



**DEPARTMENT OF MATHEMATICS
NATIONAL UNIVERSITY OF SINGAPORE**

Our Milestones
1929 - 2015

HEADS OF DEPARTMENT - FROM INCEPTION TO PRESENT

1931 – 1959

Prof Alexander Oppenheim



1959 – 1962

Prof Daniel Pedoe



1962 – 1979

Prof P.H. Diananda



1979 – 1980

Prof Kumkum Kumar Sen



1980 – 1982

Prof TEH Hoon Heng



1982 – 1996

Prof PENG Tsu Ann

Top Row (from left):

Prof Alexander Oppenheim, Prof Daniel Pedoe, Prof TEH Hoon Heng, Prof PENG Tsu Ann and Prof Louis CHEN Hsiao Yun

1996 – 2000

Prof Louis CHEN Hsiao Yun

Bottom Row (from left):

Prof LEE Seng Luan, Prof CHONG Chi Tat, Prof SHEN Zuowei and Prof ZHU Chengbo

2000 – 2006

Prof LEE Seng Luan



2006 – 2012

Prof CHONG Chi Tat



2012 – 2014

Prof SHEN Zuowei



2014 – present

Prof ZHU Chengbo



HEADS OF DEPARTMENT - A SNAPSHOT IN 2013



*From left to right:
Prof LEE Seng Luan, Prof PENG Tsu Ann, Prof SHEN Zuowei,
Prof CHONG Chi Tat and Prof Louis CHEN*

MILESTONES

1929

1929

- The Department of Mathematics was among its first departments when Raffles College was officially opened in 1929. There was only one faculty member – Raymond K. Butchart from Scotland. Professor Butchart was a Fellow of the Royal Society of Edinburgh.



Professor Raymond K. Butchart

1931 to 1946

1931 to 1946

- The Department had 2 faculty members – Professor Alexander Oppenheim and one lecturer J.C. Cooke. They were assisted for many years by K.M.R. Menon of the Education Department of the Straits Settlement. Menon eventually joined the Department as Lecturer in 1951 and left the university on retirement in 1955. Mathematics was taught to both Arts and Science students, and until 1940, the number of Arts and Sciences students did not exceed 50.



Professor Alexander Oppenheim

1949

1949

- This year saw the formation of the University of Malaya. Professor Oppenheim continued as Professor of Mathematics and Head of Department. In January 1957, Professor Oppenheim was appointed Vice Chancellor of the University of Malaya for 2 years after which he was to return to his position as Head of Department. But in January 1959, he was re-appointed as Vice Chancellor of the University of Malaya for five years and he retired from the Chair of Mathematics which he had occupied for 28 years. He was later honoured by the government of Malaya with the award of Tan Sri and was knighted by the British government.

MILESTONES

1950s

1950 to 1951

- The Department of Mathematics, now part of the University of Malaya, introduced its first honours course in Mathematics, with 4 students. Students in the honours year had to read the same subjects in pure and applied mathematics and sat for six papers at the end of the course.

1952

- Members of the Department, with the help of some school teachers in mathematics, founded the Malayan Mathematical Society (later known as the Singapore Mathematical Society), with Professor Oppenheim as its president. Its aim was to raise the standard of mathematical education in the schools and to foster relations between those interested in mathematics in Singapore and the then Federation of Malaya. The Society also published a bulletin (the Bulletin of the Malayan Mathematical Society) containing mainly articles of general interest to its members. In 1956, the Society organized its first inter-school mathematical competition which attracted a large number of 345 candidates. The bulletin was discontinued in the 1970's. The inter-school competition continued till present, in its current form as the Singapore Mathematical Olympiad (SMO).

MILESTONES

1950s

1951 to 1957

New faculty members joined the department during this period:

- 1951 - P.H. Diananda and Richard. K. Guy, both lecturers.
- 1952 – Eric. C. Milner and Malcolm. J. Wicks, both assistant lecturers.
Wicks retired in 1988 and remained in Singapore after retirement.
- 1957 – Peter Lancaster, assistant lecturer.
- In the 1950s, Professor Oppenheim arranged visits by a good number of notable mathematicians, including several visits by Paul Erdos. At a later stage in their careers, Guy co-authored 4 papers with Erdos and Milner co-authored 15 papers with Erdos. Hence, Guy and Milner had Erdos number 1.
- In 1964, Lancaster became the first person since founding of Raffles College to receive a Ph.D. degree in mathematics in Singapore. Lancaster was supervised by Daniel Pedoe.
- Guy, Milner and Lancaster left to join the University of Calgary in the 1960s.



