IMS Bulletin

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CONTENTS

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President's Message

Alison Etheridge
IMS President

Well, that was it. Jon Wellner handed over the gavel (and I rapidly handed it back to Elyse for safe keeping). Tati took a picture and, before I had a chance to think about it, cheerily persuaded me to write something for the *Bulletin*. And now it seems that I am President of the IMS (and writing something for the *Bulletin*).
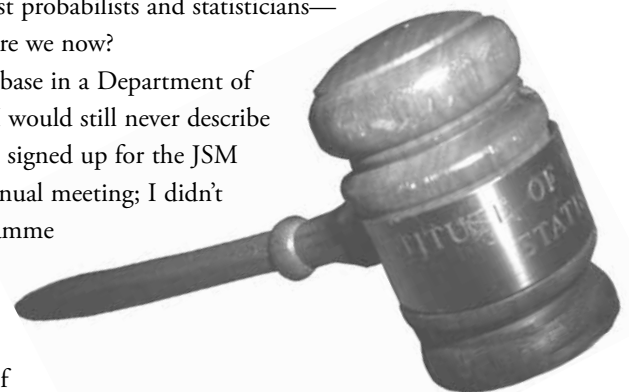
It was just the next daunting event in a slightly overwhelming week. The JSM is on a completely different scale to any meeting that I've ever before attended. Representing the IMS with Jon at the First-Time Attendee Orientation, I was too embarrassed to reveal the first timer's ribbon lurking in my own pocket. But what a wonderful experience it was. I was surrounded by excited young people, all of whom were far more prepared than me. Yes, they had managed to download a version of the app that worked (not something that I had even tried with my aged not-very-smartphone); yes, they knew the opening hours of the Expo; and yes, they had planned their schedules. Jon reminded me that my own schedule required me to be elsewhere and we left a vast hall, buzzing with energy.

That was the first of many receptions at the JSM, where I met many more old friends than I expected and made plenty of new ones. Everybody was curious to know what I was setting out to achieve as President. I'm not sure that I found a very satisfactory answer. At one level, the answer is not much; the IMS is in great shape and my primary aim should be not to do too much damage. On the other hand, in an organisation that is so dependent upon electronic communication, it is especially important to make sure that initiatives don't lose momentum, and I should certainly like to nudge along some of the activities that were kicked off by my predecessors.

Lacking a more imaginative agenda, when I set out to write this piece, I decided to turn to those predecessors for inspiration. What had they written? I think all of them agreed that a year is anyway too short a time in which to change very much. And there were other recurrent themes: IMS 'groups', data science, and a concern that probability and statistics—or at least probabilists and statisticians— might be moving apart. So where are we now?

Even having made my research base in a Department of Statistics for the last twenty years, I would still never describe myself as a statistician. And when I signed up for the JSM it was solely because of the IMS annual meeting; I didn't even check out the scientific programme before registering. Indeed, I briefly wondered how I'd fill my days. In the event, I had quite the opposite problem. Here are a few of the keywords from the lectures that I attended: random forests,

IMS Bulletin

IMS Members' News

James L. Rosenberger (left) presenting the 2017 C.R. and Bhargavi Rao Prize to Donald B. Rubin

The Penn State Department of Statistics held the 2017 Rao Prize Conference on May 12, 2017, and honored three outstanding prize recipients (and IMS members). Donald B. Rubin, the John L. Loeb Professor of Statistics at Harvard University, received the 2017 C.R. and Bhargavi Rao Prize (pictured above). The 2017 C. G. Khatri Lecturer was Paul R. Rosenbaum, the Robert G. Putzel Professor of Statistics at the Wharton School; and the 2017 P. R. Krishnaiah Lecturer was Satish Iyengar, who is Professor of Statistics at the University of Pittsburgh.

IMS Fellow Donald B. Rubin is one of the most highly cited authors in the world in mathematics and economics. He is an elected Fellow/Member/Honorary Member of: the Woodrow Wilson Society, John Simon Guggenheim Memorial Foundation, Alexander von Humboldt Foundation, American Statistical Association, IMS, International Statistical Institute, American Association for the Advancement of Science, American Academy of Arts and Sciences, European Association of Methodology, British Academy, and the US National Academy of Sciences. Rubin received the Samuel S. Wilks Medal from the American Statistical Association, the Parzen Prize for Statistical Innovation, the Fisher Lectureship, and the COPSS George W. Snedecor Award.

A report of the conference is on page 16.

Karen Kafadar Elected ASA President

Karen Kafadar, chair and commonwealth professor in the department of statistics at the University of Virginia, has been elected the American Statistical Association's 114th President. She will serve a one-year term as president-elect beginning January 1, 2018; her term as president becomes effective January 1, 2019. Karen's research interests focus on robust methods; exploratory data analysis; characterization of uncertainty in the physical, chemical, biological, and engineering sciences; and methodology for the analysis of screening trials.

Walter A. Rosenkrantz passed away

Walter A. Rosenkrantz, who passed away September 19, was Emeritus Professor at the Department of Mathematics and Statistics of the University of Massachusetts, Amherst. He had spent over 30 years at UMass. His Bachelor's degree was from University of Chicago in 1957, and his MS (1959) and PhD (1963) were from the University of Illinois. He wrote a textbook, *Introduction to Probability and Statistics for Scientists and Engineers*, in 1997 (McGraw-Hill). An obituary will follow.

Nominate for Awards, Prizes

It's time to think about nominating your outstanding colleagues and collaborators for these IMS awards: Tweedie award, Carver medal and IMS Fellowship.

The **Tweedie New Researcher Award** funds travel to present the Tweedie New Researcher Invited Lecture at the IMS New Researchers Conference. It was created in memory of Richard Tweedie, who mentored many young colleagues. New researchers (who received their PhD in 2012–2017), who are members of IMS, are eligible. The nomination deadline is December 1, 2017. See http://www.imstat.org/awards/tweedie.html.

Nominations are invited for the **Carver Medal**, created by the IMS in honor of Harry C. Carver, for exceptional service specifically to the IMS. All nominations must be received by February 1, 2018. Please visit http://www.imstat.org/awards/carver.html.

A candidate for the **IMS Fellowship** shall have demonstrated distinction in research in statistics or probability, by publication of independent work of merit. This qualification may be partly or wholly waived in the case of either a candidate of well-established leadership whose contributions to the field of statistics or probability other than original research shall be judged of equal value; or a candidate of well-established leadership in the application of statistics or probability, whose work has contributed greatly to the utility of and the appreciation of these areas. Candidates for fellowship should be members of IMS on December 1 of the year preceding their nomination, and should have been members of the IMS for at least two years (you can email Elyse Gustafson erg@imstat.org to check this before you start). The nomination deadline is January 31, 2018. For nomination requirements, see http://www.imstat.org/awards/fellows.htm.

Apply for Travel Awards

Applications are open for two types of travel awards. **New this year** is the **IMS Hannan Graduate Student Travel Award**, which funds travel and registration to attend (and possibly present a paper/poster at) an IMS sponsored or co-sponsored meeting. The travel awards are available to *IMS members who are graduate students (seeking a Masters or PhD degree) studying some area of statistical science or probability*. If you are a New Researcher (awarded your PhD in 2012–17) looking for travel funds, you should apply for the **IMS New Researcher Travel Award** to fund travel, and possibly other expenses, to present a paper or a poster at an IMS sponsored or co-sponsored meeting (apart from the IMS New Researcher's Conference, which is funded separately). Applicants for both these travel awards must be members of IMS, though joining at the time of application is allowed (student membership is free, and new graduate membership discounted!). The application deadline for both is February 1, 2018. See http://www.imstat.org/awards/hannan.html and http://www.imstat.org/awards/travel.html

Nominations still open for COPSS, Doeblin

If you're in a nominating mood, remember there's still time to nominate for next year's COPSS Awards: the **R.A. Fisher Award and Lectureship** (deadline December 15), and the **Presidents' Award** and **Elizabeth L. Scott Award** (both January 15, 2018).

Nominations are also open (deadline November 15) for the Bernoulli Society's **Wolfgang Doeblin Prize**, awarded to an early career researcher, for outstanding research in probability theory. See http://bulletin.imstat.org/2017/07/call-for-nominations-for-the-2018-doeblin-prize/

President's Message continued

random networks, random matrices, Erdős-Rényi graphs, Wasserstein distances, differential geometry… Any probabilists out there feeling jealous? If there is any separation between probabilists and statisticians, it is certainly not built on a chasm between the underlying disciplines. On the other hand, statistics and probability are growing at an unprecedented rate, and it becomes ever more difficult to maintain any sense of cohesion across the piece. Here, the IMS has an important role to play in providing the necessary glue.

With governments and funding agencies in many parts of the world increasingly focused on "goal-oriented" research, with evident (and preferably imminent) financial or societal benefits, many theoretical researchers can feel sidelined. But experience shows that not only does this more applied research stimulate exciting theoretical research, but very often the theoreticians have spent decades developing just the tools that are required for the application. Think of financial mathematics. Bachelier's famous thesis introduced the idea of using Brownian motion in option pricing in 1900, but it was essentially forgotten by economists for half a century. When it was rediscovered by economists in the 1950s, not only was the economics surprisingly relevant, but also stochastic analysis had matured to just the point where the tools were in place for the Nobel Prize-winning theory of option pricing to be developed. The pioneers of stochastic analysis were not motivated by the applications in finance, yet no goal-oriented research programme could have developed a better toolkit. And of course, stochastic analysis has much broader applications. In an era of big data, we are seeing the stochastic analysis story replicated many times over. It becomes ever clearer that we absolutely need a community to be developing the theoretical tools and structures, but that to exploit those increasingly sophisticated tools effectively requires communication and collaboration. By bringing so many people together under a single umbrella, the IMS offers outstanding opportunities for cross-fertilisation of ideas across our vast discipline.

IMS Groups

To be successful in this, in a rapidly changing scientific landscape, we must be effective and agile in engaging with our members—and that was one of the motivations for setting up the IMS groups. I should emphasize that groups are certainly not intended to be exclusive; it is perfectly reasonable to be associated with multiple groups, but they should facilitate more targeted engagement. The IMS groups have been around for seven or eight years, but, on the whole, I think that it is fair to say, they have not really taken off. The most obvious exception is the **New Researchers Group**, which

has really flourished in the last couple of years: Richard Davis announced its existence in his President's article two years ago, but the New Researchers Committee has existed for much longer, and I think that the committee will be the key to providing the continuity and "institutional memory" necessary for the group's ongoing success. The New Researchers Committee focuses on ensuring the continuance of the New Researchers Conference (NRC), a robust web presence, and fostering new ways for young researchers to meet, collaborate, and share their experience. This last activity is greatly enhanced by the first: the scientific programme of the NRC is interspersed with discussion panels, as I experienced first-hand in NRC 2018. I have no idea how useful the comments of panel members were to the New Researchers (not least as, in large part due to the UK/US language barrier, this panel member only understood the topic of the panel she was on five minutes after it began), but the value of early career academics sharing their ideas and experience in a lively and positive environment is indisputable. I enjoyed myself enormously and I have already signed up for next year.

Of course there is still more for the New Researchers Group to do, such as increasing its global reach, but my hope is that lessons

Jon Wellner (left) handed the President's gavel to Alison Etheridge at JSM—a statistics meeting with a surprising amount for a probabilist like her to enjoy

learned from their successes can be transferred to other areas. I suspect that each group will need some sort of steering committee to play a similar role to the New Researchers Committee and ensure that the leadership can be refreshed and passed on in a regular cycle. The first test case will be Data Science.

Data Science Group

The Data Science group was also announced by Richard in his piece two years ago. To my delight, **Sofia Olhede** and **Patrick Wolfe** have volunteered to take on its leadership at what I see as a crucial time. Whether one thinks that statisticians and probabilists should take ownership of data science, or instead clear up the mess left behind by the savvy, computationally adept, applications-driven researchers who increasingly dominate the area, it is clear that we should embrace data science. Who better than an IMS group to help define and emphasize the role of statistics and probability? I won't steal their thunder, Sofia and Patrick have promised to write a piece for the *Bulletin* themselves, but I know that they'd welcome your input, so please do contact them at datascience@imstat.org if you would like to be involved (or even if you just want to make a suggestion).

Groups offer a clear conduit for the flow of ideas between IMS members and those they have entrusted with the leadership of the organisation. They provide a first port of call for the leadership when they are seeking expertise in particular areas and a natural mechanism for members to discuss concerns pertinent to their own interests and raise them with the leadership. We have discovered that most groups struggle to survive in the long term without some intervention, but I very much hope that we can renew our groups and with some minimal governance structures ensure that they adapt and grow with the scientific environment.

Like all our activities, groups rely on input from members. I am acutely aware of the pressures on everyone's time and am deeply grateful for the time and energy that so many people put into ensuring that the scientific activities of the IMS are of the very highest quality. A concern that I have mirrors my experience in other parts of my academic life. In refreshing the committee membership for 2017–18, I had to guard against always calling on the "usual suspects" or people I'd previously worked with, not least as they are slightly more likely to respond to my emails than people I have never (e-)met. How can we involve more members?

