

[IMS Home](#) > [Programs & Activities](#) > [Current and Up-coming](#)

# Meeting the Challenges of High Dimension: Statistical Methodology, Theory and Applications (13 Aug - 26 Oct 2012)

[Organizing Committee](#) · [Visitors and Participants](#) · [Overview](#) · [Activities](#) · [Venue](#) · [Enquiries](#)



[Workshop 1](#)

## Organizing Committee

### Co-chairs

- [Peter Hall](#) (Saw Swee Hock Professor of Statistics in DSAP, NUS and The University of Melbourne)
- [Xuming He](#) (University of Michigan)
- [Yingcun Xia](#) (National University of Singapore)

### Members

- [Zhidong Bai](#) (National University of Singapore)
- [Peter Bickel](#) (University of California at Berkeley)
- [Jianqing Fan](#) (Princeton University)
- [Mike Titterton](#) (University of Glasgow)

## Visitors and Participants

- [Overseas visitors](#)
- [Local visitors](#)
- [Graduate students](#)
- [Registered local participants](#)

## Overview

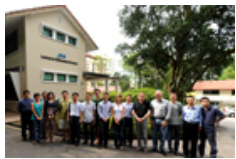
The "curse of dimensionality ... has plagued the scientist from the earliest days," wrote the mathematician Richard Bellman in 1961. Specifically, Bellman's curse relates to the fact that the number of data needed to adequately represent information in  $p$ -vectors grows exponentially as a function of  $p$ . The curse achieved particular prominence in statistics in the 1970s and 1980s, with the development of

Online registration form  
[Register](#)

Enquiries

[General](#)

[Scientific aspects](#)



[Tutorial](#)



[Workshop 2](#)

projection pursuit methods and related techniques in the contexts of regression and density estimation. These methods, sometimes viewed today as "classical" approaches to dealing with high-dimensional data, required the dimension to be smaller than, or at least of the same order as, sample size. That assumption is often violated today.

To at least some extent the curse needs a specific context in order to have the proportions asserted by Bellman and others. For example, problems involving functional data analysis (FDA) are, at least in terms of their mathematical concept, infinite dimensional, yet they suffer significantly less from the curse of dimensionality than do many contemporary finite-dimensional problems, for example those in genomics. This is because, in many but not all of the forms in which FDA is commonly encountered today, it lacks the missing ingredient of sparsity that Bellman had particularly in mind. An approach to FDA based on principal component analysis often manages to arrange the dimensional components in order of decreasing importance; or at least, it manages to order the first  $n$  components, where  $n$  denotes sample size. This is a boon to analysis, and it generally puts the famous curse into abeyance.

New types of data require new statistical methodologies, but just as importantly they imply that the questions that the analysis is directed at answering are new and distinctive. Those questions have changed fundamentally the connection between statistics and the areas of science, engineering and social science where the impact of statistics is greatest.

Thus, the topic of high-dimensional data analysis has many aspects, motivated by many applications, sometimes relying heavily on dimension reduction and variable selection, and sometimes co-habiting happily with more conventional multivariate methods. The program's first workshop (13 - 24 Aug 2012) will address all of these aspects. They lie at the frontiers along which statistical methodology, the applications that motivate it, the questions that it answers, and the theory that underpins it, are advancing today. The program's second workshop (1 - 12 Oct 2012) will continue to address challenges of high dimensional data analysis with more focuses on the methods and applications where sparsity is present.

## Activities

- **Workshop 1: [13 - 24 Aug 2012](#)**
- **Seminar by Lixing Zhu, Hong Kong Baptist University, Hong Kong**  
*Jointly organized with Department of Statistics and Applied Probability*  
Title: [Ultrahigh dimensional time course feature selection](#)  
Date & Time: Tuesday, 28 Aug 2012, 3.00pm - 4.00pm  
Venue: [S16-05-101, DSAP Computer Lab 1](#)
- **Tutorial Lectures: Some methodology and theory for functional data analysis [25, 27 Sep 2012](#)**  
by Peter Hall, Saw Swee Hock Professor of Statistics in DSAP, NUS and

The University of Melbourne, Australia

- **Workshop 2: [1 - 12 Oct 2012](#)**
- **Tutorial Lectures: On modelling high-dimensional data via finite mixture distributions [16, 18 Oct 2012](#)**  
by Geoff McLachlan, University of Queensland, Australia
- **Public Lecture by Terry Speed, Walter and Eliza Hall Institute of Medical Research, Australia and University of California at Berkeley, USA**  
Title: [Epigenetics: a new frontier](#)  
Date & Time: Tuesday, 16 Oct 2012, 6:30pm - 7:30pm  
Venue: [LT31](#), Block S16, Level 3, Faculty of Science, NUS
- **Seminar by Terry Speed, Walter and Eliza Hall Institute of Medical Research, Australia and University of California at Berkeley, USA**  
*Jointly organized with Department of Statistics and Applied Probability*  
Title: [Removing unwanted variation from gene expression data](#)  
Date & Time: Wednesday, 17 Oct 2012, 4.00pm - 5.00pm  
Venue: [S16-06-118, Seminar Room](#)

\* Our office will be closed on the Monday, 20 Aug 2012, being Singapore public holiday.

Students and researchers who are interested in attending these activities are requested to complete the [online registration form](#).

The following do not need to register:

- Those invited to participate.

## Venue

- IMS Auditorium
- [Detailed instruction on how to get to the institute by public or private transport](#)

## Enquiries

For general enquiries, please email us at [ims\(AT\)nus.edu.sg](mailto:ims(AT)nus.edu.sg).

For enquiries on scientific aspects of the program, please email Peter Hall at [halpstat\(AT\)ms.unimelb.edu.au](mailto:halpstat(AT)ms.unimelb.edu.au),

Xuming He at [xmhe\(AT\)umich.edu](mailto:xmhe(AT)umich.edu) or Yingcun Xia at [staxyc\(AT\)nus.edu.sg](mailto:staxyc(AT)nus.edu.sg).

[Organizing Committee](#) · [Visitors and Participants](#) · [Overview](#) · [Activities](#) · [Venue](#) · [Enquiries](#)

Best viewed with IE 7 and above