Malcolm. J. Wicks

MILESTONES

1950s

1956

- Nanyang University or Nantah was built from contributions and resources pooled from the Chinese Community, and a Department of Mathematics was formed.



MILESTONES

1960s

1960s

- The University of Singapore was established on 1 January, 1962.

From the 1950s to 1960s

- The Department of Mathematics remained small with about 10 staff members, but number of students studying Math increased rapidly. There were 44 honours students in the 1969-1970 batch. From 1949 to 1969, there was little change in the curriculum except for the introduction of courses in probability and statistics in the late 1960s.
- Peng Tsu Ann was the first Singaporean student to return from abroad with a PhD in mathematics, in 1965.
- **Notable publication**
E.J. Brody, The topological classification of the Lens spaces, Ann. of Math., 1960.

MILESTONES

1970s

1970s

- Changes in curriculum including introduction of new courses in Numerical Analysis and Operations Research
- Members of the Department started *Mathematical Medley*, a publication of the Singapore Mathematical Society dedicated to the promotion of mathematics in Singapore. Its first issue was published in 1973.

1979

- The Department of Mathematics at Nanyang University organized the First Franco-Southeast Asian Mathematical Conference, in which ten leading French mathematicians, including Jean Dieudonné, Jacques L. Lions and Laurent Schwartz, were invited speakers.
- **Notable Publication**
Prof Louis Chen published a seminal paper “Poisson approximation for dependent trials” in the *Annals of Probability*, 1975.



MILESTONES

1980s

1980s

- The National University of Singapore was formed with the merger of the University of Singapore and Nanyang University in 1980.
- Department entered a new era. As a result of the merger, the Department acquired a staff strength of about 35.
- New campus in Kent Ridge, transfer of faculties and departments completed in 1986.
- Department organized more than 10 conferences and workshops at the research level. This includes a major international conference the “Singapore Group Theory Conference”, in 1987. Participants included W. Feit, G. Higman, J.-P. Serre, M. Suzuki, and J. G. Thompson. (The main funding for these meetings came from the Department’s Lee Kong Chian Centre for Mathematical Research which received an annual grant from the Lee Foundation. The Centre was first established in Nanyang University.)
- Department sent some of her best honours graduates for PhDs in top overseas schools, under the Senior Tutorship Scheme.
- Department started recruiting international faculty in significant numbers from the late 1980s.
- Department had a staff of about 75 in 1989.

MILESTONES

1980s

“Singapore Group Theory Conference”, in 1987.
Participants included W. Feit, G. Higman, J.-P. Serre, M. Suzuki, and J. G. Thompson.



MILESTONES

1990s

1990s

- The Department works towards providing an innovative teaching programme that covers very broad areas of mathematics, and designs its courses and programmes to cater to the diverse need of students.
- Prof CHONG Chi Tat was appointed as Deputy Vice Chancellor of NUS in 1996.
- The Department of Statistics and Applied Probability (DSAP) was formed in 1998, with the majority of its staff from the Department and the rest from other parts of the university, notably from the Faculty of Arts and Social Sciences.

MILESTONES

1990s

1990s

Research

- Research in mathematics is carried out in each of the six divisions of the Department, namely Algebra, Analysis, Geometry, Applied Mathematics, Combinatorics & Operations Research, and Statistics . The Department has also built up research groups to focus on strategic areas of research which are directly relevant to the economy of Singapore. These include: Cryptography and Computer Security ; Mathematical Economics and Financial Mathematics and Wavelets Strategic Research Programme
- The Department hosted the Center for Financial Engineering (CFE), which offered the MSc in Financial Engineering (MFE). CFE was the predecessor of the NUS Risk Management Institute (RMI). The latter was established in 2006 by NUS as a university-level research institute dedicated to the area of financial risk management.
- The Wavelets Strategic Research Programme was carried out through the Centre for Wavelets, Approximation and Information Processing (CWAIP), a faculty-level research center.