The selfless contributions of members benefit the entire community, members and non-members alike. IMS membership has been falling—not rapidly, but enough to make me feel that we need to find a better way to articulate the benefits of membership. At

first sight it seems that by joining, one just exposes oneself to the risk of being asked to take on yet more work. But turning this on

> *Perhaps the most rewarding aspect of being involved with IMS has been the opportunity to meet so many truly remarkable people.*

its head, by joining, one is in a position to help shape the scientific programme of the IMS and make an important contribution to the profession. I did ask a few people at the JSM what they saw as the benefits of membership, or why they had allowed IMS membership to lapse. One person I spoke to, who had recently rejoined, expressed regret that he had ever allowed membership to lapse. Why? "I really like being part of the IMS community." I myself joined because Ruth Williams asked me to serve on the Committee on Special Lectures, but added that she seemed to remember that I wasn't actually a member of the IMS, and this was a requirement, so would I please join. I always do as Ruth asks, and so I joined. I have never looked back. From my perspective, perhaps the most rewarding aspect of being involved has been the opportunity to meet so many truly remarkable people.

I left the JSM with an immense sense of pride in the IMS. The IMS is a badge of academic quality; we publish outstanding journals and our Committee on Special Lectures had excelled in their contribution to the scientific programme. But most of all, the IMS is a community of scholars that supports and nourishes talent from right across the spectrum of our discipline. I think that I am looking forward to the next ten months. I have Jon, Xiao-Li, the Council and of course Elyse to bounce ideas off, to keep me on the straight and narrow, and to ensure that things actually happen. But I need your help too. Tell me what you want from your society. What do you like about the IMS? What do you dislike about the IMS? And, of course, if you would like to be more involved in any aspect of our activities, or if you have suggestions for improving the IMS or for new IMS initiatives, then please don't hesitate to contact me at president@imstat.org.

Finally, here is your homework assignment:

1. *What should the IMS do to remain relevant to our members?*
2. *How can we articulate the benefits of membership?*
3. *What more can we do to increase awareness of each other's academic activities?*

…and a bonus question:

4. *Can anyone think of a single term that captures probability and statistics?*

Send in solutions to the President's mailbox as soon as you can—I don't have long.

Teaching Statistics in the Age of Data Science

Jon A. Wellner gave his **IMS Presidential Address** at the Joint Statistical Meetings in Baltimore. In it, Jon reviewed the influence of data science and machine learning on the teaching of statistics at the Graduate Level in the USA, and drew comparisons with several articles by Harold Hotelling from the 1940s.

1. Statistics and Data Science: Introduction

What has happened, and is happening? Many departments of statistics in the U.S. and elsewhere have initiated new MS degree programs in Data Science. Several departments (including Yale and the University of Texas at Austin) have changed their names to "Statistics and Data Science." Many departments of statistics have created new pathways in Data Science and Machine Learning at the PhD level: for example, the University of Washington, Carnegie Mellon University, and Stanford, among others.

These changes naturally lead to questions concerning curricula and teaching in departments of statistics (and elsewhere) at all levels: undergraduate and graduate, including MS and PhD levels. Before proceeding, I should openly disclose that I have another reason for trying to address the issues in teaching raised by the changes briefly outlined above. Firstly, my department chair has asked me to review theory course offerings in the PhD program in Statistics at the UW, and recommend changes in the curriculum, if needed. Secondly, I will be teaching Statistics 581 and 582, Advanced Statistical Theory, during Fall and Winter quarters 2017–2018. So, what should I be teaching?

2. Exciting Times for Statistics and Data Science

The current excitement and attractions of statistics and data science have been propelled and provoked by:

a] increased demand for our knowledge and expertise;

b] the challenges of "big data" in terms of both computation and theory;

c] changes needed in statistical education to meet these demands and challenges.

2.1. Increasing demand. This is a "golden age" for statistics! Statisticians (and Data Scientists) are in great demand across a wide range of endeavors ranging from science to medicine and business or commercial enterprises, and with employment opportunities in academia, government, and industry. The following table from the US Bureau of Labor Statistics puts "statistician" right at the top of job categories for which there will be increased demand for the period 2014–2024:

Projections, Bureau of Labor Statistics, 2014–24	
Job Description	Increase
Statistician	34%
Mathematician	21%
Software Developer	17%
Computer & Information Research Scientist	11%
Biochemists and Biophysicist	8%
Physicists and Astronomer	7%
Chemists and Materials Scientist	3%
Computer Programmer	−8%

Note that "Data scientist" has not yet entered the list of job descriptions here, but that there is certainly some overlap with the categories "Software Developer" and "Computer and Information Research Scientist." The increasing demand for statisticians raises a number of important questions:

Q1 Can we meet the demand?

Q2 How should we be gearing up to meet the increased demand?

Q3 What changes should we be making in the teaching of statistics to attract the best and brightest students?

Q4 What should we be teaching?

2.2. Challenges of big data. "Big data" continues to present a variety of challenges for statistics and data science: for computation and analysis, as well as for theory. On the other hand, in a lucid discussion, "big data" is dismissed by Donoho [13] as a distinction between statistics and data science. I will return to Donoho's thought-provoking article briefly below.

2.3. Changes needed in statistical education? Meeting the increased demand for statisticians and data scientists and answering the challenges of big data, may well require further changes in degree structures and changes in curricula for existing and new degrees at all levels: high school, all college or university students, undergraduates, MS degree students, and PhD students. It may also require changes in the modes of teaching.

Johnstone's short article [24] raises an intriguing question about student enrollment in undergraduate statistics majors, but that picture may well be changing with the increases in undergraduate study of statistics. Important developments and improvements are taking place at all these levels (see for example [16], [10], [6], [33], [5], [4]), but because of my own particular interests in graduate level teaching (and the current task from my chair), I will focus on curricula for MS and PhD programs in statistics during the remainder of this article.

There are clearly differing views within our community about the issues and challenges presented by data science for the statistics profession. Marie Davidian, said in the 2013 *Report of the London Workshop on the Future of Statistical Sciences*, [31]: "I believe that the statistical sciences are at a crossroads, and that what we do currently … will have profound implications for the future state of our discipline. The advent of big data, data science, analytics, and the like requires that we as a discipline cannot sit idly by… but must be proactive in establishing both our role in and our response to the 'data revolution' and develop a unified

set of principles that all academic units involved in research, training, and collaboration should be following. … At this point, these new concepts and names are here to stay, and it is counterproductive to spend precious energy on trying to change this. We should be expending our energy instead to promote statistics as a discipline and to clarify its critical role in any data-related activity."

In an article [44] commenting on the London Workshop report, Terry Speed said: "Are we doing such a bad job that we need to rename ourselves data scientists to capture the imagination of future students, collaborators, or clients? Are we so lacking in confidence … that we shiver in our shoes the moment a potential usurper appears on the scene? Or, has there really been a fundamental shift around us, so that our old clumsy ways of adapting and evolving are no longer adequate? … I think we have a great tradition and a great future, both far longer than the concentration span of funding agencies, university faculties, and foundations. … We might miss out on the millions being lavished on data science right now, but that's no reason for us to stop trying to do the best we can at what we do best, something that is far wider and deeper than data science. As with mathematics more generally, we are in this business for the long term. Let's not lose our nerve."

On the other hand, Richard De Veaux, speaking at the London Workshop [31], said: "Statistics education remains mired in the twentieth (some would say the nineteenth) century."

3. Back-tracking: History, part 1
At this point it might be helpful to review some of the history concerning the creation of departments of statistics in the US, and the organization of teaching in those departments. Harold Hotelling played a key role in this. Here is a brief recap of Hotelling's career: He was born in 1895

Harold Hotelling

in Minnesota. In 1904 he moved to Washington with his family. He studied journalism as an undergraduate at the University of Washington and earned a BA degree in journalism in 1919 after service in the Army during World War I interrupted his studies. Not finding journalism to his liking, Hotelling then earned an MS degree in Mathematics from the UW. During this period he was advised by Eric Temple Bell, who urged him to study economics. Hotelling gained entrance to the PhD program in Mathematics at Princeton, hoping to study mathematical economics and statistics. Finding no-one at Princeton engaged in these research directions, he turned to topology and differential geometry, earning a PhD degree under Oscar Veblen in 1924. Hotelling then joined the Food Research Institute at Stanford University and became associated with its Mathematics Department, where he served as an Assistant Professor during the period 1927–31. During this period he worked on both economics and statistics, and spent 6 months with R. A. Fisher at Rothamsted in 1929. In 1931 Hotelling moved to the Department of Economics at Columbia University, where he began attracting graduate students and other faculty interested in statistics, and he became involved in the early period of the IMS, serving as the sixth President of the IMS in 1941. During World War II Hotelling was deeply involved in the Statistical Research Group at Columbia, which played a key role in providing statistical advice to the US government and military. After failing to convince Columbia University to form a separate Department of Statistics, in 1946 Hotelling moved to the University of North Carolina at Chapel Hill, where he was able

to create such a department. He remained at UNC Chapel Hill until his death in 1973. For further information concerning Hotelling and his work, see [41], [11], [2] and [47].

But the work of Hotelling which concerns us here is his 1940 paper [18] on the "Teaching of Statistics". This was presented as an invited talk at a meeting of the IMS held in Hannover, New Hampshire. This could be viewed as a preliminary position paper of a committee formed by the IMS to examine the teaching of statistics. In his paper and talk Hotelling laid out the two difficulties involved in the teaching of statistics as of 1940, i.e., failure to recognize statistics as a science requiring specialists to teach it, and a shortage of qualified instructors.

Hotelling's talk and paper strongly influenced Jerzy Neyman. Ingram Olkin [35] noted that Hotelling's 1940 paper on the teaching of statistics "had a phenomenal impact. Jerzy Neyman stated that it was one of the most influential papers in statistics. Faculty attempting to convince university administrators to form a Department of Statistics often used this paper as an argument why the teaching of statistics should be done by statisticians and not by faculty in substantive fields that use statistics."

On the other hand, the discussion of Hotelling's paper by W.E. Deming raised issues relevant for applications: "Above all, a statistician must be a scientist. A scientist does not neglect any pertinent information."

Hotelling authored at least two other works ([21], [19]) on the teaching of statistics. The 1948 *Annals* article was a report of the IMS Committee on the Teaching of Statistics with Hotelling as the chair and Walter Bartky, W. E. Deming, M. Friedman, and P. Hoel as further committee members. Part I of the article was presented as the consensus of the committee, was relatively brief and addressed the following

questions:

(1) Who are the prospective students of statistics?
  (a) All college (university) students.
  (b) Future consumers of statistics.
  (c) Future users of statistical methods.
  (d) Future producers and teachers of statistical methods.
(2) What should they be taught?
(3) Who should teach statistics?
(4) How should the teaching of statistics be organized?
(5) What should be done about adult education?

The longer Part II of the article, The Place of Statistics in the University, was written by Hotelling and reflected his views. His major points are summarized:

A. **Minor nuisances and inefficiencies in statistical teaching** (*Lack of coordination among departments; Lack of advanced courses and laboratory facilities; Inefficient decentralization of libraries*)

B. **The major evil: failure to recognize the statistical method as a science, requiring specialists to teach it** (*Too many teachers not specialists; Results: students ill equipped; Reasons why teachers of statistics are often not specialists: the rapid growth of the subject, confusion between the statistical method and applied statistics, failure to recognize the need for continuing research, and the system of making appointments to teach statistics within particular departments that are devoted primarily to other subjects; Appointments under the existing system are not all bad; Unsatisfactory texts; Omission of probability theory from texts and teaching*)

C. **Proper qualifications of teachers of statistics** (*Statistics compared with other subjects; Current research in the statistical method is essential for teachers; Minimum requirements in mathematics for the training of teachers and research men* [sic] *in statistical theory*)

D. ***Need for relating theory with applied statistics*** (*An example of the interaction between theory and practice; Supplying opportunities for application in graduate studies of statistics*)

E. **Recommendations on the organization of statistical teaching and research in institutions of higher learning** (*Research should be encouraged; teaching schedules should not be overloaded; Organization of statistical service in the university; Organization for teaching; The statistical curriculum; Statistical method as part of a liberal education*).

The 1940 paper [18] and the 1948 committee report [21] were reprinted in *Statistical Science* in 1988 [20], followed by discussion pieces by D.S. Moore, J.V. Zidek, K.J. Arrow, H. Hotelling Jr., Ralph Bradley, W.E. Deming, S.S. Gupta, and I. Olkin. The discussion pieces reflected the long-standing (and creative) tensions between the influence of mathematics on statistical theory on the one side, and applications/data analysis on the other. Here, I will simply note Shanti S. Gupta's view of Hotelling's papers: "He rightly visualized the academic statistician as a tool-maker who 'must not put all his time on using the tools he makes', but must focus his/her attention on the tools themselves."

