

**Program Review, 2007**  
**Department of Statistics**  
**(B.S., M.S., Ph.D., CIP 270501)**

**1. Mission, Centrality, Uniqueness**

The mission of statistics at Kansas State University is to continue the department's 48 year tradition of excellence by

- Training and educating future generations of statisticians through its highly recognized B.S., M.S. and Ph.D. programs;
- Communicating statistics and statistical thought through quality education in graduate and undergraduate service courses;
- Pursuing theoretical and applied research driven by novel data types that arise in a variety of scientific contexts;
- Contributing to Kansas State research in science, engineering and the social sciences through active collaboration.

The reputation of the K-State Department of Statistics and Statistical Laboratory has historically been built on the relationships and collaborations established with agricultural scientists. The problems solved by K-State statisticians in these applied areas have contributed to the strong body of literature in classical linear models and experimental design. During the last 20 years, Kansas State statistics has branched out to collaborative efforts in a much wider sphere, including computer science, psychology, sociology, economics, education, mathematics, textiles, and genetics. In addition to collaborating and consulting with researchers in the College of Agriculture and KSRE, statisticians within the department consult and/or collaborate with scientists and researchers in the Colleges of Arts & Sciences, Engineering, Veterinary Medicine, Business, and Human Ecology. The quality of research undertaken at Kansas State is greatly influenced by the existence of the Department of Statistics and the willingness of the faculty and students to work with and consult with researchers from across the university.

While other Kansas universities offer degrees in mathematics that have an emphasis on statistics, we are the only full department of statistics in the state of Kansas. Further, our degree programs tend to put significantly more emphasis on the applied aspects of statistics than the other universities in the region. K-State's department has a well-deserved reputation for training capable applied statisticians.

**2. Degree Programs, Quality of Faculty**

The department offers bachelors, masters and doctoral degrees in statistics. Although the B.S. program is small, averaging three graduates per year over the last few years, the department devotes no resources exclusively to this program; there is not a single course taught exclusively or primarily for undergraduate majors. This situation, moreover, is not uncommon among research universities, as many places see statistics as primarily a graduate discipline. Nevertheless, the students who do finish B.S. degrees are well prepared for work or graduate study; 25 of the required hours for the degree are in courses numbered 500-799.

The department has healthy programs at both the masters and doctoral levels. The degree requirements include a significant number of applied courses as well as mandatory consulting experience. The department is nationally and internationally known for its ability to train students at the M.S. and Ph.D. level who will become outstanding applied statisticians with strong consulting and communication skills. The program has strong components in both applied and theoretical courses, but the theoretical courses are always taught with an eye toward the application of that theory to real-world problems. Graduates from the department are known for their ability to "hit the ground running" in their first employment situations.

The Department of Statistics and the Statistical Laboratory presently has 12.5 tenure-earning lines. The faculty are all actively engaged in research and have won numerous awards; four current or recently retired faculty have been honored by being named a Fellow of the American Statistical Association; two have been given prestigious Founders Awards by the American Statistical Association; five have served on editorial boards of major journals in the last five years. The last two years, however, have created major changes. There have been retirements of three very senior (more than 30 years of service each) faculty, the departure of the department's strongest young faculty member for another university, and the death of a strong mid-career member of the faculty. The past year required a vigorous hiring program and the results indicate that we have been quite successful at replacing a good bit of the talent lost, although we are considerably younger than we have been.

### **3. Quality of Students**

Statistics is not well known as a discipline among high school students, and as a consequence, a great majority of our undergraduate majors are students who change majors or add statistics as a second major after arriving at Kansas State. To convince students to try statistics as a study area requires continual promotion of the field by instructors in the service courses and a strong advising component for those who are considering such a move. The quality of our incoming M.S. degree-seeking students is reasonable, but not exceptionally high. All universities that offer graduate degree programs in statistics compete with one another for the same small pool of the very best students. The pool of American students from which all U.S. universities recruit is actually smaller than the requirements of the job market, so the department finds itself in a very competitive situation with respect to attracting students. Hence, we accept nearly every nominally qualified American student who applies.

A similar situation applies to the students in the doctoral program. The department strives vigorously to recruit Ph.D. candidates, but the number of American students who are interested in and capable of doing doctoral level work is quite limited. We do attract a group of international students with strong preparation and at the current time the program has more than 50% international students. The end result has been that the quality of our students over the last few years, as well as those currently in the program, has been highly variable. We have educated some outstanding graduates who will clearly make their mark in the world, but we have also dealt with some of quite marginal quality.

### **4. Employer Demand**

B.S. graduates seeking immediate employment are able to find jobs. However, our experience has been that the majority of our graduates go on to graduate school. Recent graduates have gone on to graduate school at such institutions as the University of Washington, Penn State, Texas A&M, and the University of South Carolina.

There is a very high demand for students with M.S. degrees in statistics. From July 2003 through June 2006, 36 students earned M.S. degrees. Of those, 9 went directly on to graduate school at Kansas State or other institutions. The remainder were heavily recruited and nearly all found jobs that value them for their ability to solve problems and quickly contribute to their employers' work efforts. Salary offers for qualified M.S. students continue to be quite competitive as well.

The job market for Ph.D. statisticians remains very strong in both industry and academia at the present time, and the forecast is that there will continue to be growth and demand for those who wish to make statistical careers in academia, federal, state, and local government agencies, nonprofit organizations, and a diverse group of industries. In the four year period from July of 2002 to June of 2006, 13 students have been awarded the Ph.D. degree by the department. None had any problem finding suitable employment, and at this time 8 are working in academia, 4 in industry, and one for the federal government.

### **5. Service to the University and Society at Large**

The department's commitment to high quality undergraduate education has been consistent since the department was created more than 45 years ago. The department offers service courses to undergraduate majors in many disciplines including the agricultural sciences, the biological sciences, the social sciences, engineering, business, and education. The department also offers graduate level service courses to M.S. and Ph.D. students in many of these same disciplines.

Statisticians at Kansas State University have been dedicated to the development, understanding, abstraction and communication of statistical principles for data analysis to Kansas State students and researchers for nearly 60 years. Statistics has been called the "quintessential inter-disciplinary science" because statisticians enthusiastically reach out to all areas of science, engineering and education in the pursuit of interesting and important problems. The consultations and collaborations that faculty have been involved with have impacted nearly every academic area in a positive way.

### **6. Cost Effectiveness**

The Department of Statistics has always spent much more of its efforts teaching non-majors than majors. Although semester credit hours are not a particularly accurate measure of "effort", it can be reported that in the fall of 2006, the department generated 10,640 undergraduate credits, and 2,483 graduate credits, and of these, fewer than 50 of the undergraduate credits and only approximately 400 of the graduate credits were taken by students majoring in statistics.