Strategic Assessment: Management Sciences Department

Management Science is an inherently interdisciplinary field of study that focuses on the use of analytical methods to arrive at rational decisions. The Management Sciences Department at the University of Iowa implements this focus by combining three related fields of study: Quantitative Methods (QM), the investigation of new techniques for mathematical optimization; Operations Management (OM), the application of mathematical and computational methods to business problems such as supply chain management and transportation planning; and Information Systems (IS), the development and application of computational methods such as database analysis, data mining and information retrieval.

Mission

The mission of the PhD program in Management Sciences is to educate the next generation of scholars and professionals. In our program, students are prepared to solve increasingly complex, large-scale decision problems across the spectrum of traditional business functions. This preparation requires a unique skill set that combines applied mathematics, computation, and decision modeling, implemented through a rigorous curriculum covering each of the three areas, along with courses from other business departments. The depth of knowledge required to perform cutting-edge research is achieved through a focus on close collaborative work with one or more faculty advisors, beginning early in the program. As a result of this mix of conceptual knowledge with practical experience, successful students are qualified for both academic and industrial positions.

Admission Process and Criteria

The admissions process has been streamlined in recent years to allow earlier decisions. Applications are accepted only for the fall semester, with a deadline of February 1. Each application is reviewed by three faculty in the relevant functional area. The criteria for admission are flexible, allowing a focus on the potential for high-quality research. In general, we look for strong standardized test scores (GRE preferred but GMAT also accepted), high GPA in a technical field (typically math, computer science, or engineering), and evidence of prior research work. The addition of the spoken component of the internet-based TOEFL has allowed us to incorporate stricter criteria for the English skills of international applicants. It is likely that this has reduced the number of applicants, which is currently around 15-20 for each of the functional areas of OM and IS, and 2-3 for QM. A total of 3-5 applicants are typically admitted. Although our success in enrolling the top students has been inconsistent through the years, changes in both the funding structure (see below) and the applications process have led to recent successes. Specifically, we have increased the focus on personal contact early in the recruiting cycle, having faculty interact with the top applicants both to express our interest and to judge the qualifications and appropriate research fit for the student. As a result of these changes, in the current academic year, five of the six admitted students have matriculated to UI.

Like other fields in the computational and mathematical sciences, we have struggled (especially in recent years) to attract qualified female and minority applicants. Of the 23 students who have
started our program since 2003, four have been female; going back to 1999, the count is eight of 35. We are hopeful that our emphasis on personal contact in recruiting, particularly from female faculty members, will improve this disparity.

The financial commitments we make to our students have also been modified to aid in recruiting. New this year, all students are guaranteed full funding (tuition and 50% GA support) for the first year. Pending their qualification as a teaching assistant, the guarantee goes through year four. As a practical matter, most students take five years to complete the program, and students beyond year four are always supported at the same level if they continue to make satisfactory academic progress.

A variety of mechanisms are used to fund students in our program. The majority of our students are supported through TA positions, which include teaching responsibilities that help prepare them for academic careers. Through the Graduate College’s SIF program, we have implemented quarter-time fellowships for all first-year students, which reduce their teaching/grading requirements, allow an earlier start on their research agenda and improve our competitive position for the best students. The department funds a single, half-time RA position that is awarded competitively every semester. As several of our faculty have active federal, internal or private research funding, there are also a varying number of additional RA positions available. The department provides a summer research fellowship (financed using a combination of Graduate College and endowment funds) that is awarded to nearly all resident students to support their research progress through the summer. Finally, the departmental commitment to our doctoral students is evidenced by an increased amount of travel funding (now $500/year for beginning students and $1000/year for others).

Program Outcomes

The outcomes reported by the Task Force indicate some of the historical strengths and weaknesses of our program. The department has consistently achieved a median time-to-degree near five years, as we would hope for. All graduating students have been placed in either academic or corporate research positions, although the recent downturn in the IS academic market has reduced the quality of some of these placements. Our recent academic placements are: Lingnan University (Hong Kong), Le Moyne College, Chapman University, Christopher Newport University, and the University of Colorado-Denver. Our recent corporate placements include Northwest Airlines, ESRI, and Microsoft. Our students have also been reasonably successful in obtaining funding from the Graduate College, securing five Summer Fellowships and one Presidential Fellowship in recent years. One of our students (Justin Goodson) also received first place in the Social Sciences and Education division of the ninth annual James F. Jakobsen Conference. Our emphasis on student involvement in research results in a steady stream of accepted papers co-authored by students. The mean GPA and GRE scores of incoming students have shown steady improvement.

One clear area in which improvement is needed is our completion rate, reported at 26% for entering students from 1996-2000. Part of this poor performance can be explained by a single significant event: a faculty member who was supervising a disproportionate number of IS students left academia, and only one of his students was successful in finding a new advisor and completing the degree. We have implemented several measures to address the issue of our completion rate. In addition to the recruiting and funding changes mentioned earlier, we have made several modifications to the required curriculum, allowing more flexibility to meet the needs of our diverse student body without compromising rigor. Further, we have added a new milestone, the Preliminary Exam, in which second-year students present the results ofsome exploratory research in their field. The
intent of this exam is not to weed out weaker students, but rather to push students into research early in the program and introduce the skills necessary for academic success. The early results from these changes look extremely promising. In the past six years, of the 18 students we have admitted, three have completed their degrees (one in another program) and nine are still in progress (one in another program), with three on track to graduate next year. Looking back to 1999, the numbers are 29 admitted, 13 completed (two in other UI departments and one who followed their advisor to Stanford), and nine in progress.

Program Characteristics

The Management Sciences doctoral program is currently functioning at a level that both successfully prepares our students and supports the research of our faculty. Given the size of our faculty and the department’s teaching needs, the optimal size for our program is 10-14 students (currently 13). This number generally consists of one or two QM students (as dictated by the small number of qualified applicants), with the rest split between OM and IS. The currently disproportionate number of OM faculty (six research-active faculty, as compared to 2.25 in IS) indicates a need for more OM students (four of the five new students this year).

One challenge that we will continue to face is the lack of a natural student constituency from which to recruit. Few undergraduate students in math, CS, or engineering start out thinking about a PhD in business, and few business undergraduates are qualified to succeed in our program. Increasing our recruiting pool while maintaining student quality will require a further increase in our personal recruiting efforts.

Conclusions

Because of the unique skill set required and the focus on research collaboration with both industry and with other UI departments (including Computer Science, Industrial Engineering, Applied Mathematical and Computational Sciences, and Nursing), the Management Sciences PhD program plays a unique and vital role within the College of Business and the University of Iowa. We will continue to build on the success of our recent innovations to maintain a strong and improving program.