Hotelling [18] had expressed the balancing act as follows: "Statistical theory is a big enough thing in itself to absorb the full-time attention of a specialist teaching it, without his going out into applications too freely. Some attention to applications is indeed valuable, and perhaps even indispensable as a stage in the training of a teacher of statistics and as a continuing interest. But particular applications should not dominate the teaching of the fundamental science, any more than particular diseases should dominate the teaching of anatomy and bacteriology to pre-medical students."

In a review of the 1948 Hotelling Committee report and a similar report on the teaching of statistics by a committee of the Royal Statistical Society [25], Truman L. Kelley (Professor of Education at Harvard University) wrote: "It seems to the reviewer that there is implicit in the British recommendation an induction of the student into statistics via the subject matter of his field of specialization, and in the American an induction via logic, including principles of mathematics and probability. It is needless to say that these approaches are far asunder."

These two quotes are a small sample of the long-running tensions within statistics and statistics education. In my view, these tensions are an inherent part of the process of creating new statistical methods and perspectives. Kelley [25] continued: "The American committee, by omission and by inclusion, reveals what it considers to be preparatory background for students of statistics. It at no point cites knowledge of data in some scientific field as essential. … The American committee deplores the general lack of mathematical competence of most teachers of statistics in different subject matter fields. This is deplorable as is their lack of knowledge of the genius of data in their fields. However, the progress of recent decades should make one optimistic, and these two committee reports should encourage college presidents to strengthen and broaden the instruction in both mathematical and applied statistics."

4. Back-tracking: History, part 2

A second set of important developments:

- In his 1962 paper, "The future of data analysis" [46], John Tukey called for a revamping of academic statistics, and pointed to a new science focused on data analysis.
- John Chambers (1993, [7]) and Bill Cleveland (2001, [9]) developed Tukey's ideas further.
- Leo Breiman's (2001) "Two cultures…" paper [3] clearly delineated the differing approaches to data analysis which developed in the years since Tukey (1962):

Predictive modeling; Common Task Framework, and *Generative modeling; Inference*

• Donoho (2015), "50 years of Data Science" [13], gives a guide to this history, explains the key role of the Common Task Framework, and provides an updated road map to what he calls Greater Data Science.

Now we fast-forward to 2002–2004. By the beginning of the 21st century the era of data science, "big data", and machine learning was well underway. Breiman's (2001) paper [3] clearly delineated the differences in approaches to data analysis which had developed in the years since Tukey (1962) [46]. In May 2002, the NSF hosted a workshop on future challenges and opportunities for the statistics community. The resulting *"Report on the Future of Statistics"* by Bruce Lindsay, Jon Kettenring and David O. Siegmund (2004, [30]):

• addressed features of the statistical enterprise relevant to the NSF;
• did not include biostatistics;
• did not explicitly address teaching of statistics, but alluded to teaching indirectly through "manpower" problems;
• identified opportunities and needs for the "core of statistics".

As noted in the report:

"If there is exponential growth in data collected and in the need for data analysis, why is "core research" relevant? … Because unifying ideas can tame this growth, and the core area of statistics is the one place where these ideas can happen and be communicated throughout science."

Of course, there have been big changes both in statistics and in the world of science in general since Hotelling's time, and even since the Lindsay-Kettenring-Siegmund report of 2004. Here is an oversimplified summary, making comparisons between 1940 and now (or 2015):

	"Then" (1940)	"Now" (2015)
# of statistics departments	5–10	≈60
# of biostatistics departments	≈1	≈43
# of graduate students, statistics	< 50?	4597 (24%)
# of graduate students, biostatistics	< 10?	1960 (14%)
IMS membership	< 100?	≈3500
Computer clock speed	5–10Hz Zuse Z3 (1941)	>2.7GHz Mac Powerbook
Terminology/ Department names	Mathematical Statistics, Applied Statistics	Statistics, Data Analysis, Data Science

This table shows that one clear outcome of Hotelling's papers [18], [21] and [19] has been the establishment of separate departments of statistics in the US. Now we are in the midst of considerable (remarkable? large? exponential?) increases in enrollment in the courses offered by these departments. The following two graphs (by Steve Pierson [38]) show the growth in Bachelor's, Master's, and PhD's in Statistics and Biostatistics combined and in Biostatistics (separately) over the period 1987–2015:
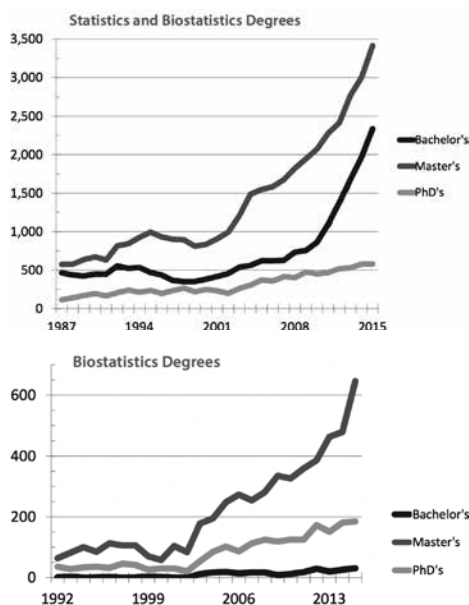
Note the much slower growth in PhD degrees versus degrees at the Masters and Bachelors levels. Comparing these curves gives some pause for reflection!

5. MS curricula in statistics

But what about the curricula of the new Data Science and Machine Learning programs? For example, what is the curriculum of one of the typical new Data Science (DS) MS degree programs?

Donoho (2015) section 7 reviews a typical such curriculum (at UC Berkeley). There the core of the MS Data Science curriculum includes: Research Design and Application for Data and Analysis; Exploring and Analyzing Data; Storing and Retrieving Data; Applied Machine Learning; and Data Visualization and Communication. The advanced courses include: Experiments and Causal Inference; Applied Regression and Time Series Analysis; Legal, Policy, and Ethical Considerations for Data Scientists; Machine Learning at Scale; Scaling up! Really big data; and a Capstone course (with data analysis project). The program at Berkeley is run by the Information School.

At my home, the University of Washington, the DS MS program is run by the E-Science Institute (with co-operation) from Statistics, CS, and Biostatistics. The curriculum includes: Introduction to Statistics and Probability; Data Visualization & Exploratory Analytics; Applied Statistics and Experimental Design; Data Management for Data Science; Statistical Machine Learning for Data Scientists; Software Design for Data Science; Scalable Data Systems and Algorithms; Human-Centered Data Science; and Data Science Capstone Project There is clear overlap in both lists with courses offered in a traditional statistics MS program, but with a number of substitutions from a Computer Science MS program. Ten American MS Programs in Data Science and Analytics were surveyed in *Amstat News* articles in April and June 2017. Each of these surveys included the following query to one of the principal organizers or instructors for the program: "Do you have any advice for institutions

considering the establishment of such a degree?"

One of the responses, which seemed very thoughtful and relevant, was from Mark Craven, Univ of Wisconsin–Madison: "I would advise any institution considering this area to build on existing partnerships between statistics, biostatistics, computer sciences, and biomedical informatics. No one unit can or should 'own' this area, so proceeding in a broad and inclusive way makes the most sense."

Donoho [13] gives an analysis of the Berkeley Data Science curriculum in the context of Tukey's critiques and writings. He writes: "Although my heroes, Tukey, Chambers, Cleveland and Breiman, would recognize positive features in these programs, it's difficult to say whether they would approve of their long-term direction —or if there is even a long-term direction to comment about: … Data Science Masters curricula are compromises: taking some material out of a Statistics masters program to make room for large database training; or, equally, taking some material out of a database masters in CS and inserting some statistics and machine learning. Such a compromise helps administrators to quickly get a degree program going, without providing any guidance about the long-term direction of the program and about the research which its faculty will pursue. What long-term guidance could my heroes have provided?"

6. PhD curricula in statistics

At the University of Washington, the PhD program has four possible tracks: Normal/Basic track; Statistical genetics; Statistics for the Social Sciences; and Machine Learning (ML) and Big Data (BD). The following table [*next column*] shows PhD student numbers in each of these tracks at the University of Washington over the period 2001-2016:

track	Graduated	Current	Total
Normal, Stat	83	37	120
Normal, Biost	103	49	152
StatGen, Stat	13	3	16
StatGen, Biost	5	3	8
Stat in Soc Sci	5	1	6
ML-BD	1	13	14
total, Stat	102	54	156
total, Biostat	108	52	160

From this table (and especially the 13 PhD students currently enrolled in the ML-BD track) it is clear that the ML-BD track is proving to attract a substantial number of our current PhD students. This makes re-consideration of the curriculum in statistical theory (and methodology) increasingly important. What should I be teaching in Statistics 581-582 during the coming two quarters? What would my heroes recommend if they were here to offer their wise advice?

My heroes are different than David Donoho's; they include: H. Chernoff, J.L. Doob, R.A. Fisher, Jaroslav Hajek, Wassily Hoeffding, Harold Hotelling, Jack Kiefer, Lucien Le Cam, Charles Stein and Abraham Wald. My sense is that future research directions, including manifold learning, topological data analysis, and statistical methods to deal with nonstandard data types (functions, trees, images, etc.) will require more mathematics and more probability rather than less.

7. Back to my problem: what to teach in the theory course sequence?

Here is a brief outline of UW's current Statistics 581, 582 and 583 courses.
Outline for Stat 581:
* *Inequalities; basic asymptotic theory in statistics*. Examples: robustness (or lack of robustness) of normal theory tests; chi-square statistic and power of chi-square tests under fixed and local alternatives; limit theory for fixed dimension linear regression; limit theory

for correlation coefficients; limit theory for empirical distributions and sample quantiles; examples from survival analysis/censored data.
* *Lower bounds for estimation*. Multi-parameter Cramér–Rao lower bounds; super-efficiency & introduction to Hajek–Le Cam convolution theorem and local asymptotic minimax theorems; simple lower bound lemma via two point inequalities.
* *Classical (and nonparametric) maximum likelihood:* Existence; empirical d.f. & empirical measure as MLEs; algorithms, one step approximations, and EM; LR, Wald, and Rao tests: fixed and local alternatives; Brief introduction to agnostic viewpoint: what if the model fails?

Outline for Stat 582:
* *Elementary Decision Theory: Bayes rules, minimax rules, and connections.*
* *Bayes theory, inadmissibility, and empirical Bayes.*
* *Optimal tests and tests optimal in subclasses: eliminating nuisance parameters by conditioning and invariance.*

Outline for Stat 583:
* *Parameters as functionals and the Delta Method*. Continuity: probability metrics and properties of functionals; differentiability of functionals: Fréchet, Hadamard, and Gateaux; examples and applications.
* *Resampling methods*. General approach to bootstrap and resampling methods; Jack-knife; Bootstrap methods; examples and applications; Bootstrap and the delta method.

New in Statistics 581 - 582 during this coming year?
* Large scale hypothesis testing and FDR's?
* More on empirical Bayes?
* More on convexity?
* More on empirical process theory and use of inequalities?
* …??

What should be reduced or deleted? I don't know exactly yet, but I'm working on it… and on the report to my chair.

Let me close with a couple of excerpts from Efron and Hastie [14]. From the Preface, page xvii: "Useful disciplines that serve a wide variety of demanding clients run the risk of losing their center. Statistics has managed, for the most part, to maintain its philosophical cohesion despite a rising curve of outside demand. The center of the field has … moved in the past sixty years, from its traditional home in mathematics and logic toward a more computational focus." And from the Epilogue, page 447: "It is the job of statistical inference (theory) to connect 'dangling algorithms' to the central core of well-understood methodology. The connection process is already underway."

Here, then, is a brief summary of my views:

- **Embrace and encourage data science!**
- **Continue evolving the curriculum to teach the unifying themes of statistical research.**
- **Keep doing what statisticians do best:** *question, question, question…* and then provide the best answers possible, based on the available data.
- **Attract the best and brightest students to research work in statistics.**
- **Teach what we know!**

I'd like to close with a personal aside: H. Hotelling played a significant role in my own involvement in statistics as a career. As is clear from the *Statistical Science* "Conversation with Z.W. Birnbaum" [32], Hotelling pointed (Bill) Birnbaum toward a position at the University of Washington in 1939. Bill created a strong environment for statistics within the UW Math Department during the period 1940–1970, and his students Ronald Pyke, Albert Marshall, and the people they attracted to the UW became my teachers and mentors when I arrived at the UW in 1971.

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OBITUARY: Ken-ichi Yoshihara

1932–2016

PROFESSOR KEN-ICHI YOSHIHARA died in Yokohama, Japan, on October 29, 2016. He was born on September 20, 1932 in Zushi, a small town near Yokohama. He graduated with a BA from Yokohama National University in 1954; and received a master's degree (1956) and PhD (1965) from the Tokyo University of Education (later Tsukuba University). He held faculty appointments at Yokohama National University in Yokohama (1963–97) and at Soka University in Hachioji (1997–2007). He was awarded the Japanese government's Medal of Honor with Purple Ribbon in 2011, for his outstanding contributions in mathematics and in education.

