Head's Message



The Department of Mathematics at NUS has experienced extraordinary growth in the last 20 years, in the breadth and scale of its undergraduate programs, in the depth and vibrancy of its postgraduate programs, and in the steadily increasing research capacity and reputation of its faculty.

Below I would like to highlight to you some important developments in the recent years.

As you might have heard, we moved into our new premise at S17 in 2011, occupying 5 and a-half levels of beautifully renovated spaces, much to the delight of current students and the envy of visiting academics. The conducive environment for learning and work should bode well for the Department's continuing progress for the next decade.

It has always been our mission and key focus to provide quality education. I am pleased to report that our Special Program in Mathematics (SPM), designed for students with a strong passion and aptitude for the mathematical sciences, has produced good results: some top honours students from SPM have gone on to excellent graduate schools such as Princeton and Harvard; with quality faculty and supervision, PhD graduates have done equally well, with many obtaining attractive positions such as postdocs in excellent universities and faculty positions in research universities.

To equip our students with the educational training to meet industrial needs, the Department has introduced in this year two specializations within the Applied Mathematics major, which are Mathematical Modelling and Data Analytics, and Operations Research and Financial Mathematics. This will help the students to obtain an additional focus of study besides the foundational training in applied mathematics, and so to be more employment ready. For graduate education, the Department operates a successful MSc Program in Quantitative Finance, which enhances the skills and knowledge of quantitative finance professionals. The yearly cohort averages 50 and number of applicants exceeds 300 for this year.

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In faculty recruitment, the Department has been especially successful in attracting outstanding mid-career mathematicians with steep research trajectories. Their appointments have added significant strength in a number of research areas (such as those in dynamics systems, partial differential equations, representation theory and automorphic forms, and quantitative finance) and thus help to reshape our research landscape in important ways.

Members of the Department produce groundbreaking research and an increasing number of staff are being recognized in the international mathematical community. For instance, there have been more than 10 publications in recent years in the most sought-after journals of mathematics including *Annals of Mathematics*, *Inventiones Math.*, and the *Journal of the American Mathematical Society*. To cite another example, 4 members of the Department (Profs Bao Weizhu, Gan Wee Teck, Shen Weixiao and Yu Shih-Hsien) are invited to speak in the International Congress of Mathematicians (ICM) this August in Seoul, Korea. This is the most prestigious speaking engagement in mathematics. It is reasonable to say that every mathematics department will be pleased with the achievements highlighted above.

To conclude, I wish all of you, students and alumni, success and happiness in what you do. Please feel free to drop me an email or visit us in our new premise, whether to help us to do our work better, or to chat with your favourite lecturer over a cup of coffee in our cosy staff lounge.

*Sincerely,*

*Zhu Chengbo*

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## News & Events

### New Dean of Science



Professor Shen Zuowei, who was the Head of the Department of Mathematics until March 31, 2014, has taken up his new appointment as the Dean of Science, from 1 April 2014.

Prof Shen, who first joined NUS as a lecturer in 1993, is the recipient of the Tan Chin Tuan Centennial professorship, which is conferred upon academics who have exceptional achievements in their field of study and made significant contributions to the academic policies and programmes of the university. He has also received numerous awards for his research, including the National Science Award in 1998 and the Society of Photographic Instrumentation Engineers' Wavelet Pioneer Award in 2012.

We wish Prof Shen success as he embarks on a new exciting chapter of his academic career.

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## Invited Lectures at the International Congress of Mathematicians 2014

The International Congress of Mathematicians (ICM) is the largest international congress in the mathematics community. Its long and illustrious history stretches over more than a century. It is held once every four years under the auspices of the International Mathematical Union (IMU). Four of the top prizes in mathematics: The Fields Medals, the Nevanlinna Prize, the Gauss Prize, and the Chern Medal are awarded during the opening ceremony on the first day of the congress. With thousands of participants and the announcement of the prestigious prizes, every ICM is the focus of the mathematical world and a highlight on the mathematical calendar.

Profs BAO Weizhu, Gan Wee Teck, SHEN Weixiao and YU Shih-Hsien will deliver invited lectures at the upcoming International Congress of Mathematicians (ICM) in Seoul, Korea, August 13-21, 2014. They will respectively speak on their ground-breaking work on Bose-Einstein Condensation, Theta Correspondence, Interval Dynamics and Boltzmann Equations

## Appointment as Fellows of the Singapore National Academy of Science

The Singapore National Academy of Science (SNAS) welcomed nine newly elected Fellows to its organisation at a ceremony held on 9 May 2014. Eight of them were NUS faculty members, of which two were from the Department of Mathematics - Professor Sun Yeneng and Professor Zhu Chengbo.