MILESTONES

1990s

Staff Receiving National Honours

- Prof Louis Chen was the first faculty member of the Department to receive the National Science and Technology Award in 1991, and subsequently Excellence for Singapore Award in 1997.
- Prof LEE Seng Luan, Dr SHEN Zuowei and A/Prof Wayne Lawton won for the department its first National Science Award in 1998. Other National Science Awards that followed were won by A/Prof SUN Yeneng (2000), Prof Harald Niederreiter, A/Profs LING San and XING Chaoping (2003), and Prof A.J. Berrick and A/Prof WU Jie (2007).
- Dr ZHU Chengbo and Dr CHAN Heng Huat received the Singapore Young Scientist Award respectively in 1998 and 1999.

Notable Publications

- M. Ru, Integral points of PN Integral Points of PN - ($2N+1$ Hyperplans in General Position), Invent. Math., 1991.
- Dr TOH Kim Chuan co-authored an influential paper "SDPT3 - A Matlab software package for semidefinite programming, Version 1.3" in Optimization Methods and Software, 1999.



Prof Louis CHEN



*Dr SHEN Zuowei, Prof LEE Seng Luan
and A/Prof Wayne LAWTON*

MILESTONES

2000 to present



2000

- The Institute for Mathematical Sciences (IMS) was established on 1 July 2000 as a university-level research institute, with Prof Louis Chen as the founding director.

The mission of the Institute is to foster mathematical research, both fundamental and multidisciplinary, in particular, research that links mathematics to other disciplines, to nurture the growth of mathematical expertise among research scientists, to train talent for research in the mathematical sciences, and to serve as a platform for research interaction between the scientific community in Singapore and the wider international community.

MILESTONES

2000 to present

- Singapore-Warwick Initiative in Mathematical Sciences (SWIMS), a four-year international collaboration project, commenced in 2000. It sponsored the Singapore International Symposium on Topology and Geometry (SISTAG) in July 2001 in NUS.
- International Conference on Fundamental Sciences: Mathematics and Theoretical Physics 2000 was held in Singapore. Its aim was to address challenges in mathematics and theoretical physics for the twenty-first century, and was jointly organized by the Faculty of Science (NUS) and the Isaac Newton Institute for Mathematical Sciences (Cambridge University).
- In January 2001, the Department took ownership of the Major in Computational Finance, a multidisciplinary programme that combines mathematics, statistics, finance and computing. It changed its name to Major in Quantitative Finance in 2004/2005.

MILESTONES

2000 to present



Prof LAM Lay Yong



Prof CHONG Chi Tat

- Prof Lam Lay Yong was awarded the Kenneth O. May Prize in history of mathematics in 2001 for her profound scholarship on Chinese mathematics. Prof Lam was the first Asian and first woman to have won this highest award in history of mathematics. She was also the first faculty member to win an international award.
- A/Prof LING San and A/Prof CHAN Heng Huat received the Singapore Youth Award respectively in 2001 and 2003.
- Prof CHONG Chi Tat received the Public Administration Medal (Gold), 2002 National Day Awards.
- Prof Harald Niederreiter was the first faculty member to give an invited lecture at the International Congress on Industrial and Applied Mathematics (ICIAM) 2003, held in Sydney, Australia.
- Prof CHONG Chi Tat was named University Professor, the highest academic appointment in NUS, in 2004.

MILESTONES

2000 to present

2005

- The Special Program in Mathematics (SPM) is launched. Its aim is to nurture talented students with passion in mathematics and to enable these students to build a solid foundation for a future career in mathematical research or state-of-the-art application in industry.
- Prof LING San was appointed as Head of the Division of Mathematical Sciences, of the newly formed School of Physical and Mathematical Sciences, NTU.
- The 4th Asian Mathematical Conference (AMC 2005) was held in NUS in conjunction with the centennial celebration of NUS.

2007

- Prof TAN Eng Chye was appointed as Deputy President (Academic Affairs) and Provost, NUS.