Professor Yoshihara was a pioneer of probability theory and statistics in the field of analysis of weakly dependent random variables. He established a breakthrough method to approximate a sequence of dependent random variables satisfying some mixing conditions by a sequence of independent random variables constructed carefully according to the joint distributions of the original sequence. He estimated the error terms very accurately and obtained the almost best possible error evaluation in the approximation (see [1]). He especially studied dependent random variables with the absolutely regular mixing condition. The absolutely regular mixing condition satisfies the ϕ-mixing condition and the strong mixing condition satisfies the absolute regular mixing condition (see [1], [2], [3] and [5]).

In the field of time series analysis, we investigate its property according to the equation of its modeling. For example, in the autoregressive (AR) model, the random variable at time t is defined by sums of time series with some weights defined before t and some noises. Since each random variable at time t can be written by sums of infinitely many random noises, we need very complicated calculations for such research. On the other hand, from the viewpoint of mixing properties, a large family of linear models of time series, like AR models, satisfies some mixing conditions. Therefore Yoshihara's approximation method for random variables with mixing conditions is very useful in time series analysis. (See [5].)

Using his approximation method, he extended some limit theorems such as the central limit theorem and law of large numbers for independent random variables to weakly dependent random variables. In particular, he paid attention to symmetric statistics like U-statistics and V-statistics, and showed the asymptotic normality of such statistics for dependent random variables satisfying some mixing condition. (See [1], [4] and [5].)

He also developed the theory of extreme value statistics for weakly dependent random variables. Recently, the rise in the risk of natural disasters due to climate change has been causing concern. Since extreme value statistics is deeply involved with such risk analysis, it is increasingly important. Originally, extreme value statistics had been investigated for independent random variables. As mentioned previously, lots of time series described by some linear models satisfy mixing conditions. Therefore extreme value statistics can be applied to time series by Yoshihara's approximation method, and has improved its availability. (See [5].)

In [5], Yoshihara collected recent developments of analysis for stochastic sequences of weakly dependent random variables in probability theory and statistics into a significant and substantial 15 volumes.

Finally, I mention Professor Yoshihara's interest in education, not only for university

Ken-ichi Yoshihara and his wife Yasuko, at Texas A&M University in Kingsville, 2012

students but also for high school students. He wrote some textbooks of mathematics for high school students, which were approved by Japan's Ministry of Education.

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Pro Bono Statistics: Learning as the replication of knowledge

Yoram Gat writes in his second column:
I remember a few scattered comments by professors, which I heard or overheard as a graduate student and which gave a glimpse into the professors' insights about learning. Maybe those comments stuck because they addressed a topic which I have so rarely heard discussed.

A major declared goal of the educational system, and a non-negligible part of its function in practice, is to have people learn. It is therefore quite surprising that consideration of the process of learning itself is largely absent from the curriculum. Throughout the years I spent at school and in higher education institutions I cannot remember a single lesson devoted to how learning occurs and what determines its success, let alone a deeper, more systematic treatment. It may very well be that analysis of learning is part of the higher education curriculum in certain departments, but with learning being a central occupation of schools in general, its consideration would be expected not be limited to specialized fields but rather given a prominent place at school, from a very young age.

It seems to me that the strange silence about learning is a reflection of, as well as a reason for, the perpetuation of a certain model of learning that is implicitly conventionally assumed. According to this model, learning is a process of reproducing and assembling standard units of knowledge. Working from an existing blueprint and using a standardized process, the units of knowledge can be produced and then assembled to create a knowledge structure, much like interlocking machine parts are produced and assembled into a machine. Teachers have some of those knowledge pieces in their minds. A competent teacher can describe those pieces and their proper relative positions to the students. Any competent and attentive student can use the description to create a copy of the pieces in their mind and assemble them together with the pieces of knowledge already present there. Once this has been done the student has learned (although some homework may be useful for oiling the gears of the newly created mental machinery, particularly for less-than-brilliant students). If learning is such a straightforward process of replication, there may be nothing to discuss. Each student is characterized by an individual academic ability which may be conceived of as a one-dimensional parameter. This parameter determines the ease and speed at which the student can replicate and assemble new units of knowledge which are presented to them. This ability—"intelligence"—is essentially innate and opaque, so rather than wondering about how learning works, the model leads towards attempting to operationalize the model's parameter and to measure its magnitude for each student.

This schematic description of a learning model is necessarily a strawman and any experienced student or teacher would likely have various reservations about accepting it. Yet it seems to me that it is essentially this model that dominates the way learning is perceived and handled in society. If it is hard to find explicit endorsements of the learning-as-replication model, this is not because other models are used or even entertained, but, on the contrary, because it is taken to be too obvious to admit any alternatives. School is obviously about students acquiring the knowledge their teachers have. Could teaching be anything other than a process of piecemeal replication of the knowledge machinery?

In various ways, society embodies the replication model as well as encourages its internalization by both students and teachers. Learning via a standardized process is put center-stage by an emphasis on class attendance and by minimal provision of interactive individual student-teacher sessions. The material taught is presented as objective and authoritative and the teachers are assumed to know all there is to know about it, so scholastic achievement is operationalized as the ability to imitate established patterns (often essentially verbatim), with little expectation for creative, let alone diverging, expression. The future of education is discussed in terms of larger scale, more efficient knowledge replication via mass media channels such as MOOCs ("the democratization of knowledge"). The educational system is busy measuring and classifying students along an axis of scholastic achievement which is taken to be a reflection of an objective ability. The system then reports the achievement measurements and classifications to interested parties. Students are driven to fulfill their inherent potential by a system of punishments and rewards which are meted out to students according to their quantile on the achievement distribution. Works of fiction and nonfiction endlessly celebrate the genius, that legendary outlier who is able to absorb knowledge quickly and effortlessly.

Thus the replication model of learning is so deeply embedded in society it seems inevitable. But the test of a learning model, like that of any model, is in how well it serves its users. Are students, and society in general, well served by the replication model? Does this model capture the important features of learning? If not, what parts of it need to be reconsidered, and what are the practical implications for society—in particular for students, teachers and managers of the educational system—of changing the model?

Yoram would be happy to have a critical and skeptical conversation about the topics he discusses in this column. He invites readers to comment on this column at the Bulletin's website, http://bulletin.imstat.org/category/pro-bono-statistics/ *or you can email us at* bulletin@imstat.org.

Recent papers: two core IMS journals

Annals of Statistics: Volume 45, No 4, August 2017

The *Annals of Statistics* aims to publish research papers of the highest quality reflecting the many facets of contemporary statistics. Primary emphasis is placed on importance and originality. The Co-Editors are Edward I. George and Tailen Hsing. Access papers at **https://projecteuclid.org/info/euclid.aos**
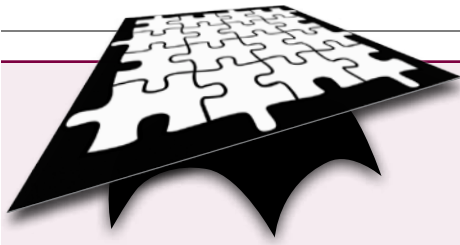
Annals of Applied Statistics: Vol. 11, No 2, June 2017

Statistical research spans an enormous range from direct subject-matter collaborations to pure mathematical theory. The *Annals of Applied Statistics* is aimed at papers in the applied half of this range. Our goal is to provide a timely and unified forum for all areas of applied statistics. The Editor in Chief is Tilmann Gneiting. Access papers at **http://projecteuclid.org/euclid.aoas**

Student Puzzle Corner 18

After a relaxed rendezvous with effulgent nothingness, we should now seriously get back to the problem corner. It is the turn of a problem in statistics. We will pose a problem on **deconvolution**, sometimes brandished as noisy data. The basic model is that you get to observe a random variable Y which has the distribution of the convolution of X and Z, it being usually assumed that Z has a completely known distribution, while the distribution of X has unknown parameters, perhaps infinite dimensional, associated with it. We would want to infer about the distribution of X, knowing only Y; often, it is assumed that iid replicates of Y are available. There is massive literature on deconvolution, particularly Gaussian deconvolution. Generally, the results are asymptotic in some sense. The problem we describe today was originally posed by C.R. Rao in 1952.

Here is the exact problem of this issue.

Suppose $X \sim \mathrm{Bin}(n_1, 1/2)$ and $Z \sim \mathrm{Bin}(n_2, p)$, $0 < p < 1$ being an unknown parameter; X and Z are assumed to be independent. Due to (spatial) aggregation, we can only observe $Y = X + Z$.

(a) Is there always an MLE of p?

(b) In suitable asymptotic paradigms, are there consistent estimators of p based on Y alone?

(c) How does one construct a confidence interval for p, again, based on Y alone?

(d) What can be said about minimax estimation of p on the basis of Y, using squared error loss?

The Student Puzzle Corner contains problems in statistics or probability. Solving them may require a literature search.

Student IMS members are invited to submit solutions (to bulletin@ imstat.org with subject "Student Puzzle Corner"). The deadline is **extended to October 4, 2017**.

The names and affiliations of student members who submit correct solutions, and the answer, will be published in the following issue. The Puzzle Editor's decision is final.

Deadline extended: October 25

Learning Sessions: more work, less shop?

Jan Swart is a research fellow at the Institute of Information Theory and Automatization, in the Academy of Sciences of the Czech Republic, Prague. He writes to share his experiences of co-organizing Learning Sessions, trialling a new format for sharing knowledge:

In four columns published in 2014 and 2015 in the *IMS Bulletin*, Vlada Limic made a case for organizing events different from the familiar mathematical workshops (which are, in effect, small conferences). She proposed something closer to workshops in certain other disciplines (like classical guitar playing): events where the focus is more on work—meaning getting your hands dirty, becoming seriously involved with new material, trying to learn something new—and less on the "shop" part of workshop, i.e., the familiar show-off of whom you are working with, what you are working on, what your results are, with a hint of the techniques involved.

When Rongfeng Sun, Matthias Birkner and I got the chance to organize a month of activities at the Institute for Mathematical Sciences in Singapore (http://ims.nus.edu.sg/events/2017/gene/index.php) which was held in July–August this year, we took Vlada's blog as an inspiration to split the central two weeks in two halves, with a usual workshop in the second week (August 7–11), and something we called **Learning Sessions** in the first week (July 31–August 4). This was not quite the format suggested in Vlada's blog from Nov 17, 2014, although it was loosely inspired by it. Since it may be of wider interest to see how this worked out, let me describe our experiences here.

Before I embark on this, it is probably fair to say that although, in view of various constraints, workshop talks often manage to convey only a vague idea of the mathematics involved, this is not true in general. As a whole, I have learned a lot from listening to talks. There have even been memorable talks where I walked away from with the feeling that I could immediately start working on a topic that just an hour earlier had been completely unknown to me. In some cases, I did. Such talks are rare, but since we have only just so much energy and time to write a few papers per year, at most, we don't need many such talks.

Also, there already exist events with other formats than workshops, that are more aimed at teaching and learning: summer schools, mini-courses, and the traditional *Arbeitsgemeinschaft* that is held twice each year in Oberwolfach, to name a few. Partly inspired by these, and partly by Vlada's ideas, we came up with the following format for our Learning Sessions. We envisaged nine sessions, each lasting half a day. Topics could be both classic material and new, cutting-edge results. Half a year before the sessions, we drew up a list of possible topics based on suggestions from the participants and from ourselves. We then asked participants which sessions they would like to present or participate in, and organized the nine most named themes.

To each session, based on the preferences of the participants, we assigned two or three "moderators," whose task it was to prepare the material to be studied and then, during the session, to give an introduction to the topic and bring up questions to be discussed. As a rule, we did not allow moderators to be authors of the papers to be discussed. Other than that, the level of expertise varied: some moderators had been familiar with their topic for many years, while others had to learn something completely new.

In certain respects, the Learning Sessions turned out different from how we expected. We had suggested that participants should not attend all sessions, but focus on up to four sessions of their choice. In the end, though, most participants went to most sessions. This may have been be partially due to the fact that, although our format did not guarantee that this would happen, we were lucky that the chosen topics formed a coherent whole, with many cross connections between different topics.

In the months before the Learning Sessions, there was some discussion about the amount of preparation that could (or should) be expected from the participants. In the end, we decided not to put pressure on them, except for recommending some preparation, and also did not require participants to register for sessions of their interest. A quick, informal survey afterwards suggests that most participants did not invest much time preparing for sessions they intended to attend. This was probably also due to the fact that for most sessions, there was little material available that could be studied beforehand, except for a list of articles. In the end, two sessions created lecture notes, but these were available only a week or so before the start of the sessions. In addition, for one session, two volunteer participants were appointed in advance who prepared short presentations on chosen topics.

Our original idea was that each session would consist of an introduction by the two or three moderators, followed by a structured discussion moderated by those same, as the name suggests, moderators. In the end, there was very little discussion, probably due to a combination of factors:

1. It is hard to think of good themes to discuss in a group, in the limited time span of, say, an hour.
2. Since in the end most participants went to most sessions, the number of attendees at each session was quite large.

3. Many moderators found out that in order to present the material in a way that went a bit deeper, they needed (almost) all their allocated time, which was 160 minutes.

