

# Singapore Mathematical Society Events and Activities 2019

## 1. SMS Lecture Series

- This annual lecture series, which is traditionally organized in conjunction with the Annual General Meeting of the Singapore Mathematical Society, features eminent local mathematicians or mathematics educators to share with the public some of their interests and ideas.
- Date: Tuesday, 12 March 2019
- Venue: National University of Singapore, Faculty of Science,
- Block S17, Level 3, LT33
- Title: Turning Uncertainty into Certainty
- Speaker: Professor Nicolas Privault (NTU)
- Abstract: There is a popular belief that Probability Theory, also known as the science of uncertainty, can only lead to uncertain conclusions. In this talk, the speaker mentioned a number of situations where probability theory is able to extract certainty and to make definitive statements on random systems and structures. The exposition was based on an informal introduction to measure theory, and supported by some live computer experiments.



## 2. Distinguished Visitor Programme

The Distinguished Visitor Programme was launched by the Singapore Mathematical Society in 1998. Through the visit of a distinguished mathematician/mathematics educator, who will interact with both mathematicians/mathematics educators at the universities as well as teachers and pupils at the schools here, the aim of the Programme is to expose as large and diverse

an audience as possible to the excitement and relevance of mathematics, thereby enhance the awareness of mathematics in our society. This year, the Distinguished Visitor is Professor Michael Röckner from Bielefeld University. Professor Michael Röckner is the immediate past President of the German Mathematical Society (DMV). He is the winner of the Max Planck Research Award 1992 and has been the Dean of the Faculty of Mathematics in Bielefeld. Professor Röckner works in the area of stochastic analysis. He is one of the most cited authors in the field of stochastic analysis and involved in numerous international activities, which have shaped developments in the field over the last three decades. During his visit, Professor Röckner conducted a Public Lecture entitled Finding Order in Disorder: Mathematics is Everywhere on 30th of August, and two colloquia talks at NUS and NTU on 28th and 29th respectively. Professor Röckner was also the Guest-of-Honor of the Society's Annual Prize Presentation which was held on 31st August 2019.



*(Professor Röckner (first row). Taken before the colloquium talk at NUS).*

### 3. Singapore Mathematics Symposium

The 10th Singapore Mathematics Symposium was held on 27th September 2019 at the School of Physical and Mathematical Sciences, NTU. The half day event included three invited lectures by mathematicians from NUS, NTU and SUTD. In his talk entitled Analysis of Optimization Algorithms via Sum-of-Squares, Professor Vincent Tan (NUS ECE & NUS Math) spoke on a new framework for unifying and systematizing the performance analysis of first-order black-box optimization algorithms for unconstrained convex minimization over finite-dimensional Euclidean spaces.

In the second talk Doing algebra in a reverse direction, Professor Wu Guohua (NTU SPMS) shared some ideas in reserve mathematics, which has been initiated and developed by Harvey Friedman and Steven Simpson. In the third talk entitled Rough paths theory and Ito-Stratonovich formulas for general Gaussian processes, Professor Lim Nengli (SUTD ESD) introduced rough paths theory, which extends the integration framework beyond martingales by augmenting rough signals with their higher-order iterated integrals. In addition to the three invited lectures, graduate students also took part in a poster exhibition and competition.

- Date: 27 September 2019
- Venue: School of Physical and Mathematical Sciences, NTU

#### 4. Singapore Mathematical Olympiad 2019

- Dates:
  - Jun 4, 2019 (Junior and Senior section - First round)
  - Jun 6, 2019 (Open section - First round)
  - June 29, 2019 (Junior and Senior section - Second round)
  - July 6, 2019 (Open section - Second round)
- The Society conducted the Singapore Mathematical Olympiad (Junior, Senior and Open Sections) in May/June 2019. A total of 7572 students from 110 schools participated in the various sections of the Olympiad.
- For Junior section, there are 3375 participants from 85 schools. For Senior section, there are 2354 participants from 85 schools. For Open section, there are 1843 participants from 71 schools. In addition, there were 291 participants from China, Malaysia, Indonesia and Vietnam.
- The SMO Subcommittee 2019 consists of
  - Dr Ku Cheng Yeaw (Chairman)
  - Dr Hang Kim Hoo (Deputy Chairman/Administration)
  - Dr Toh Pee Choon (Junior Section Coordinator)
  - Dr Ku Cheng Yeaw (Senior Section Coordinator)
  - Associate Professor Toh Tin Lam (Open Section Coordinator)
  - Associate Professor Tay Tiong Seng (Second Round Coordinator)
- The top 10 ranking for the SMO 2019 individual awards is given below:

