

Charmaine Dean Remarks on Teaching

Teaching Philosophy

Statistics is an interdisciplinary field; it draws from the strengths of many and contributes alike. My diverse collaborations of an applied nature provided the groundwork for the development of my teaching philosophy, which stresses a view of the discipline as a balance between statistical theory and applied science. The following are characteristics of my approach to teaching.

- An overflowing enthusiasm for the subject material.
- An ability to put the material considered in broader perspective, relating it not only to other parts of the course, but also to other courses and to problems that are typically encountered in statistical practice. For example, my opening lecture of every course describes the topics which will be studied during the term, inter-relating the course to other Statistics courses in the program, and highlighting interesting examples which give the students a broad picture of the types of analyses they will be able to perform at the end of the term. The first few minutes of every lecture are spent outlining the subject matter of the lecture, linking it with previous lectures, while the last few minutes are spent by having the students review what was studied. I try to give the students a sense of the importance of merging theoretical statistical expertise with an understanding of the scientific nature of the problem at hand. Since many of my research collaborations lie in the biostatistical arena, many of these problems are drawn from the medical field. In graduate courses, I generally invite statisticians, who work in the medical field in Vancouver and Victoria, to deliver seminars to my class on topics which relate to their work and to the material of the course. Our students have recently been directed to spending co-op terms working at hospitals and federal health organizations because of my contacts there.
- A real concern for the members of the class as students and as ‘human beings’. In addition to formal office hours, I keep unrestricted office hours, making myself available to students during regular working hours on weekdays; providing patient guidance to students who find the course material difficult to understand; discussing tricky concepts and Statistics in general with students who have an inherent interest in the subject; providing advice on academic matters, on career choices; and occasionally providing help with personal problems, even if that help is only a sympathetic ear. Often I arrive to class early enough to spend a few minutes in helping the students with their assignments, or just attempting to learn their names.
- Delivery of well-organized lectures. This is a fundamental aspect of good course delivery.
- Providing frequent feedback to students.
In this regard, I acknowledge the benefit of working with very good statistics graduate students as teaching assistants. I have encouraged them to help me identify key concepts which the students have not fully grasped, and they have always responded generously. I always mark midterm examinations (and final examinations) myself, and

occasionally grade one or two assignment questions during the term in order to better assess the students' learning and the clarity of the examinations.

- Variety in learning.

At my request, the department purchased a series of videos, the 'Against All Odds' series, which presents fundamental statistical concepts and methods supplemented by the use of computer graphics and photography. The videos generated much enthusiasm across campus which led to their purchase from the previous Mathematics and Statistics Department by Media Resources, in order to coordinate their use by other departments. I use these and other videos as well as computer demonstrations in class. There are several experiments which I routinely conduct in class in order to give the students 'hands-on' experience in design of experiments, collection of data and analysis. I have also invited students, who have participated in co-op terms as Statistical consultants, to give a brief talk on the type of work in which they were involved during their co-op term, when this work relates to the course content. Prompted by successful stories from colleagues on the assigning of 'team-work' to classes, I first experimented with this idea with a fourth-year class of size 40 several years ago and now routinely use it in certain fourth-year courses and in graduate courses. Part of the success of 'team-work' can be attributed to the fact that the students are generally mature. However, the process enhances my understanding of the approaches the students take in attempting to solve a problem; the students learn not just from me, but from each other and seem to enjoy the interaction. In graduate courses, the students are encouraged to read and comment on recent articles in the medical or statistical literature, and we devote class time to such discussions on a regular basis during the term.

- Taking Special Care with Mature Students.