The appointments were made in recognition of Prof Sun's path-breaking work in mathematical economics by providing a much needed mathematical foundation for modelling a large market with many agents under individual level uncertainty, and for his discovery of a series of surprising results in probability theory and economics."

Prof Zhu's appointment was for his contributions to the representation theory of classical groups, in particular for proving the multiplicity one conjectures for smooth representations and conservation conjecture for local theta correspondence.



From left: Professor Sun and Professor Zhu together with the other SNAS Fellows

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## Prof Bao Weizhu wins 10<sup>th</sup> Feng Kang Prize in Scientific Computing

Prof BAO Weizhu was awarded the 10<sup>th</sup> Feng Kang Prize in Scientific Computing in 2013. He is the inaugural recipient from NUS to be awarded the Feng Kang Prize for Scientific Computing by the Chinese Society of Computational

Mathematics for his significant contributions in Numerical methods and mathematical analysis for Bose-Einstein condensation and numerical analysis of the Schrödinger equation.

Prof BAO Weizhu has made significant contributions to computational and applied mathematics, especially in the areas of Bose-Einstein condensation, solid-state dewetting problems, computational fluid dynamics, wave motion in quantum and plasma physics, combustion, etc. His work on numerical methods and mathematical analysis for ground states and dynamics of Bose-Einstein condensation has been published in top journals in computational and applied mathematics, as well as physics.

Prof BAO has been invited to give a 45-minute presentation at the International Congress of Mathematics (ICM) 2014 to be held in Seoul, South Korea. The invitation is an immense honour that is widely acclaimed by the mathematical community as a mark of excellence and recognition of his position as a world-class mathematician.

The Feng Kang Prize in Scientific Computing honours young Chinese scientists (before the age of 45) in China and abroad for significant contributions in scientific computing. Winners are rewarded with a premium of 20,000 Chinese Yuan each (approximately S\$4,000). Since 1995, the award has been presented biennially with at most three receipts each time and has honored young Chinese mathematicians in China and abroad for their significant contributions in the broad areas of scientific computing.

The Feng Kang Prize is dedicated to the memory of the late Professor Feng Kang (1920 – 1993), the founder and pioneer of Chinese computational mathematics. He was a member of the Chinese Academy of Sciences, as well as the founding director of the Computing Centre of the Chinese Academy of Sciences.

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## *Our Alumnus Dr Yeo Sze Ling*

The University gives out awards to alumni who have made achievements in their respective field of work.

Dr Yeo Sze Ling lost her sight when she contracted glaucoma at the tender age of four. As she grew up in spite of the many odds stacked against her, she was determined not to let her “disability” stop her from living life to the fullest.

Sze Ling bravely chose to begin attending mainstream schools in secondary school, embracing hard work with unwavering commitment. Her determination earned her the A\*STAR Graduate Scholarship, and she was bestowed the National Science and Technology Award for being the top student to graduate from the Faculty of Science at the National University of Singapore in 2001.

Completely blind, she surmounted doubts and challenges to earn herself three degrees, including a PhD in Mathematics. Sze Ling’s fearless and tenacious spirit brought her far. She is an outstanding Research Scientist 1 at the Institute for Inforcomm Research, Cryptography and Security department, where she has worked since 2005, and is also currently an Adjunct Assistant Professor in the School of Physical and Mathematical Science at Nanyang Technological University.

In June 2012, Dr Yeo received the Singapore Youth Award, and her achievements were highlighted by Prime Minister Mr Lee Hsien Loong in his 2013 National Day Rally Speech.

She was also the recipient of the NUS Outstanding Alumni Award 2013 and the Her World Young Woman Achiever Award 2013.





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## *A Tribute to our Faculty Members*

Three of our faculty members Prof Koh Khee Meng, A/Prof Leong Yu Kiang and A/Prof Quek Tong Seng retire from the Department on 30 June 2014. The Department had a special luncheon to thank them for their valuable contributions and would like to wish them a happy and relaxing retirement ahead.



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*On the occasion of Professor Koh's retirement on 30 June 2014, we would like to thank him for his valuable contributions to the department and faculty, and wish him a fun-filled and relaxing retirement.*

Professor Koh was an alumnus of Nanyang University (B.Sc, 1968) and University of Manitoba, Canada (Ph.D. 1971).