	Junior section		Senior section		Open section
1	Yu Qinxi (RI)	1	Boo Tse Yang Lucas (RI)	1	Boo Tse Yang Lucas (RI)
2	Jamie Lim Jia Sin (Lin Jiaxin) (NUSHS)	2	Low Choo Ray (RI)	1	Ng Yu Peng (HCI)
2	Mario Tanijaya (NUSHS)	3	Krishnan Akash (NUSHS)	3	Cheng Puhua (RI)
4	Oh Zhi Yuan (NUSHS)	4	Wu Xinyue (NYGH)	4	David Toh Hui Kai (RI)
5	Liu Zihan (RI)	5	Lim Jin Tao (NUSHS)	5	Tan Xu Chen (RI)
6	Su Zixuan (RI)	6	Chieu Le Heng (Jiang Leheng) (NUSHS)	6	Ng Yangyi, Aloysius (RI)
7	Edden Chew Keyn-Hantz (NUSHS)	7	Shevonne Chia (NUSHS)	7	Tan Wee Kean (RI)
7	Yu Hanzhang (RGS)	8	Wang Yuxuan (RI)	8	Khor Jun Wei (RI)

	Junior section		Senior section		Open section
9	Andrew Yar Kwok Wing (RI)	9	Wang Yunrui (RI)	9	Low Choo Ray (RI)
10	Ryan Suwandi (NUSHS)	10	Lee Wei Ming (NUSHS)	10	Leong Eu-Shaun (RI)

The SMO 2019 School Awards for Category 1 and 2 are given below:

Category 1	
Gold Award	Silver Award
Hwa Chong Institution	Anglo-Chinese School (Independent)
Raffles Girls' School (Secondary)	Catholic High School
NUS High School of Mathematics and Science	Maris Stella High School
Raffles Institution	Nanyang Girls' High School
	River Valley High School
	St Joseph's Institution
	Victoria School
Bronze Award	
Anderson Secondary School	Cedar Girls' Secondary School
CHIJ St Nicholas Girls' School	Chung Cheng High (Main)
Dunman High School	Nan Chiau High School
Nan Hua High School	National Junior College
Ngee Ann Secondary School	Singapore Chinese Girls' School
Temasek Junior College	
Commendation Award	
Anglo-Chinese International School	Bukit Panjang Govt High School
Clementi Town Secondary School	Commonwealth Secondary School
Crescent Girls' School	Dunman Secondary School
Fuhua Secondary School	Gan Eng Seng School
Kranji Secondary School	Methodist Girls' School
NPS International School	St Andrew's Secondary School
Swiss Cottage Secondary School	Tanjong Katong Girls' School
Tanjong Katong Secondary School	Temasek Secondary School
United World College of South East Asia	Xinmin Secondary School
Yishun Town Secondary School	Zhonghua Secondary School

Category 2	
Gold Award	Silver Award
Hwa Chong Institution	Anglo-Chinese School (Independent)
NUS High School of Mathematics and Science	Nanyang Junior College
National Junior College	
Raffles Junior College	
Bronze Award	
Dunman High School	Temasek Junior College
Victoria Junior College	
Commendation Award	
Anderson Secondary School	Nanyang Girls' High School
Anderson Serangoon Junior College	Ngee Ann Secondary School
Anglo-Chinese Junior College	NPS International School
Catholic Junior College	River Valley High School
Crescent Girls' School	St Joseph's Institution
Eunoia Junior College	St Joseph's Institution International
Hwa Chong International School	Tampines Meridian Junior College
Jurong Pioneer Junior College	Victoria School
Nan Hua High School	