There was some good news: in spite of turning out somewhat differently than expected, it seems fair to say that most participants agreed the Learning Sessions were, yes, quite a success. So what worked well, and what did they achieve?

First of all, it seems people really learned, and learned a lot. The moderators, who all really put a lot of effort into their presentations, in fact themselves learned a lot from this; especially those who presented a topic that was new to them. The presentations, approximately two and a half hours long, really managed to delve deeper into the material than an ordinary workshop talk. In addition, they were not hindered by the need to quickly go over a lot of "well-known" results, that may not be so well-known to the audience, in order to come to the (often rather specialized) new parts the speaker has added.

Also, the Learning Sessions gave plenty of opportunities for interaction:

1. There was interaction between the moderators, who sometimes had never worked together before.
2. Interaction between different sessions, revealing new connections, which in at least one case (mine) led to a new project and a new collaboration.
3. As a co-moderator of my session, I also interacted with one of the authors of the articles under discussion, in the form of email and Skype discussions.

I now come to a more speculative point, which I nevertheless want to make: I believe, based on the points above, and also on the feedback of many participants, that the format of the Learning Sessions is more effective than a usual workshop when the aim is to inspire new research and start new collaborations. Of course, there are only so many projects a person can be involved in, and apart from initiating new projects, finishing them is also important and usually more time-consuming. Nevertheless, for the often-stated aim of stimulating new research, it may be worth considering the format of the Learning Sessions, or something in the same spirit.

Compared to summer schools and mini-courses, our Learning Sessions were shorter, allowing for more diversity, while compared to workshop talks they were still long enough to allow in-depth coverage. An unusual feature (which, however, is similar to the German *Arbeitsgemeinschaft*) was that speakers were not authors of

> *The format of the Learning Sessions is more effective than a usual workshop when the aim is to inspire new research and start new collaborations*

the results presented. This has a number of potential advantages:

1. Non-authors can potentially offer a more fresh look on a subject, colored by their own experiences, and may have more feeling for the difficulties a beginner may encounter when trying to master a new topic.
2. This set-up can lead more easily to interaction between moderators and authors, and between one moderator and another.
3. The moderators who prepare a session potentially learn a lot themselves.

On the other hand, newcomers to a subject may have trouble getting to the core of matters, and even occasionally misrepresent or misunderstand part of the articles they are meant to explain. However, if this happens, does this not also point to the fact that not all articles are equally good at getting their message across, and hence strengthen the case for getting more people involved in spreading new knowledge?

Time will tell if our Learning Sessions will be a one-off experiment, or part of a larger move to find new ways of sharing new mathematical developments. For those who are interested in trying something similar, based on our experiences, we can offer the following bits of advice:

1. It seemed that sessions were especially successful if the moderators already had some, though perhaps not too much, prior experience with the subject.
2. It is worth thinking at an early stage about how much preparation can be expected from participants and what kind of material, if any, should be made available to them by the moderators for this aim.
3. If some sort of preparation is required, then it may be good to set deadlines to the moderators for when the preparatory material should be made available.
4. We probably profited from the fact that there is a functioning community in our sub-field of probability so that people trust each other and are (sometimes after a bit of nudging) willing to put in work for the community. Organizing a similar event with complete strangers may be harder.

And finally, a last point, that may be obvious but is still important:

5. We recommend that you should feel free to experiment and try something new. In our experience, it is fun to do and the result can be very rewarding!

Meeting reports

Senegal course on Records Theory: foundation, estimation, prediction and characterization

The Department of Applied Mathematics and LERSTAD (Laboratoire d'Études et de Recherches en Statistiques et Développement) at the Université Gaston Berger, Saint-Louis, Senegal) hosted an invited international course on **Records Theory (foundation, estimation, prediction and characterization)**. This international post-graduate course took place in the Gaston Berger University (UGB) from 20 to 31 March 2017, and was followed by participants from Senegal, Mali and Togo.

The invited speaker, Professor **Mohammad Ahsanullah** of Rider University (Lawrenceville, New Jersey, USA) was able to successfully cover all aspects of records theory and exposed some of its new research trends. He also left a series of open problems to be tackled by those in attendance.

Some of the participants at the Records Theory course in Senegal in March

It is expected that some members of the LERSTAD (both MS/PhD students and senior members) will undertake research activities on the topic of the course. Workshops are also scheduled within Africa to share the results of this fantastic experience.

This course is part of an initiative launched to diversify and to empower the research activities at the local plan of UGB, and more generally in Africa, to set up a MS–PhD mentoring system, and to initiate co-authoring with well-confirmed scientists who wish to share with their African counterparts. A special effort is made to reach experts from North-America, as in this case, with Prof Ahsanullah.

The course was organized by Prof Gane Samb Lo, under the supervision of the LERSTAD, Applied Mathematics Department and the Sciences Faculty. It was funded by the World Bank Excellence Center CEA-MITIC/UGB.

Future courses are planned within the scope described above. Contact Gane Samb Lo, President of the Statistics and Probability African Society (statpas.net), for further details: gane-samb.lo@ugb.edu.sn.

2017 Rao Prize Conference

The Penn State Department of Statistics held the 2017 Rao Prize Conference on May 12, 2017, where three outstanding prize recipients were honored. The 2017 C. R. and Bhargavi Rao Prize recipient was **Donald B. Rubin**, the John L. Loeb Professor of Statistics at Harvard University. **Paul R. Rosenbaum**, the Robert G. Putzel Professor of Statistics at the Wharton School, was the 2017 C. G. Khatri Lecturer. The 2017 P. R. Krishnaiah Lecturer was **Satish Iyengar**, who is Professor of Statistics at the University of Pittsburgh.

The conference program consisted of these three plenary speakers, together with four invited speakers, and a poster presentation by graduate students. The four invited speakers were **Samuel Kou** (Professor of Statistics at Harvard University); **Kari Lock Morgan** (Assistant Professor of Statistics at Penn State); **Joseph Schafer** (Statistical Researcher at the US Census Bureau); and **Dylan Small** (the Class of 1965 Wharton Professor of Statistics at The Wharton School).

More information about the conference and the speakers (including videos of the talks) is online at http://stat.psu.edu/Events/2017-Rao-Prize.

The C. R. and Bhargavi Rao Prize was established to honor and recognize outstanding and influential innovations in the theory and practice of mathematical statistics, international leadership in directing statistics research, and pioneering contributions by a recognized leader in the field of statistics. The C. R. and Bhargavi Rao Prize is awarded in odd years. The 2019 Rao Prize Committee will accept nominations in 2018. The C. G. Khatri Memorial Lectureship and P. R. Krishnaiah Memorial Lectureship honor the memory of C. G. Khatri and P. R. Krishnaiah by inviting outstanding researchers in statistics to deliver lectures at Penn State. More details are on the web at http://stat.psu.edu/information/prizes-and-memorial-lectures.

XL-Files: ISIPTA-ECSQARU, BFAS-SMPS & WHOA-PSI

Contributing Editor Xiao-Li Meng has attended some great meetings, with exotic acronyms, over the summer. He writes:

No, these are not Chinglish or Pinyin. If you haven't heard of ISIPTA-ECSQARU, then you are in the good company of 95–99% of statisticians and probabilists. I certainly hadn't, until BFF4 (http://bulletin. imstat.org/2017/05/xl-files-bayesian-fiducial-and-frequentist-bff4ever/), thanks to Teddy Seidenfeld's timely introduction. I could not have arranged a better sabbatical orientation than de-deaning in the paradise of Lugano and learning about the paradoxes of imprecise probability. The joint meeting of the 10th International Symposium on Imprecise Probability: Theories and Applications (ISIPTA) and the 14th European Conference on Symbolic and Quantitative Approaches to Reasoning with Uncertainty (ECSQARU), from July 10–14, provided me with the therapeutic freedom of not needing to figure out some smart phrases (for giving a talk) or smiling faces (of people I don't recall). For the first time, I felt like a post-doc venturing into a neighboring field, and could say "Mom, I made it!" (Ages ago, when I told my mother that I had become an Assistant Professor, her response was, "So you didn't make it to post-doc?" In Chinese, "post-doc" sounds like "beyond doctor" but "Assistant Professor" more like a TA.)

My glorious post-doctoral feeling was troubled by less sunny thoughts about the isolation of disciplines that share virtually the same goal. Such separation has led to much reinventing of wheels and repeating of mistakes, a clear waste of intellectual and other resources. But I do wonder if it also helped foster some very different perspectives that otherwise could not have survived. For example, as statisticians, our reactions to the Dempster–Shafer theory of belief function have largely been either,

"What's *that*?" or "Who believes in belief functions?" Yet in ISIPTA-ECSQARU, Dempster's combining rule was invoked far more frequently than Bayes' rule.

There is also a Belief Function and Applications Society (BFAS), and its 2018 conference will be jointly held with SMPS: Soft Methods in Probability and Statistics. Whereas the statistical community has generally shunned anything that is "softer" than probability, a recent anecdote reminded me that the "hardness" we statisticians have imposed on scientists may also be a contributing factor to the outcry of non-replicability. A student of mine asked an astrophysicist collaborator if he could provide some examples where he only has vague prior information, such as knowing a Poisson intensity is between 3 and 5, but nothing else. The astrophysicist was rather amused: "Some examples? Everything I do! It is you guys that always push us to make up an entire prior!" With the growing concerns of non-replicable studies, perhaps it is the time for us statisticians to soften our hearts towards these soft methods that are designed to reduce the amount of "made-ups"?

Incidentally, my heart was further softened by the panda, lynx, and elephant that appeared at the second Workshop on High-Order Asymptotics and Post-Selection Inference (WHOA-PSI) at Washington University in St. Louis, August 12–14. Rest assured, no animal or human being was
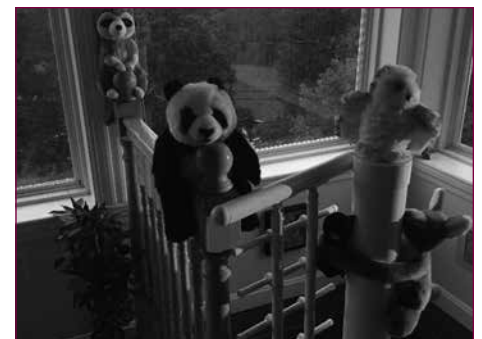
Sunrise with Teddy's paper; and sunset with Todd's panda

harmed. Todd Kuffner, a multi-talented composer, singer, and thinker, had this cool idea of using stuffed animals for timing speakers. Panda's charm reminds me that I still have five minutes to charm the audience (and thanks to Todd, it now charms me every day: see below). Lynx is known for its speed: I have one minute to run for my life. But when the elephant is in the room, no one would be paying any attention to me, even if I were showcasing deep learning via its ability to reject the Riemann hypothesis with a $p<0.005$.

To ensure enough audience for the 7:45am sessions, Todd had another creative idea: 15-minute morning entertainment starting at 7:30am. With over 7000 YouTube subscribers (https://www.youtube.com/user/toddmakesnoise), Todd had little trouble enhancing the morning coffee with original songs that are as beautiful as his mind. He also provided me with a 15-minutes-of-fame slot: "Laughing early with XL," another first-time adventure for me. My opening act (*"A professor was dreaming that he was teaching. He woke up. He was."*) apparently was not as pungent for statisticians as *"Why are standard deviations always 6?"* (http://bulletin.imstat.org/2013/02/the-xl-files-a-fundamental-link-between-statistics-and-humor). Nevertheless, I am ready to make $n=2$…

So what softened your heart (or woke you up) this summer?

IMS meetings around the world

Joint Statistical Meetings: 2018–2023

IMS sponsored meeting
JSM 2018
July 28–August 2, 2018
Vancouver, Canada

w http://ww2.amstat.org/meetings/jsm/2018/
Join us in Vancouver, for one of the biggest statistical events of the
year: with more than 6,000 attendees (including over 1,000 students) from 52 countries, and over 600 sessions, it's
a busy few days! The theme is *"Lead with Statistics."*

IMS sponsored meetings: JSM dates for 2019–2023

| **IMS Annual Meeting @ JSM 2019** July 27–August 1, 2019, Denver, CO | **JSM 2020** **August 1–6, 2020** **Philadelphia, PA** | **IMS Annual Meeting @ JSM 2021** **August 7–12, 2021, Seattle, WA** | **2022 Joint Statistical Meetings** **August 6–11, 2022** **Washington, D.C.** | **IMS Annual Meeting @ JSM 2023** **August 5–10, 2023** **Toronto, ON, Canada** |

IMS co-sponsored meeting   *NEW*
ISNPS2018: The 4th Conference of the International Society for Non-Parametric Statistics
June 11–15, 2018. Salerno, Italy

w http://www.isnps2018.it/
The ISNPS (International Society of Non-Parametric Statistics)
conferences take place biennially. The Fourth Conference of ISNPS
is scheduled to take place in Salerno, southern Italy, next June, and
is co-sponsored by the IMS, the ISI, and other organizations.

