Strategic Assessment of Graduate Programs
Department of Statistics and Actuarial Science
September 3, 2009

1 Introduction and Mission Statement

The Department of Statistics and Actuarial Science has two graduate degree programs: an M.S.–PhD program in Statistics, and an M.S. program in Actuarial Science. The MS program in Actuarial Science is considered the preeminent program in the nation. The two MS programs are largely independent, though students on occasion earn a second M.S. degree in the other. Students wishing to pursue a PhD in Actuarial Science do so within a sub-track of the PhD in Statistics.

We share a common mission statement:

> To foster intellectual and professional growth in our students so that they will become leading actuarial and statistical scientists.

An implicit part of this mission is to work to attract students who have this potential. We have a long and proud history of such leadership among our graduates; their accomplishments range from becoming outstanding researchers, teachers, and writers, shapers of the Social Security system, presidents, officers, and founders of professional societies, CEOs of insurance companies, and excellent consultants and industrial statisticians.

2 Admission Processes and Criteria

2.1 Student Demand and Criteria for Selection

Student demand for graduate degrees in Statistics is high due to growth in the job market within government, industry and academia. The number of applicants to the UI Statistics graduate program hovered around 80 in the mid- to late 1990's. Since then, the number has increased, and we had 138 applicants for Fall of 2008. In the past few years, the ratio of MS applicants to PhD applicants has increased considerably, from 38/73 in 2004 to 90/48 in 2008. Applicants admitted to our Statistics program tend to be very strong; on average, they have quantitative GRE scores above 770 and V+Q scores around 1300; these are somewhat higher scores than those for mathematical sciences overall at Iowa, and much higher than the average for all UI programs. Even the verbal GRE scores are higher than those other cohorts. For international students, we require very high TOEFL scores for admission. Applications are also assessed based on recommendation letters and statements of purpose; these help identify candidates with good potential and creativity, and for international students also give further evidence of English proficiency. These qualitative assessments are particularly important for less typical applicants, such as domestic applicants and minority applicants.

Demand for education in Actuarial Science is very high as well due to high job market demand and excellent starting salaries. Each year, there are usually 80–100 applicants to our MS program in Actuarial Science. Applicants are comparably strong to those applying to the Statistics program. The main criterion for admission is whether the student has a sufficiently strong mathematical background, as evidenced by a very high GRE quantitative score, grades in mathematics courses, and other information.

2.2 Success in Enrollment

Overall, around 15% of those admitted to the Statistics program and about 40% of those admitted with financial support enroll in our program. This is consistent with results at many peer departments.

In Actuarial Science, where we rarely offer admission with financial support, around 40% of those admitted enroll in our program. The students enrolled are of very high quality as shown by their high success rate on the actuarial exams.

We have 75 students enrolled in our graduate programs. Almost equal numbers are male and female students (38 and 37); and we have almost equal numbers of Actuarial Science and Statistics majors (37 and 38). Most applicants, and enrolled students, are international; 49% of our students are from China, 27% are from the US, and 24% are from other countries. 47 students (63%) are supported in some way. These percentages are consistent with recent years' experience and with other graduate programs in our field. We have had only a small number of Hispanic and African-American applicants and have had some success in enrolling these applicants.

To increase the number of domestic applicants, we have targeted smaller liberal arts colleges in the region in our recruiting efforts. These efforts have not been very successful and we are exploring other possibilities for increasing diversity in our applicant pool. In partnership with Mathematics and other departments, we are fully participating in the organization of the StatFest/Field of Dreams conference to be held in Iowa City in September 2009. This is a national effort to attract minority students to careers in quantitative sciences, and having the conference here provides an opportunity to try to recruit some more minority students to our programs.