## 5. Singapore Mathematics Projects Festival 2019.

- Dates:
  - February 16 2019 (Preliminary round A)
  - February 23 2019 (Preliminary round B)
  - March 30 2019 (Festival Congress – Final round)
- This year the Project Festival attracted 16 projects from Junior section and 23 projects from Senior section.
- The preliminary rounds were held at various locations, including NUS, Hwa Chong Institution and NUS High School of Mathematics. Judging panels made up of Mathematicians and school teachers were formed to grade the presentation of each team.
- 6 teams from the Junior section and 5 teams from Senior Section were invited to the Festival Congress held at NUS High School of Mathematics and Science
- The judges for the Festival were
  - Junior Section: Dr Teo Kok Ming, Assoc Prof Zhao Dongsheng, Dr Toh Pee Choon (NIE)
  - Senior Section: Dr Ku Cheng Yeaw (NTU), Dr Cheong Kang Hao (SUTD), Dr Wang Fei (NUS)

- Medals were awarded to the following projects:

#### Junior section

- Gold (Foo Kean Pew Memorial Prize): **Seas the Day – the Bay Way**, by Katharine Eleanor Chong Yong Min, Elise Sun Li Lyn, Jolene Soh En Yi, Claire Chan Kye Sun (Methodist Girls' School)



- Gold: **Bus Route 123**, by Liu Yixuan, Javier Chan Yan Kai, Pierre Yeap Yu Song, Chua Rui Hong (Hwa Chong Institution)



- Gold: **The Sylver Coinage Game**, by Daniel Ng Chun Kit, Dylon Wong Yee Kin (NUS High School of Mathematics and Science)

## 6. Annual Prize Presentation Ceremony

1. Date: 31st August 2019
2. Venue: Auditorium 2, University Town @ Stephen Riady Centre
3. Guest of Honor: Professor Michael Röckner (Bielefeld University), Singapore Mathematical Society Distinguished Visitor 2019

4. The following prizes were given out at the ceremony:
- 6 prizes for the Singapore Mathematics Project Festival (Junior Section)
  - 5 prizes for the Singapore Mathematics Project Festival (Senior Section)
  - 9 prizes for the SMS Essay Competition (3 each in categories A, B and C)
  - 30 individual prizes for the Singapore Mathematical Olympiad (Junior section)
  - 30 individual prizes for the Singapore Mathematical Olympiad (Senior section)
  - 30 individual prizes for the Singapore Mathematical Olympiad (Open section)
  - 42 School Awards for the Singapore Mathematical Olympiad (Category 1)
  - 26 School Awards for the Singapore Mathematical Olympiad (Category 2)
  - Awards to the Singapore Team to the 60th International Mathematical Olympiad

## 7. Mathematics Teacher Conference 2019

Almost 650 participants, mostly local mathematics teachers, attended the Mathematics Teachers Conference 2019 which took place on 7 June 2019 at the National Institute of Education (NIE). The event was co-organized by the Mathematics & Mathematics Education Academic Group of NIE and the Association of Mathematics Educators, and supported by SMS. Several SMS members were invited to conduct workshops for the teachers. Dr Wang Fei, students and teachers from Hwa Chong Institution also conducted a special sharing session titled “Mentoring Mathematical Research Projects in Secondary Schools”.



- A/P Toh Tin Lam

### Using Comics in Teaching Lower Secondary Statistics

**Abstract:** This workshop introduces the use of comics in teaching lower secondary statistics in the mathematics curriculum to facilitate students to develop a robust understanding of the subject. The speaker will introduce participants to the way to link various statistical and mathematical concepts together using comics for mathematics instruction, with an underlying emphasis on big ideas and connections across concepts. The speaker will also portray a mathematics comics classroom lesson on statistics making use of statistics package.