Prof TAN Eng Chye

MILESTONES

2000 to present

▪ Notable Publications

- A. Dembo, B. Poonen, **Q.-M. Shao** and O. Zeitouni, Random polynomials having few or no real zeros, J. Amer. Math. Soc., 2000.
- **J. Berrick**, F. R. Cohen, **Y. L. Wong** and **J. Wu**, Configurations, braids, and homotopy groups, J. Amer. Math. Soc., 2006.
- **D.Q. Zhang**, A theorem of Tits type for compact Kahler manifolds, Invent. Math., 2009.
- A. Avila, J. Kahn, M. Lyubich and **W. Shen**, Combinatorial rigidity for unicritical polynomials, Ann. of Math., 2009.
- **S.H. Yu**, Nonlinear Wave Propagations over a Boltzmann Shock Profile. J. Amer. Math. Soc., 2010.
- J.-F. Cai, B. Dong, S. Osher and **Z.W. Shen**, Image restoration: total variation, wavelet frames, and beyond, J. Amer. Math. Soc., 2012.
- X.Z. Chen and **X.W. Xu**, The scalar curvature flow on S^n – perturbation theorem revisited, Invent. Math., 2012.
- B. Sun and **C.-B. Zhu**, Multiplicity one theorems: the Archimedean case, Ann. of Math., 2012.
- **C.T. Chong**, Theodore A. Slaman and **Y. Yang**, The metamathematics of Stable Ramsey's Theorem for pairs, J. Amer. Math. Soc., 2014.
- **W.T. Gan**, Y. Qiu and S. Takeda, The regularized Siegel-Weil formula (the second term identity) and the Rallis inner product formula, Invent. Math., 2014.
- **W.T. Gan** and A. Ichino, Formal degrees and local theta correspondence, Invent. Math., 2014.
- **W.-K. To** and S.-K. Yeung, Finsler metrics and Kobayashi hyperbolicity of the moduli spaces of canonically polarized manifold, Ann. of Math., 2015.
- B. Sun and **C.-B. Zhu**, Conservation relations for local theta correspondence, J. Amer. Math. Soc., 2015.
- Prof SHEN Zuowei co-authored an influential paper “A Singular Value Thresholding Algorithm for Matrix Completion” in SIAM Journal on Optimization, 2010.

MILESTONES

2000 to present

2009

- The Department started the Masters in Science in Quantitative Finance by Course Work (MQF), with its first intake in AY2009/10.
- Prof SHEN Weixiao was awarded the “Chern Shiing Shen Prize”, by the Chinese Mathematical Society.

2010

- Prof SHEN Zuowei was the first faculty member to speak at the International Congress of Mathematicians held in Hyderabad, India.

2011-2014

- Six of our faculty members were elected as fellows of the Singapore National Academy of Science:
 - Profs Louis Chen, CHONG Chi Tat, SHEN Zuowei, TAN Eng Chye (2011)
 - Profs SUN Yeneng, ZHU Chengbo (2014)



*Prof SHEN Zuowei
at ICM 2010, India.*

MILESTONES

2000 to present

2012

- Prof SHEN Zuowei received the Wavelet Pioneer Award from the Society of Photographic Instrumentation Engineers (SPIE), USA.
- The Department's alumnus YEO Sze Ling (BSc Hons, class of 2001, and PhD, class of 2006) received the Singapore Youth Award 2012.

2013

- Prof BAO Weizhu was awarded the 10th Feng Kang Prize for Scientific Computing by the Chinese Academy of Sciences.

MILESTONES

2000 to present



2014

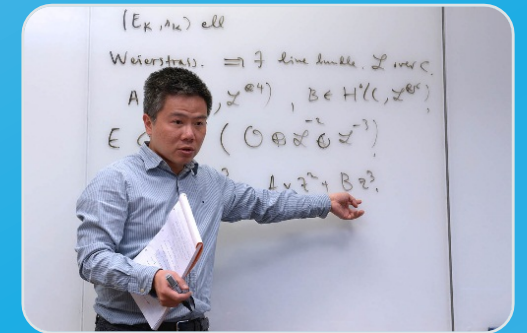
- Four faculty members Profs BAO Weizhu, GAN Wee Teck, SHEN Weixiao and YU Shih-Hsien (from left to right in above photo) were invited to give talks at the International Congress of Mathematicians (ICM) held in Seoul, Korea.
- Prof TAN Eng Chye received the Public Administration Medal (Gold), 2014 National Day Awards.

MILESTONES

2000 to present

2015

- The Department and the IMS started a distinguished lecture series, called the Oppenheim Lectures, in honour of Sir Alexander Oppenheim. The inaugural Oppenheim Lecture was delivered by Prof NGO Bao Chau (University of Chicago and 2010 Fields Medalist).
- Associate Professor REN Weiqing was awarded the 11th Feng Kang Prize of Scientific Computing by the Chinese Academy of Sciences.
- Professor SHEN Zuowei gave an invited lecture at the 8th International Congress on Industrial and Applied Mathematics (ICIAM), held in Beijing, China.



Prof NGO Bao Chau