The coastal town of Salerno is 34 miles (55km) south of Naples,
less than an hour by bus or by train from Napoli Capodichino
International Airport, connected to many European cities by direct
flights. Salerno is also well connected with Rome, two hours by
direct high speed trains.

The conference will bring forth recent advances and trends
in several areas of nonparametric statistics, in order to facilitate
the exchange of research ideas, promote collaboration among
researchers from all over the world, and contribute to the further
development of the field. The program will include plenary talks,
special invited talks, invited talks, contributed talks and posters on
all areas of nonparametric statistics. A roundtable discussion on the
constitution of ISNPS and future conferences will also take place.

Researchers who are interested in ISNPS and/or would like to
participate in its Fourth Conference by giving a contributed talk
or poster are encouraged to register online or contact ISNPS at the
email: isnps2018@unisa.it.

IMS co-sponsored meeting
2018 IMS Asia Pacific Rim Meeting
June 26–29, 2018
Singapore

w https://ims-aprm2018.stat.nus.edu.sg/
The fifth IMS Asia Pacific Rim meeting
(IMS-APRM) will be held in Singapore
from June 26–29, 2018. It will provide an
excellent forum for researchers in Asia and
the Pacific Rim, and promote communica-
tions and collaborations between researchers
in this area and those from other parts of
the world.

The program, covering a wide range of
topics in statistics and probability, includes
Plenary Lectures from Rick Durrett and
Bin Yu, and many **Distinguished Speakers:**
Vivek S. Borkar, Raymond J. Carroll, Zhen-
Qing Chen, Ching-Kang Ing, Bing-Yi Jing,
Samuel Kou, Satoshi Kuriki, Regina Y. Liu,
Eric Moulines, Art B. Owen, Byeong Uk
Park, Giovanni Peccati, John Robinson,
Ingrid Van Keilegom, Fengyu Wang and
Hongyu Zhao.

IMS co-sponsored meeting
40th Conference on Stochastic Processes and their Applications (SPA)
June 11–15, 2018. Gothenburg, Sweden
NEW w http://spa2018.org/

The 40th Conference on Stochastic Processes and their Applications (SPA 2018) will be held June 11–15, 2018, at the Chalmers University of Technology in Gothenburg, Sweden.

Submission of proposals for contributed sessions, contributed talks and posters are welcomed! The organizers encourage early submissions to leave the accepted speakers plenty of time to make travel and funding arrangements. The submissions will be assessed and good proposals are accepted on a regular basis. Accepted contributed talks will be grouped into additional contributed sessions after the submission deadline, March 2, 2018.

Plenary speakers: Robert Adler (Technion, Israel); Francois Baccelli (U. Austin, USA and ENS, France); Mia Deijfen (U. Stockholm, Sweden); Alison Etheridge (U. Oxford, UK) – Lévy lecture; Patricia Gonçalves (U. Lisbon, Portugal); Kurt Johansson (KTH, Sweden); Olav Kallenberg (U. Auburn, USA); Davar Khoshnevisan (U. Utah, USA) – IMS Medallion lecture; Anna De Masi (U. Aquila, Italy) – IMS Medallion lecture; Mikhail Menshikov (U. Durham, UK); Annie Millet (U. Paris-1, France); Elchanan Mossel (MIT, USA); Asaf Nachmias (U. Tel Aviv, Israel); Jeffrey Steif (Chalmers, Sweden) – Doob lecture; and Nike Sun (U. Berkeley, USA).

IMS co-sponsored meeting
41st Conference on Stochastic Processes and their Applications (SPA)
July 8–12, 2019
Evanston, IL, USA
w TBC

The 2019 Conference on Stochastic Processes and their Applications will be held in Evanston, Illinois. Details to follow.

IMS sponsored meeting
WNAR/IMS Meeting
June 24–27, 2018
Edmonton, Canada
w http://www.wnar.org/Meetings

Next summer's WNAR/IMS meeting will be held June 24–27, 2018, at the University of Alberta, Edmonton, Canada. The local organizers are Bei Jiang and Linglong Kong. The university's campus is located on the southern bank of the North Saskatchewan River. As one of the largest cities in Canada, Edmonton is a cultural center, with many arts and cultural events anchored in the downtown Arts District, accessible from campus by the city light rail system. Both the Edmonton Jazz Festival and Freewill Shakespeare Festival are scheduled to occur in the city during the WNAR conference dates. Most of the city has accessible bike and walking trail connections. In addition, Edmonton is a 4-hour drive from Banff National Park, Canada's oldest National Park and Alberta's most visited tourist destination. Visitors to Banff in the summer can enjoy hiking, camping, canoeing, cycling, fishing, golfing, kayaking, skateboarding, swimming, walking trails, and relaxing at the hot springs. Meeting details coming soon.

IMS co-sponsored meeting
Statistics Meets Friends:
From Inverse Problems to Biophysics and back
November 29–December 1, 2017
Göttingen, Germany
NEW w http://www.stochastik.math.uni-goettingen.de/smf2017/

Axel Munk

This workshop, held on the occasion of the 50th birthday of Axel Munk, aims to Bridging the gap between Mathematical Statistics, Inverse Problems and Biophysics, highlighting recent developments at their interfaces.
DEADLINE for pre-registering is September 15, 2017.

IMS sponsored mtg
2018 IMS Annual Meeting & 12th Vilnius Conference on Prob. Theory & Math. Statistics
July 2–6, 2018
Vilnius, Lithuania
NEW w http://ims-vilnius2018.com/ Program Co-chairs Peter Bühlmann (IMS) and Vygantas Paulauskas (Vilnius). Local Chair is Remigijus Leipus.

ENAR

IMS sponsored meetings
ENAR dates, 2018–2020
March 25–28, 2018: in Atlanta, GA
March 24–27, 2019: in Philadelphia, PA
March 22–25, 2020: in Nashville, TN
w http://www.enar.org/meetings/future.cfm

IMS co-sponsored meeting
Bernoulli/IMS 10th World Congress in Probability and Statistics
August 17–21, 2020. Seoul, South Korea
w TBC

The next World Congress in Probability and Statistics will be in Seoul, South Korea.

Other meetings and events around the world

Remembering Charles Stein: Scientist, Colleague, and Friend *NEW*
November 28, 2017
Stanford, CA, USA

w https://statistics.stanford.edu/stein-symposium

The Department of Statistics at Stanford University warmly invites you to a symposium, reception, and dinner, *Remembering Charles Stein: Scientist, Colleague, and Friend*, on Tuesday, November 28, 2017 at the Li Ka Shing Conference Center on the Stanford campus. During his career, Charles Stein was acknowledged as the world's premier mathematical statistician. He was also our treasured colleague of 50+ years, and was the department's intellectual leader. Friends, family, and colleagues of Professor Stein will gather for an afternoon of talks surveying a few of his influential ideas, followed by a reception and dinner.

Registration is required to attend. Please register by November 7, 2017. Details and the registration link are at the website above.

Webinar Series: *NEW*
Data Science Undergraduate Education

w http://sites.nationalacademies.org/cstb/CSTB_181242

Join the National Academies of Sciences, Engineering, and Medicine for a webinar series on undergraduate data science education. Webinars are taking place on Tuesdays from 3–4pm ET, ending on November 14. See below for the list of dates and themes for each webinar.

Webinar speakers will be posted as they are confirmed on the webinar series website. Register to attend online at:
https://www.eventbrite.com/e/webinar-series-data-science-undergraduate-education-tickets-37095989102

Webinar Dates and Topics

9/12/17 - Building Data Acumen
9/19/17 - Incorporating Real-World Applications
9/26/17 - Faculty Training and Curriculum Development
10/3/17 - Communication Skills and Teamwork
10/10/17 - Inter-Departmental Collaboration and Institutional Organization
10/17/17 - Ethics
10/24/17 - Assessment and Evaluation for Data Science Programs
11/7/17 - Diversity, Inclusion, and Increasing Participation
11/14/17 - Two-Year Colleges and Institutional Partnerships

All webinars take place from 3-4pm ET. If you plan to join online, please register to attend. You will have the option to register for the entire webinar series or for individual webinars.

Survival Analysis for Junior Researchers 2018 (SAfJR2018) *NEW*
April 24–26, 2018
Leiden, The Netherlands

w http://safjr2018.com

Contact Sanne Willems **e** safjr2018@leidenuniv.nl

SAfJR2018 is a three-day event that is aimed at young-career statisticians with an interest in the application and development of time-to-event analysis and related topics. The event includes a tutorial on multi-state models by Prof. dr. Hein Putter (Leiden University Medical Center), talks from keynote speakers Dr. Maja Pohar Perme (University of Ljubljana) and Dr. Birgit Witte (VU University Medical Center, Amsterdam), as well as poster sessions, a welcome reception and a conference dinner.

ICQSBEI'18: 2nd International Conference on *NEW*
Quantitative, Social, Biomedical and Economic Issues
with emphasis on New Technologies
March 2–3, 2018
Athens, Greece

w http://icqsbei2018.weebly.com/

You are invited to participate to the International Conference on Quantitative, Social, Biomedical and Economic Issues 2018 (ICQSBEI '18) by submitting your abstract or poster, relevant to the topics of the conference. The main subject for investigation of this conference is the impact of new technologies on management, education and people's behavior.

This conference serves as an excellent platform for presenting theoretical and applied papers in the fields of the uses of new technologies (internet, social media, smart phones, technological addictions) for information, communication, entertainment, education ,business management and marketing, as well as, the dangers for people's health from the addictive and uncontrollable uses and abuses of the new technologies.

Registration is open now. Register by January 20, 2018.

Last day for abstract submission: January 15, 2018.

For more information about the conference please email Chris Frangos, cfragos@teiath.gr

Employment Opportunities around the world

Australia: Melbourne

University of Melbourne

Lecturer / Senior Lecturer in Statistics

https://jobs.imstat.org/c/job.cfm?jb=36818913

Australia: Melbourne

University of Melbourne

Lecturer / Senior Lecturer in Data Science

https://jobs.imstat.org/c/job.cfm?jb=36818459

Australia: Melbourne

Monash University, School of Mathematical Sciences

Lecturer in Probability and Statistics

https://jobs.imstat.org/c/job.cfm?jb=37024778

Australia: Sydney

University of New South Wales

Lecturer/Senior Lecturer

https://jobs.imstat.org/c/job.cfm?jb=36748729

Austria: Klosterneuburg

IST Austria

Faculty

https://jobs.imstat.org/c/job.cfm?jb=36937775

Canada: Vancouver, BC

University of British Columbia, Department of Statistics

Assistant Professor Tenure Track

https://jobs.imstat.org/c/job.cfm?jb=36666803

Canada: Vancouver, BC

University of British Columbia

Assistant Professor Grant Tenure-Track in Biostatistics

https://jobs.imstat.org/c/job.cfm?jb=36765449

Canada: St. John's, NF

Memorial University, Department of Mathematics and Statistics

Tenure track position in Statistics

https://jobs.imstat.org/c/job.cfm?jb=37035922

Canada: Toronto, ON

University of Toronto

Associate Professor, Statistical and Social Science

https://jobs.imstat.org/c/job.cfm?jb=37164961

Canada: Toronto, ON

University of Toronto

Assistant Professor, Statistical and Social Science

https://jobs.imstat.org/c/job.cfm?jb=37164953

Canada: Toronto, ON

University of Toronto

Assistant Professor, Statistical Genetics and Genomics

https://jobs.imstat.org/c/job.cfm?jb=37194799

Canada: Waterloo, ON

University of Waterloo, Department of Statistics & Actuarial Science

Tenure-track or tenured faculty position(s) in Actuarial Science

https://jobs.imstat.org/c/job.cfm?jb=37151418

Canada: Montreal, PQ

Université de Montréal, Département de mathématiques et de statistique

Professor in Statistics, Biostatistics or Data Science

https://jobs.imstat.org/c/job.cfm?jb=37048450

Taiwan: Taipei

Academia Sinica, Institute of Statistical Science

Regular Research Positions

The Institute of Statistical Science, Academia Sinica, is seeking candidates for tenure-track/tenured research positions at the level of assistant, associate or full research fellow available in 2018. Candidates should have a Ph.D. degree in statistics or related areas. Application materials must include (1) a curriculum vita, (2) three letters of recommendation, and (3) representative publications and/or technical reports. Additional supporting materials such as transcripts for new Ph.D. degree recipients may also be included. Electronic submissions are encouraged. Applications should be submitted to

>   Dr. Yi-Hau Chen
>   Chair of the Search Committee
>   Institute of Statistical Science, Academia Sinica
>   128 Sec. 2 Academia Road, Taipei 11529, Taiwan, R.O.C.
>   Fax: +886-2-27831523
>   E-mail: recruit2017@stat.sinica.edu.tw

Application materials should be received by December 28, 2017 for consideration, but early submissions are encouraged.

Singapore

Faculty Positions at the Department of Statistics & Applied Probability, National University of Singapore

The National University of Singapore intends to hire faculty members whose research focus is in data science. The positions can be at any level. The new hires will join the Department of Statistics and Applied Probability, and will be financially supported by the Institute of Data Science. A PhD in statistics or a related field is required. The applicants should have demonstrated potential for excellence in research in data science, teaching and service. The shortlisting of candidates will begin in December 2017.

