

Mathematics Enrichment Camp 2016

Saturday, 13th August 2016
8.30am to 2.00pm
@ Faculty of Science, NUS
Lecture Theatre 25

Register by 1st August!

Tea break & lunch will be provided
Prizes to be won!

Organised by



Department of Mathematics
Faculty of Science

Programme

8.30am	Registration
9.00am	Welcome Address By Professor Zhu Chengbo Head, Department of Mathematics
9.05am	About the Department of Mathematics By Associate Professor Victor Tan Assistant Head, Department of Mathematics
9.15am	A Peek Into the Realm of Randomness By Associate Professor Sun Rongfeng
10.00am	The Hamilton algebra and Cayley algebra By Professor Loke Hung Yean
10.45am	Tea Break
11.15am	An Application of Scientific Computing By Associate Professor Chu Delin
12.00pm	Genes are flipped like pancakes By Associate Professor Zhang Louxin
12.45pm	Lunch
~End of Programme ~	

Abstracts

An Application of Scientific Computing **By Associate Professor Chu Delin**

The aim of scientific computing is to design, analyze and implement effective numerical algorithms for solving scientific and engineering problems. In this talk, we will introduce an application of scientific computing: incremental regularized least squares for dimensionality reduction of large-scale data.

About the Speaker

A/Prof Chu Delin obtained his Ph.D. (in Mathematics) from the Tsinghua University in China in 1991 and joined the National University of Singapore in 1998. His research area is Scientific Computing with particular emphasis on Numerical Linear Algebra and its Applications.

The Hamilton algebra and Cayley algebra **By Professor Loke Hung Yean**

It is well known that the equation $x^2 = -1$ has no real solution x . Mathematicians introduced an imaginary solution i and thus obtained the complex numbers. The complex numbers system gives many important applications and beautiful formulas, like complex analysis and the Euler's formula. Hence it is natural to find an even 'bigger' number system. In mathematics terminology, this is called finding a finite extension field. Gauss's thesis kill off this problem in which he proved that the complex field is algebraically closed. One asks if it is possible to find a skew field extension instead. Irish mathematician William Hamilton discovered such a number system in 1843. This is now known as the *Hamilton algebra*. It turned out that there is only one skew field containing the complex numbers. What if one weakens the conditions of a skew field? This leads to an 8 real dimensional number system called the *Cayley algebra*, discovered independently by John Graves and Arthur Cayley. In this talk, I will describe some fascinating properties of such numbers.

About the Speaker

Prof Loke Hung Yean was a former student of River Valley High School and Hwa Chong Junior college. From 1989 to 1992, he did his undergraduate studies at NUS. Later he attended graduate school at Harvard University where he obtained his PhD in Mathematics in 1997. Since 1997, he has been a member of the Department of Mathematics at NUS.

Abstracts

A Peek Into the Realm of Randomness

By Associate Professor Sun Rongfeng

Randomness affects every aspect of the world we live in. However, randomness on the microscopic scale can often lead to predictable behavior on the macroscopic scale. Classic examples are the Law of Large Numbers and the Central Limit Theorem. In this talk, we will introduce the basics of probability theory, and explain via examples what is the Law of Large Numbers, how can the Gaussian distribution and the Poisson distribution arise. We will also see what role randomness plays in a few other examples, such as genetic evolution, magnetism, etc.

About the Speaker

A/Prof Sun Rongfeng obtained his Ph.D. from the Courant Institute of Mathematical Sciences, New York University, in 2004. He then spent two years as a post-doctoral research fellow in the research institute EURANDOM in the Netherlands, followed by another two year postdoc in Technical University of Berlin. He joined the Department of Mathematics at NUS in 2008, and has been an associate professor since 2014. His research interests lie in probability theory, and in particular, in the study of interacting particle systems and models from statistical physics.

Genes are flipped like pancakes

By Associate Professor Zhang Louxin

In restaurant, a chef often sort a stack of pancakes in order of size, with the smallest on top and the largest on the bottom. At each step in the sorting process, he may insert a spatula anywhere within the stack and then flip over all the pancakes above the spatula. If no other manipulations are allowed, how many flips are required to get n pancakes in order?

Surprisingly, genes are flipped like pancakes in our genome. In this talk, I will present key mathematical techniques that are used to study gene orders.

About the Speaker

Zhang Louxin is an Associate Professor at the Department of Mathematics, National University of Singapore. His research interests include computational biology and discrete algorithm designs.

Register by 1st August!

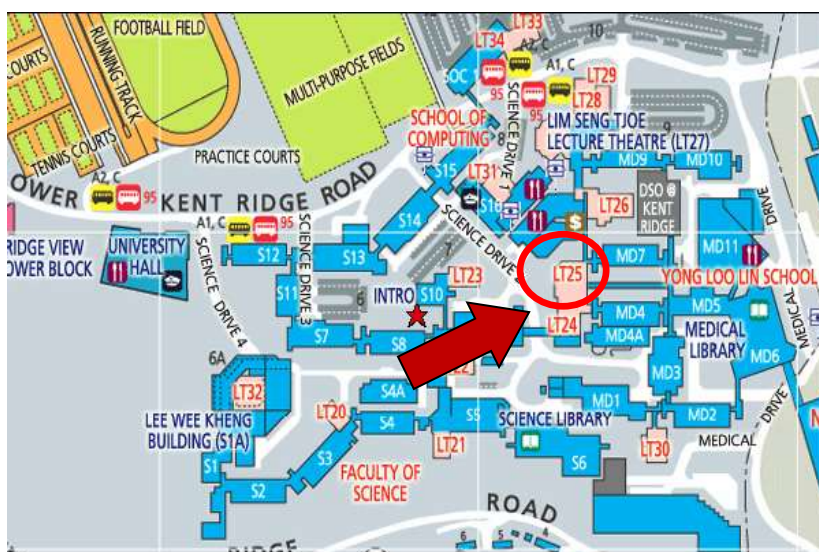
1. The Registration Fee per person is **S\$10 (GST inclusive)** and this includes 1 tea break and lunch.
2. Payment is by **cheque only**. Please make cheque payable to **National University of Singapore**.
3. Cancellations are **not refundable** although participants can be substituted.
4. Please send the completed registration form (see next page) together with the cheque **by Monday, 1st August 2016**, addressed to:

Ms Chan Lai Chee
Department of Mathematics
National University of Singapore
Blk S17 Level 4
10 Lower Kent Ridge Road
Singapore 119076

5. For further information, please contact Ms Lynette Wong (6516 8322, matwongl@nus.edu.sg), or Ms Chan Lai Chee (6516 2762, matclc@nus.edu.sg)

Getting to the Camp

1. Take the MRT and alight at Kent Ridge MRT Station.
2. Transfer to Internal Bus Service A1 / D2 at the bus-stop.
3. Alight at the bus-stop in front of the Lim Seng Tjoe Lecture Theatre 27 in NUS.
4. Follow the map and walk to Lecture Theatre 25.
5. For an interactive map of NUS, please visit <http://www.nus.edu.sg/campusmap/>



Registration Form

For Individual Registration:

Name:

Institution:

Email:

Phone:

Bank & cheque number:

For Group Registration: Please also provide the participants' details on the next page.

Institution:

No. of students:

Name of teacher-in-charge:

Email:

Phone:

Bank & cheque number:

For Group Registration only

Complete and return this page together with the registration form and payment. Enter the particulars on a new page if necessary.

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