I would like to add a few comments here on working with mature students. I have had the great pleasure of instructing in the Integrated Studies Program and working with mature students through this interaction. Usually these mature students are deathly afraid having to master *their view* of statistical techniques and bring to the class all the attendant psychological baggage and emotional upheavals supporting these fears. Watching a change in behaviour, understanding and attitude as discussions unfold on the importance of understanding basic concepts of information delivery in this era brings with it immense satisfaction. Simple examples drive home the importance of critical thinking, for example, where the same information is deliberately portrayed to support opposing sides of a case in turn, or where convincing evidence is brought forward to support a case then later shown to be shown to be completely at odds with the truth because of hidden confounding factors. The class focuses on concepts, on proper data collection schemes, on exploring data through graphics, on giving good presentations, on making careful inference and on being responsible for conclusions and messages sent to audiences about data collected. The students leave with a completely different view of the world of statistics and their knowledge impacts their everyday life in simple and important ways. They bring data from their place of employments to class and discuss how best to present results. They are far more careful readers of the newspaper and of reports of studies and bring articles to class which they wish to challenge or which they find confusing. Most of the examinations are take-home, open book and team projects. Importantly, I have had very good success with moving this group beyond studying for good grades to studying for the sake of learning and of being

responsible citizens. Admittedly this is easier to do with mature students; even so, the transformation which takes place right at the start of lectures brings an overwhelming sense of accomplishment. In turn, these students have taught me quite a bit about what makes a successful instructor of mature students, both in terms of the overall picture of interacting with them and small-scale details. In fact, in terms of such small-scale details, organizational charts for completion of the bi-weekly assignments and reading are critical for this group. Also important right at the outset is an introduction to how to study statistics and the difference between effective methods for studying statistics and those for courses which are based on reading large numbers of journal articles. In the first week of classes, I routinely include a guest lecture by an expert in education with whom I've had discussions on such differences. The first time I was asked to teach this course, I spent some considerable time itemizing at the outset all the challenges which would face me and the students and set about thinking of ways to overcome them. Discussions with instructors who had previous experience teaching in this program and with the administrators of this program also helped to brainstorm solutions to these challenges and to understand differences required for these learners including different classroom dynamics, anticipating potential physical difficulties, understanding which usual evaluation tools would be unfair for this audience, and building upon the wealth of experience these students bring with them.

What is most important in the instructional and learning environment is that an instructor has to be interested in teaching and carry an enthusiasm for what is to be learned. The instructor needs to understand the audience, what motivates them and what challenges they face. He or she needs to build upon the strengths of students, and note these strengths will not be nearly as homogeneous as one would like. The instructor must bring the students to a place where they can appreciate the material and the knowledge it will bring them, and then flow from that to an understanding of what tools and processes are required to learn the material. Sharing of values such as integrity, fairness, generosity, caring, are inescapable in such interactions and all of us need to remember what important role models we play in this regard.

Program and Course Development in Statistics & Actuarial Science

Courses Delivered

I have taught Statistics courses at all levels including the courses listed below. I construct at least one of the three parts of the Statistics Ph.D. comprehensive examinations regularly. I have given directed studies and reading courses at both the graduate and undergraduate levels.

STAT 203 Introduction to Statistics for the Social Sciences
STAT 280 Applied Probability Models
STAT 285 Intermediate Probability and Statistics
STAT 390 Reading Course in Probability
STAT 350 Linear Models in Applied Statistics
STAT 390 Selected Topics in Probability and Statistics
STAT 402 Generalized Linear and Nonlinear Models
STAT 450 Theoretical Statistics
STAT 602 Generalized Linear and Nonlinear Modeling
STAT 801 Mathematical Statistics
STAT 805 Non-parametric Statistics and Discrete Data Analysis
STAT 806 Lifetime Data Analysis
STAT 890 Biometrics
STAT 890 Longitudinal and Life-History Data Analysis
STAT 890 Spatial Statistics and Applications
STAT 894 Reading Course

New Course Development

1. STAT 350 Linear Models in Applied Statistics.
2. STAT 450 Theoretical statistics. A revision of this course was required with the introduction of STAT 350.
3. STAT 402 Generalized Linear Models.
4. STAT 806 Survival analysis. This discusses statistical methodology used in analyzing failure time data.
5. STAT 890 Biometrics.
6. STAT 890 Longitudinal and Life History Data Analysis
7. STAT 890 Spatial Statistics and Applications
8. Biostatistics, U of Calgary. I also developed a course in biostatistics for medical students in their final year of residency. This course was delivered at the medical faculty at the University of Calgary.