3 Program Outcomes

3.1 Placements of Graduates

We maintain a list of our alumni and their current positions at `http://www.stat.uiowa.edu/people/alumni.html`. Our Statistics MS students take positions within the financial, marketing, health, and insurance industries; or proceed into PhD programs at Iowa and elsewhere. For Actuarial Science MS graduates, placements are with insurance companies and actuarial consulting firms. Students from both M.S. programs generally have no problem finding a good position. PhD graduates have done very well; of the 18 Ph.Ds graduated in the past few years (2006–2009), 11 originally took tenure-track positions (Manitoba, Oakland University, Soongsil University [Korea], University of Rochester, Medical College of Wisconsin, East Carolina, Chinese University of Hong Kong, Miami, Western Illinois, Northwestern); 5 went into consulting or research positions (Merck (2), Electrical Geodesics, Mayo Clinic, Becton Dickinson); and 2 took post doctoral or visiting positions. Three of the tenure-track placements have been from the actuarial sub-track of our PhD program. Academic actuaries are a very rare commodity, and so we have filled some important needs in the future of actuarial education.

4 Program Characteristics and Challenges

No recent reliable rankings are available for our programs. The NRC assessment is not yet out, the *US News and World Report* mixes us in with Mathematics (they will rank Statistics separately next year), and it is often hard to determine whether the rankings include or

exclude Statistics or Actuarial Science, Biostatistics, Educational Measurement, etc. The very old NRC ratings have us ranked 20th to 25th among Statistics programs at public universities; and we are generally regarded as the top Actuarial Science program in the US.

By absolute standards, our programs rate quite highly with regard to admissions standards, as well as high rates of success in placing our graduates in good positions in academia and industry. We also have the ability to financially support all qualified PhD students either through teaching assistantships or grant funding. And we have a strong faculty with broad research interests, willing to work closely with students.

At the other end of the spectrum, we suffer some from relatively low student counts relative to where we would like to be—especially of US students, minority or otherwise, in the Statistics programs. We have a higher-than-desirable average time to PhD (at 6.6 years). While we are past the worst slump in numbers of good applicants that we suffered a decade ago, we have a ways to go. Ideally, our graduate-student counts in the Statistics programs, should be 50% to 100% higher. This would make it possible to populate our core PhD sequence courses sufficiently that they can be taught every year, rather than alternate years. As a result of every-other-year courses, our PhD students often do not begin on research until after their third year, which delays their graduation and puts them at a disadvantage with respect to their peers at other institutions, hence our high average time to PhD.

To help ameliorate these problems, we are studying the possibility of a BS-MS program in Statistics. Noting recent increases in undergraduate majors, there is hope of expanding our graduate population through such a program, and retaining the top students who will be well-prepared to proceed into the PhD program and complete it in good time. This would also help increase our proportion of US students. Our participation in Statfest/Field of Dreams will also potentially increase our student counts and our minority representation. Finally, we are currently considering changes to our advising system so that students receive more individual mentoring at an earlier point in their program.

Turning to issues of particular concern for our Actuarial program, one is that our PhD program in Actuarial Science is a sub-track of the Statistics Ph.D. An official PhD program in Actuarial Science would attract one to two additional high quality students a year, and these students would have excellent employment opportunities in universities, insurance firms, and investment banks. A formal PhD program is however difficult to maintain with current faculty levels and the demands of the MS and undergraduate programs. Because of the small number of actuarial faculty, our courses contain both undergraduate and graduate students. The courses are often quite large for the level and material and sometimes do not serve either group as well as they could.

5 Conclusion/Summary

The Statistics MS and PhD programs are highly regarded and produce very strong graduates for a vibrant job market. Our MS program in Actuarial Science is also very strong and is considered by many to be the best in the nation. Our Statistics programs would benefit most by increasing student numbers, especially US students including minorities; and our Actuarial Science program would benefit by instituting its own PhD program.

While all previous discussion has focused on what we can do to improve our pro-

grams, we cannot conclude without mentioning that substantial improvement along these lines will require additional faculty. We have a number of phased retirements and near-future retirements of key faculty in both Statistics and Actuarial Science. Gaining more students so that we can meet the important objective of offering core sequences every year and populating those courses, will mean that we need faculty to teach those courses.