- A/P Victor Tan

#### On Vectors, Matrices and Systems of Linear Equations

**Abstract:** Vectors, Matrices and Systems of Linear Equations are the key mathematical objects under the topic of linear algebra. Lower dimensional cases of these concepts are covered in both H2 Math and Further Math syllabus. These are important foundation to be built in order to better prepare the students when they learn linear algebra at the university level, which is essential for all STEM courses. In this workshop, we will discuss some of the difficulty students have when learning these concepts, and how we can help students to visualize the concepts as well as to see the connection among them.



- A/P Yap Von Bing

#### Probability through R

**Abstract:** R is a free computing language which is widely used by the statistical community for data analysis. Participants will learn enough of the basic commands and structure to prepare simulated data sets to teach the essential ideas of probability to JC students, though much of the content is also applicable to the secondary school curriculum. R can also be helpful for administrative work, for analysis and visualization of various data types.

## 8. SMS Essay Competition 2019

This year, the SMS Essay Competition carried on with the Series in the Application of Mathematics in order to encourage students to explore and discover different facets of Mathematics in our everyday life. The theme for this year's SMS Essay Competition was "Mathematics and Economics". The competition aimed to introduce the students to the

different branches of economics, such as microeconomics, macroeconomics, game theory and finance, and to let the students understand how mathematics is applied in them. The competition was officially launched on 12 March 2019 during a lecture of the SMS Lecture Series titled “Turning Uncertainty into Certainty” by Professor Nicolas Privault from NTU.

We saw enthusiastic participation this year. By the closing date of 12 July 2019, we received a total of 65 essay entries from 17 schools with the following breakdown: Category A (secondary 1 & 2 or equivalent): 28, Category B (Secondary 3 & 4 or equivalent): 21, Category C (JC or equivalent): 16.

The judges for the competition were:

Category A: Mr. Ai Xinghuan (MOE) and Mr. Christian Ong Go (NUS).

Category B: Dr. Gong Zheng (NUS).

Category C: Prof. Ho Weng Kin (NIE) and Dr. Douglas Streeter Rolph (SUTD).

The winning essays are:

#### Category A

1<sup>st</sup>: “Basic Mathematical Optimisation in Economics” by Shrimay Bikash Saikia from Raffles Institution.

2<sup>nd</sup>: “The Economics of Queueing” by How Yun Hsuen Inge from National Junior College.

3<sup>rd</sup>: “Mathematics and Economics in The World” by Selvakumar Vigneshwaran from NUS High School of Math & Science.

#### Category B

1<sup>st</sup>: “Application of Game Theory in Current Affairs” by Chu Sida, Bai Zirui and Xu Yixiang from Nan Hua High School.

2<sup>nd</sup>: “Mathematics and Economics” by Ng Wei Ming and Soh Yong Xiang from Hwa Chong Institution.

3<sup>rd</sup>: “Multiple Linear Regression Models - Predicting Resignation Rate in Singapore Labour Market” by Guru Anand Anish from St. Joseph’s Institution.

#### Category C

1<sup>st</sup>: “Climate Change: A Case of The Tragedy of the Commons and Its Potential Solution” by Alfred Tan Kok Loong, Peh Ze Rong and Pala Tej Deep from Nanyang Junior College.

2<sup>nd</sup>: “Optimal Auction Design and Application in Facebook Sponsored Advertisements” by Ge Shu from Victoria Junior College.

3<sup>rd</sup>: “Analysis of Price Wars in Oligopolistic Markets” by Nguyen Minh Tuan from National Junior College.

## 9. Workshop for Teachers

The Society conducted a workshop for teachers entitled *Student Preparation for Mathematical Olympiads* on 1 Oct 2019 at NUS Centre for Quantum Technology Seminar Room. The speakers of the workshop Dr Hang Kim Hoo and Mr Wang Haibin illustrated how well taken scaffoldings can effectively develop students’ mathematical reasoning and problem solving skills. The workshop was well-attended by more than 30 teachers and had received positive feedbacks from the participants. The Society will continue conduct such workshops to engage teachers’ interest in mathematical problem solving approaches.