The special topics courses, Biometrics and Longitudinal and Life History Data Analysis, and the Survival Analysis course provide the basics of Biostatistics to the graduate students. This is an important field where many of our graduates gain employment. Students from the University of British Columbia take the course on medical statistics, Biometrics. A feature of that course is that statisticians working in the medical field in Vancouver are invited to discuss typical analyses and problems which they encounter, which relate to the course material. This has yielded a side benefit of co-op job offerings by these statisticians to our students (at St. Paul's Hospital, Children's Hospital) and also of offers of full-time employment to students (one from the University of British Columbia).

The special topics course, Spatial Statistics and Applications attracts students from the University of British Columbia and the University of Victoria as well as students from other departments at SFU including Resource and Environmental Management, Biological Sciences, Earth Sciences, Geography, and Kinesiology. The primary objective of the course is to consider basic techniques in analyzing and interpreting spatially dependent data. These include spatial point patterns, geostatistical data, and regular/irregular lattice data. Examples from ecology, forestry and epidemiology are used throughout the course. Both lectures and assignments provide opportunities for students from the various disciplines to interact and observe commonalities in their spatial analyses, and for the statistics students to observe the breadth of applications of the topic. The strong interest generated by those in the various environmental fields and in disease surveillance in British Columbia illustrates a clear need for a course on this topic as a regular offering, which the department will be developing. To provide student access with this material in the Pacific North-West, with Jim Zidek (UBC), Sylvia Esterby (UBC Okanagan) and Peter Guttorp (University of Washington), I have been experimenting with video-conference offering of a course on spatial statistics across our four campuses: University of Washington, UBC-Okanagan, UBC, and SFU. The first such course was offered in 2009. Although educational institutions are embracing the potential of technology to transform teaching, collaborative, interdisciplinary, inter-institutional and international courses that use this technology are still uncommon. There were challenges particularly with cross-border teaching and evaluation, with the technology used, and with engagement of students across campuses which will need careful consideration in subsequent offerings. I am spearheading an major extension of this to the development of a Pacific North-West Environmetrics certificate program which will be offered across these four campuses.

Program and New Course Development in Health Sciences

With assistance from Allan Davidson and David MacLean, I led the development of SFU's Population and Public Health Program, including the notice of intent, the development of the full proposal, the response to its external review and the final submission to Senate for approval. This included the development of 10 new courses at SFU. A description of the Master of Public Health program is available online at <http://www.fhs.sfu.ca/graduate-programs>

With assistance from Iraj Poureslami and David MacLean, I spearheaded the development of the notice of intent of the global health program and preliminary descriptions of the full program and course content. I organized a conference in spring 2005, the Global Health Forum (see <http://www.stat.sfu.ca/~dean/globalhealth>) to bring together key experts in

the area of global health to critique the first draft of the proposed program.

University Forum for Promoting Better Instruction

Invited Panelist for the Simon Fraser University Centre for University Teaching, Teacher and Student Film and Discussion Series. This discussion series aims to stimulate thought on better teaching practices.

Health Sciences Workshops on Teaching Resources

With assistance from the LIDC, I organized a series of workshops on teaching resources at SFU for the new Faculty of Health Sciences in September 2005.

Graduate Student Interactions

I take great personal interest and spend considerable time with my graduate students. I host weekly meetings with each student as well as team meetings where students discuss new work or journal articles of joint interest. All my graduated students have positions in academia or as statisticians and I continue to mentor them after they leave SFU. Students' work have appeared in high quality outlets and as soon as results are available, I sponsor their attendance at statistical meetings to disseminate such work. I also take students along to give seminar presentations at other universities. With my strong interest in applications, all of my graduate students have experience working in a team environment in the medical field or in forestry, an emerging area of interest for me. I provide rapid, constructive feedback, helping the students to see connections with other work and keep in touch with the broader picture beyond their expertise, in addition to detailed evaluation of their work and suggestions for new directions. I constantly evaluate and improve interactions with students. For example, recently, as students near completion, I have experimented with organization of team projects which blend their research skills and which have resulted in significant, interesting joint publications of members of my research team. This also has the side benefit of developing new areas of research for joint pursuit by these young researchers as they move into their new environments.