After completing his graduate studies, he returned to Singapore and began his academic career in 1972 as Lecturer at the Nanyang University, which was subsequently merged with the University of Singapore to form the National University of Singapore in 1980. Professor Koh was promoted to Professor in 1996.

Having dedicated 42 years to a teaching and research career, Professor Koh has been an inspiring figure to many mathematics graduates and younger faculty members. He has won 20 teaching awards including the prestigious University Outstanding Educator Award. He is also the co-author of eight books comprising six textbooks and two solution manuals, several of which have received positive reviews and are widely used in schools and universities in Singapore and overseas.

When asked about his feelings on teaching and his retirement, Prof Koh shares that *"Teaching is not my occupation but my calling. Mathematical results are not inexplicable products but crystallisations of the collective wisdom of mankind. As a mathematics educator, I relish the challenge of transforming the abstract into something concrete, the dull into something interesting, and the impractical into something relevant. It is a satisfying and meaningful task that I value and constantly seek to achieve in my teaching."*

Prof Koh's research interests are in graph theory and combinatorial analysis. He, with a total of 21 students, has published more than 160 research and conference papers; some of them are in reputable international journals such as Journal of Graph Theory, Society for Industrial and Applied Mathematics (SIAM) Journal on Discrete Mathematics, Discrete Mathematics and Discrete Applied Mathematics.



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*As A/Prof Quek retires on 30 June 2014, we would like to thank him for his valuable contributions to the department and faculty, and wish him a fun-filled and relaxing retirement.*



A/Prof Quek did both his undergraduate and graduate studies at the University of Singapore. After receiving his PhD in 1980, he joined the Department as Lecturer in 1981, and was promoted to Associate Professor in 1996.

During his 33-year career, A/Prof Quek was a dedicated teacher and was a recipient of the Faculty of Science Teaching Award in 1992. He was also an active member of the Department Student Advice Committee from 2005 to 2012.

A/Prof Quek was also a member of the Singapore Mathematical Society and the Southeast Asian Mathematical Society. His research areas include Fourier analysis and abstract harmonic analysis.

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*A/Prof Leong retires from the Department of Mathematics on 30 June 2014 after a fulfilling career spanning 42 years. We would like to thank him for his valuable contributions to the Department and Faculty, and wish him a fun-filled and relaxing retirement ahead.*

After completing his undergraduate studies at the then University of Singapore (now NUS) in 1969, Prof Leong pursued his graduate studies at the Australian National University before joining the Department of Mathematics at NUS as a lecturer in 1972. He was promoted to Associate Professor in 1999.

Prof Leong was a dedicated teacher and had immense rapport with his students. His General Education module "Living with Mathematics" and Freshman Seminar Module "Analogy and Intuition in Mathematics" <<http://www.science.nus.edu.sg/undergraduate-studies/ugenh/fsm/185-undergraduate/ugenh/fsm/677-fsm-topics-1214#analogy>> were extremely well received by many students.

Many of us know Prof Leong not just as a mathematician, but also as our residential poet and grammarian, who dishes out a limerick on demand. He contributed his literary talent by serving as Editor of "Mathematical Medley", a publication of the Singapore Mathematical Society for several years. He was also the founding editor of "Imprints", a newsletter published by the Institute for Mathematical Sciences (IMS), NUS, from 2002 to 2006. The concept of a newsletter with interviews of distinguished mathematicians and scientists as a regular feature was conceived arising from discussions with Prof Louis Chen, Director of IMS from 2000 to 2012. Prof Leong conducted every interview personally from 2003 to 2009, despite having relinquished his position as editor in 2006. This series of interviews has since been compiled into a book entitled "Creative Minds, Charmed Lives" published by World Scientific Publishing Company, to commemorate IMS's 10th anniversary with the theme "10 years of mathematical synergy".

In 1985, he had also conducted, jointly with Prof Chi Tat Chong, an interview of the legendary French mathematician Jean-Pierre Serre, who became the youngest recipient of the Fields Medal (the mathematical counterpart of the Nobel Prize) in 1954 at the age of 28. The interview was first published in the June 1985 issue of "Mathematical Medley", a publication of the Singapore Mathematical Society, and later in Volume 8 (1986) of the Mathematical Intelligencer. Since then, it has been translated into several languages including Czech, Chinese, Arabic, Japanese and Russian.