Applicants should send an application letter, a CV, a research statement and a teaching statement and arrange for at least THREE reference letters to be sent directly to the Department. Applications should be mailed by post or via e-mail to:

> *Search Committee on Data Science*
> *Department of Statistics & Applied Probability*
> *National University of Singapore*
> *6 Science Drive 2*
> *Singapore 117546*
> E-mail: stasec@nus.edu.sg

NUS offers internationally competitive remuneration, generous research support and funding, relocation assistance and other benefits. The Department of Statistics & Applied Probability has close to 30 faculty. We provide a stimulating environment for our faculty to develop professionally. For more information about the University, Department and Terms of Service, please visit our websites:
University: http://www.nus.edu.sg/
Department of Statistics & Applied Probability:
http://www.stat.nus.edu.sg/
Institute of Data Science: http://ids.nus.edu.sg/index.html

New Zealand: Wellington

The School of Mathematics and Statistics

Lecturer in Mathematics
https://jobs.imstat.org/c/job.cfm?jb=36510699

Taiwan: Taipei

Institute of Statistical Science, Academia Sinica

Regular Research Positions
https://jobs.imstat.org/c/job.cfm?jb=36872809

United States: Tempe, AZ

Arizona State University

Assistant Professor - Statistics
https://jobs.imstat.org/c/job.cfm?jb=37083350

United States: Berkeley, CA

UC Berkeley

Assistant Professor
https://jobs.imstat.org/c/job.cfm?jb=36811825

United States: Berkeley, CA

UC Berkeley

Visiting Assistant Professor
https://jobs.imstat.org/c/job.cfm?jb=36708773

United States: Davis, CA

University of California, Davis, Department of Statistics

Assistant Professor Tenure-Track
https://jobs.imstat.org/c/job.cfm?jb=35783972

United States: Fullerton, CA

CSUF, Math Dept

Tenure Track Statistics Position
https://jobs.imstat.org/c/job.cfm?jb=37151369

United States: Hayward, CA

California State University, East Bay

Assistant Professor of Statistics & Biostatistics (Data Science)
https://jobs.imstat.org/c/job.cfm?jb=36083040

United States: Pasadena, CA

Caltech

Tenure-track Faculty Position
https://jobs.imstat.org/c/job.cfm?jb=37151512

United States: San Diego, CA

University of California San Diego

Tenure-Track and Tenured Faculty - Department of Mathematics
https://jobs.imstat.org/c/job.cfm?jb=36827561

United States: San Francisco, CA

San Francisco State University

Tenure-Track Assistant or Associate Professor Position in Statistics
https://jobs.imstat.org/c/job.cfm?jb=36949148

United States: Stanford, CA

Stanford University, Statistics Department

Associate or Full Professor in Statistics and Probability

https://jobs.imstat.org/c/job.cfm?jb=36858848

United States: Stanford, CA

Stanford University, Department of Statistics

Assistant Professor in Statistics or Probability

https://jobs.imstat.org/c/job.cfm?jb=36858837

United States: Stanford, CA

Stanford University

Faculty Search in Statistical and Computational Neuroscience (all-levels)

https://jobs.imstat.org/c/job.cfm?jb=36938031

United States: Durham, NC

samsi
NSF•Duke•NCSU•UNC

The Statistical and Applied Mathematical Sciences Institute (SAMSI) is soliciting applications from statistical and mathematical scientists for up to 6 postdoctoral positions for the SAMSI Research Programs for 2018-2019: **Program on Statistical, Mathematical, and Computational Methods for Precision Medicine (PMED)** and **Program on Model Uncertainty: Mathematical and Statistical (MUMS)**. Appointments will begin in **August** 2018 and will typically be for two years, although they can also be arranged for one year. Appointments are made jointly between SAMSI and one of its partner universities, where teaching opportunities may be available. The positions offer extremely competitive salaries, travel stipend, and health insurance benefits.

Criteria for selection of SAMSI Postdoctoral Fellows include demonstrated research ability in statistical and/or applied mathematical sciences, excellent computational skills and the ability to communicate both verbally and in written form. Finally, the preferred applicant will have a strong interest in the SAMSI program areas offered. The deadline for full consideration is **December 1, 2017**, although later applications will be considered as resources permit.

Please specify which of the two SAMSI research programs you are applying for in your cover letter and why you believe you would be a good fit for SAMSI and the program you choose.
To apply, go to mathjobs.org: **SAMSIPD2018 Job #10496**

To see these programs visit:
www.samsi.info/pmed or **www.samsi.info/mums**
** SAMSI is an Affirmative Action/Equal Opportunity employer **

United States: Ames, IA

Iowa State University

Assistant Professor

https://jobs.imstat.org/c/job.cfm?jb=37036291

United States: Ames, IA

Iowa State University

Assistant, Associate, or Full Professor in Forensic Statistics

https://jobs.imstat.org/c/job.cfm?jb=37139949

United States: Athens, GA

University of Georgia

Tenure-track assistant professorship in statistics, Department of Statistics, University of Georgia, starting August 2018. Requires Ph.D. in Statistics or a closely related discipline by August 1, 2018, and a strong commitment to teaching and research in statistics. For details, see http://www.stat.uga.edu .

　To apply, use http://facultyjobs.uga.edu/postings/2745 Applications received by November 26, 2017, will be assured consideration. The University of Georgia is an Equal Opportunity/ Affirmative Action employer. All qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, disability, gender identity, sexual orientation or protected veteran status.

United States: Iowa City, IA

University of Iowa

Assistant Professor of Statistics

https://jobs.imstat.org/c/job.cfm?jb=36632238

United States: Champaign, IL

University of Illinois at Urbana-Champaign

College of Liberal Arts and Sciences: Open Rank Faculty in Statistics & Data Science, Department of Statistics

https://jobs.imstat.org/c/job.cfm?jb=36558789

United States: Chicago, IL

The University of Chicago Booth School of Business

Assistant/Associate Professor of Econometrics & Statistics

https://jobs.imstat.org/c/job.cfm?jb=37035862

United States: Urbana, IL

University of Illinois at Urbana-Champaign

Tenured/Tenure-Track Position in Actuarial Science & Statistics

https://jobs.imstat.org/c/job.cfm?jb=37165332

United States: Bloomington, IN

Indiana University

Assistant Professor of Statistics

https://jobs.imstat.org/c/job.cfm?jb=37036228

United States: Wichita, KS

Wichita State University, Department of Mathematics, Statistics, and Physics

Assistant Professor of Statistics

https://jobs.imstat.org/c/job.cfm?jb=37049666

United States: Amherst, MA

Amherst College, Department of Mathematics and Statistics

Statistics Tenure Track

https://jobs.imstat.org/c/job.cfm?jb=36876077

United States: Cambridge, MA

Harvard University - Statistics

Tenure Track Professor

https://jobs.imstat.org/c/job.cfm?jb=37151611

United States: College Park, MD

University of Maryland, College Park, The Department of Epidemiology and Biostatistics

Assistant Professor (Tenure Track) in Biostatistics

https://jobs.imstat.org/c/job.cfm?jb=36764687

United States: Minneapolis, MN

University of Minnesota, School of Statistics

Tenure-track Assistant Professor

https://jobs.imstat.org/c/job.cfm?jb=36748331

United States: Chapel Hill, NC

The University of North Carolina at Chapel Hill

Assistant Professorship in Statistics

https://jobs.imstat.org/c/job.cfm?jb=37150963

United States: Durham, NC

Duke University

Tenure Track Assistant Professor

https://jobs.imstat.org/c/job.cfm?jb=36961983

United States: Durham, NC

Duke University

Professor of the Practice, Open-Rank

https://jobs.imstat.org/c/job.cfm?jb=36961966

United States: Durham, NC

Fuqua School of Business, Duke University

Tenure Track Faculty Position in Decision Sciences

https://jobs.imstat.org/c/job.cfm?jb=35757055

United States: Greensboro, NC

University of North Carolina at Greensboro, Department of Mathematics and Statistics

Tenure-track Assistant Professor in Statistics with Specialization in High-dimensional Data Analysis

https://jobs.imstat.org/c/job.cfm?jb=37165266

United States: Omaha, NE

University of Nebraska Medical Center

Chair of the Department of Biostatistics

https://jobs.imstat.org/c/job.cfm?jb=36978928

United States: Princeton, NJ

PRINCETON UNIVERSITY

Assistant Professor

https://jobs.imstat.org/c/job.cfm?jb=37250882

United States: Princeton, NJ

PRINCETON UNIVERSITY

Associate or Full Professor

https://jobs.imstat.org/c/job.cfm?jb=37250863

United States: Ithaca, NY

Cornell University

Tenured/Tenure-track Faculty Positions

https://jobs.imstat.org/c/job.cfm?jb=36979219

United States: Philadelphia, PA

Wharton Department of Statistics, University of Pennsylvania

Tenure-track Assistant Professor

The Department of Statistics of the Wharton School, University of Pennsylvania, is seeking applicants for a full-time, tenure-track Assistant Professor position. Applicants must show outstanding capacity and achievement in research, as well as excellent teaching and communication skills. Applicants must have a Ph.D. (expected completion by June 30, 2019 is acceptable) from an accredited institution. The appointment is expected to begin July 1, 2018.

Please visit our website, https://statistics.wharton.upenn.edu/recruiting/facultypositions, for a description of the department and a link to submit a CV and other relevant materials. Any questions can be sent to statistics.recruit@wharton.upenn.edu.

The University of Pennsylvania is an EOE. Minorities / Women / Individuals with disabilities / Protected Veterans are encouraged to apply.

Tenured/Tenure-track Faculty Positions

Cornell University's School of Operations Research and Information Engineering (ORIE) seeks to fill multiple tenured/tenure-track faculty positions for its Ithaca campus. We will primarily consider applicants with research interests in the areas of integer programming and financial engineering, though we welcome strong applicants from all research areas represented within ORIE, especially those in resonance with the College of Engineering Strategic Areas: **www.engineering.cornell.edu/research/strategic**.

Requisite is a strong interest in the broad mission of the School, exceptional potential for leadership in research and education, an ability and willingness to teach at all levels of the program, and a Ph.D. in operations research, mathematics, statistics, or a related field by the start of the appointment. Salary will be appropriate to qualifications and engineering school norms.

Cornell ORIE is a diverse group of high-quality researchers and educators interested in probability, optimization, statistics, simulation, and a wide array of applications such as e-commerce, supply chains, scheduling, manufacturing, transportation systems, health care, financial engineering, service systems, and network science. We value mathematical and technical depth and innovation, and experience with applications and practice. Ideal candidates will have correspondingly broad training and interests.

Please apply online at **https://academicjobsonline.org/ajo/jobs/9654** with a cover letter, CV, statements of teaching and research interests, sample publications, at least three reference letters and, for junior applicants, a Doctoral transcript. We strongly encourage applicants attending the INFORMS annual meeting to submit all application materials by October 15, 2017. All applications completed by November 15, 2017 will receive full consideration, but we urge candidates to submit all required material as soon as possible. We will accept applications until we fill the positions.

ORIE and the College of Engineering at Cornell embrace diversity and seek candidates who can contribute to a welcoming climate for students of all races and genders. Cornell University seeks to meet the needs of dual career couples, has a Dual Career program, and is a member of the Upstate New York Higher Education Recruitment Consortium to assist with dual career searches.

Visit **www.unyherc.org/home** to see positions available in higher education in the upstate New York area.
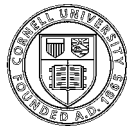
Diversity and Inclusion are a part of Cornell's heritage. We are a recognized employer and educator valuing AA/EEO, Protected Veterans, and Individuals with Disabilities. We strongly encourage qualified women and minority candidates to apply.

United States: Ithaca, NY
Cornell University
Faculty Position in Operations Research and Information Engineering (ORIE)
https://jobs.imstat.org/c/job.cfm?jb=37151448

United States: Brookings, SD
South Dakota State University
Assistant or Associate Professor of Statistics
https://jobs.imstat.org/c/job.cfm?jb=36114803

United States: College Station, TX
Texas A&M University (Dept of Statistics)
Faculty Positions Available
https://jobs.imstat.org/c/job.cfm?jb=36928441

United States: Salt Lake City, UT
University of Utah College of Science
Assistant/Associate/Full Professor
https://jobs.imstat.org/c/job.cfm?jb=30153601

United States: Norfolk, VA
Old Dominion University
Statistics - Two Tenure-Track Assistant Professors
https://jobs.imstat.org/c/job.cfm?jb=37243810

United States: Madison, WI
University of Wisconsin-Madison, Department of Statistics
Assistant Professor
https://jobs.imstat.org/c/job.cfm?jb=37024463

United States: Milwaukee, WI
University of Wisconsin-Milwaukee
Assistant/Associate Professor in Statistics
https://jobs.imstat.org/c/job.cfm?jb=37035747/

International Calendar of Statistical Events

IMS meetings are highlighted in maroon with the *ims* logo, and new or updated entries have the *NEW* or *UPDATED* symbol. Please submit your meeting details and any corrections to Elyse Gustafson: erg@imstat.org

October 2017

October 1–6: Fréjus, France. **High Dimensional Statistics, Theory and Practice w** http://ecas2017.sfds.asso.fr/

October 2–5: CRM, Montréal, Canada. **Dependence Modeling Tools for Risk Management w** http://www.crm.umontreal.ca/2017/Dependence17/index_e.php

October 4–6: Västerås, Stockholm, Sweden. **Stochastic Processes and Algebraic Structures: From Theory Towards Applications w** https://spas2017blog.wordpress.com/

October 11–13: Bethesda, MD, USA. **ASA Symposium on Statistical Inference w** http://ww2.amstat.org/meetings/ssi/2017/

October 12–14: Los Angeles, CA, USA. **Design and Analysis of Experiments (DAE 2017) Conference w** http://www.stat.ucla.edu/~hqxu/dae2017/

October 16–19: Fields Institute, Toronto, ON, Canada. **2017 Fields Medal Symposium: Martin Hairer w** http://www.fields.utoronto.ca/activities/17-18/fieldsmedalsym

October 18–19: Salt Lake City, UT, USA. **Modern Math Workshop w** https://icerm.brown.edu/mmw2017/

October 19–21: La Jolla, CA, USA. **2017 ASA Women in Statistics and Data Science Conference w** https://ww2.amstat.org/meetings/wsds/2017/index.cfm

October 23–27: Moscow, Russia. **Analytical and Computational Methods in Probability Theory and its Applications w** http://acmpt.ru/

Looking for a new position? Visit the jobs section on the IMS website, where you can:

* *View job opportunities in probability and statistics, including in academia and industry*
* *Post your resume/CV online*
* *Create personal Job Alerts so that you never let a matching job opportunity pass you by…*

http://jobs.imstat.org/

November 2017

November 2–3: Boston, MA, USA. **Program in Quantitative Genomics (PQG 2017) w** https://www.hsph.harvard.edu/2017-pqg-conference/

November 26–30: Kingscliff, NSW, Australia. **Biometrics by the Border w** http://biometric2017.org/

NEW November 28: Stanford, CA, USA. **Remembering Charles Stein: Scientist, Colleague, and Friend w** https://statistics.stanford.edu/stein-symposium

ims November 29–December 1: Göttingen, Germany. **Statistics Meets Friends: From Inverse Problems to Biophysics and Back NEW w** http://www.stochastik.math.uni-goettingen.de/smf2017/

December 2017

December 11–14: CRM, Montréal, Canada. **Risk Modeling, Management and Mitigation in Health Sciences w** http://www.crm.umontreal.ca/2017/Sante17/index_e.php

December 11–15: Manipal, India. **Linear Algebra and its Applications w** http://iclaa2017.com

December 16–19: Chennai, India. **Statistical Methods in Finance 2017 w** http://www.cmi.ac.in/~sourish/StatFin2017

January 2018

January 2–4: Kolkata, India. **PCM 125: International Conference in Statistics and Probability w** http://www.isid.ac.in/~pcm125spconf

January 8–12: Chulalongkorn University, Bangkok, Thailand. **2nd Bangkok Workshop on Discrete Geometry and Statistics w** http://thaihep.phys.sc.chula.ac.th/BKK2018DSCR/

January 17–19: NIMBioS at the University of Tennessee, Knoxville, TN, USA. **NIMBioS Investigative Workshop: Stoichiometric Ecotoxicology w** http://www.nimbios.org/workshops/WS_ecotox

January 22–24: Lunteren, The Netherlands. **17th Winter School on Mathematical Finance w** https://staff.fnwi.uva.nl/p.j.c.spreij/winterschool/winterschool.html

February 2018

February 5–16: National University of Singapore. **Meeting the Statistical Challenges in High Dimensional Data and Complex Networks**
w http://www2.ims.nus.edu.sg/Programs/018wstat/index.php

February 15–17: Portland, OR, USA. **Conference on Statistical Practice w** https://ww2.amstat.org/meetings/csp/2018/index.cfm

March 2018

NEW **March 2–3:** Athens, Greece. **ICQSBEI'18: 2nd International Conference on Quantitative, Social, Biomedical and Economic Issues with emphasis on New Technologies**
w http://icqsbei2018.weebly.com/

ims **March 25–28:** Atlanta, GA, USA. **ENAR Spring Meeting**
w http://www.enar.org/meetings/future.cfm

March 26–29: Barcelona, Spain. **Bayes Comp 2018**
w https://www.maths.nottingham.ac.uk/personal/tk/bayescomp/

April 2018

NEW **April 24–26:** Leiden, The Netherlands. **Survival Analysis for Junior Researchers 2018 (SAfJR2018) w** http://safjr2018.com

June 2018

NEW **June 3–6:** McGill University, Montreal, Québec, Canada. **Statistical Society of Canada 2018 Annual Meeting**
w https://ssc.ca/en/meetings/2018-annual-meeting

NEW *ims* **June 11–15:** Salerno, Italy. ISNPS2018: The 4th Conference of the International Society for Non-Parametric Statistics **w** http://www.isnps2018.it/

ims **June 11–15:** Gothenburg, Sweden. **40th Conference on Stochastic Processes and their Applications (SPA 2018)**
w http://spa2018.org/

ims **June 24–27:** Edmonton, Canada. WNAR/IMS Meeting
w http://www.wnar.org/Meetings

June 24–29: Edinburgh, UK. **ISBA 2018 World Meeting**
w https://bayesian.org/2018-world-meeting/

ims **June 26–29:** Singapore. **2018 IMS Asia Pacific Rim Meeting (IMS-APRM)**
NEW w https://ims-aprm2018.stat.nus.edu.sg/

July 2018

Vilnius, "baroque beauty of the Baltic" (says Lonely Planet) and capital of Lithuania, is the location of the 2018 IMS annual meeting (July 2–6, 2018).

Photo: Marcin Białek / Wikimedia Commons

ims **July 2–6:** Vilnius, Lithuania. **Joint 2018 IMS Annual Meeting and 12th International Vilnius Conference on Probability Theory and Mathematical Statistics**
NEW WEBSITE http://ims-vilnius2018.com/

July 2–6: St Andrews, UK. **Sixth International Statistical Ecology Conference w** http://www.isec2018.org

NEW **July 8–13:** Kyoto, Japan. **ICOTS10: Tenth International Conference on Teaching Statistics w** http://icots.info/icots/10/

July 16–20: Bristol, UK. 33rd International Workshop on Statistical Modelling **w** http://www.statmod.org/workshops.htm

ims **July 28 – August 2:** Vancouver, Canada. **JSM 2018**
w http://ww2.amstat.org/meetings/jsm/2018/

International Calendar *continued*

August 2018

August 1–9: Rio de Janeiro, Brazil. **International Congress of Mathematicians 2018 (ICM 2018) w** http://www.icm2018.org/

August 25–27: Shahrood, Iran. **ISC14: Fourteenth Iranian Statistics Conference w** http://isc14.shahroodut.ac.ir

August 26–30: Melbourne, Australia. **Joint International Society for Clinical Biostatistics and Australian Statistical Conference 2018 w** http://iscbasc2018.com/

September 2018

September 8–10: St Louis, Missouri, USA. **Third Workshop on Higher-Order Asymptotics and Post-Selection Inference (WHOA-PSI) w** http://www.math.wustl.edu/~kuffner/WHOA-PSI-3.html

March 2019

March 24–27: Philadelphia, PA, USA. **ENAR Spring Meeting w** http://www.enar.org/meetings/future.cfm

July 2019

July 8–12: Evanston, IL, USA. **41st Conference on Stochastic Processes and their Applications (SPA 2019) w** TBC

July 14–18: Leuven, Belgium. **40th Conference of the International Society for Clinical Biostatistics w** http://www.icsb.info

July 27–August 1: Denver, CO, USA. **IMS Annual Meeting at JSM 2019 w** http://www.amstat.org/ASA/Meetings/Joint-Statistical-Meetings.aspx

March 2020

March 22–25: Nashville, TN, USA. **ENAR Spring Meeting w** http://www.enar.org/meetings/future.cfm

July 2020

July 5–11: Portoroz, Slovenia. **8th European Congress of Mathematics. w** http://www.8ecm.si/

August 2020

August 1–6: Philadelphia, PA, USA. **JSM 2020 w** http://www.amstat.org/ASA/Meetings/Joint-Statistical-Meetings.aspx

August 17–21: Seoul, Korea. **Bernoulli/IMS World Congress on Probability and Statistics w** TBC

August 2021

August 7–12: Seattle, WA, USA. **IMS Annual Meeting at JSM 2021 w** http://www.amstat.org/ASA/Meetings/Joint-Statistical-Meetings.aspx

August 2022

July/August: Location TBC. **IMS Annual Meeting w** TBC

August 6–11: Washington DC, USA. **JSM 2022 w** http://www.amstat.org/ASA/Meetings/Joint-Statistical-Meetings.aspx

August 2023

August 5–10: Toronto, ON, Canada. **IMS Annual Meeting at JSM 2023 w** http://www.amstat.org/ASA/Meetings/Joint-Statistical-Meetings.aspx

Are we missing something? If you know of any statistics or probability meetings which aren't listed here, please let us know.
You can email the details to Elyse Gustafson at erg@imstat.org, or you can submit the details yourself at http://www.imstat.org/submit-meeting.html
We'll list them here in the Bulletin, and on the IMS website too, at www.imstat.org/meetings/

Membership and Subscription Information

Journals

The scientific journals of the Institute of Mathematical Statistics are *The Annals of Statistics*, *The Annals of Probability, The Annals of Applied Statistics*, *The Annals of Applied Probability*, and *Statistical Science*. The *IMS Bulletin* is the news organ of the Institute.

Individual Memberships

Each individual member receives the *IMS Bulletin* (print and/or electronic) and may elect to receive one or more of the five scientific journals. Members pay annual dues of $105. An additional $79 is added to the dues of members for each scientific journal selected ($49 for *Stat Sci*). **Reduced membership** dues are available to full-time students, new graduates, permanent residents of countries designated by the IMS Council, and retired members.

Individual and General Subscriptions

Subscriptions are available on a calendar-year basis. **Individual subscriptions** are for the personal use of the subscriber and must be in the name of, paid directly by, and mailed to an individual. Individual subscriptions for 2017 are available to *The Annals of Applied Probability* ($194), *The Annals of Applied Statistics* ($194), *The Annals of Probability* ($194), *The Annals of Statistics* ($194), *Statistical Science* ($164), and *IMS Bulletin* ($115). **General subscriptions** are for libraries, institutions, and any multiple-readership use. Institutional subscriptions for 2017 are available to *The Annals of Applied Probability*, *The Annals of Applied Statistics*, *The Annals of Probability*, and *The Annals of Statistics* (each title $490 online only / $522 print+online), *Statistical Science* ($280/$296), and *IMS Bulletin* ($123 print). Airmail rates for delivery outside North America are $140 per title.

IMS Bulletin

The *IMS Bulletin* publishes articles and news of interest to IMS members and to statisticians and probabilists in general, as well as details of IMS meetings and an international calendar of statistical events. Views and opinions in editorials and articles are not to be understood as official expressions of the Institute's policy unless so stated; publication does not necessarily imply endorsement in any way of the opinions expressed therein, and the *IMS Bulletin* and its publisher do not accept any responsibility for them. The *IMS Bulletin* is copyrighted and authors of individual articles may be asked to sign a copyright transfer to the IMS before publication.

The *IMS Bulletin* (ISSN 1544-1881) is published eight times per year in January/February, March, April/May, June/July, August, September, October/November and December, by the Institute of Mathematical Statistics, 3163 Somerset Dr, Cleveland, Ohio 44122, USA. Periodicals postage paid at Cleveland, Ohio, and at additional mailing offices. Postmaster: Send address changes to Institute of Mathematical Statistics, 9650 Rockville Pike, Suite L3503A, Bethesda, MD 20814-3998.

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Advertising job vacancies

A single 60-day online job posting costs just $295.00. We will also include the basic information about your job ad (position title, location, company name, job function and a link to the full ad) in the *IMS Bulletin* at no extra charge. See http://jobs.imstat.org

Advertising meetings, workshops and conferences

Meeting announcements in the *Bulletin* and on the IMS website at http://imstat.org/meetings/ are free. Send them to Elyse Gustafson; see http://www.imstat.org/program/prog_announce.htm

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Issue		Deadline	Online by	Mailed
1:	January/February	**December 1**	December 15	January 1
2:	March	**February 1**	February 15	March 1
3:	April/May	**March 15**	April 1	April 15
4:	June/July	**May 1**	May 15	June 1
5:	August	**July 1**	July 15	August 1
6:	September	**August 15**	September 1	September 15
7:	Oct/Nov	**September 15**	October 1	October 15
8:	December	**November 1**	November 15	December 1

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Articles