

Kansas State University
College of Arts and Sciences
Department of Mathematics
Programs: CIP 270101 – Mathematics
Review Period: 2002-2006

1. Centrality to the Mission and Role of Kansas State University

The Department of Mathematics plays a central role in the mission of Kansas State University, through its degree programs, its research, and service course work provided to all sectors of the Institution.

All three mathematics degree programs: bachelors, masters, and doctorate help to develop the highly skilled and educated work force necessary for the economic well being of the state of Kansas. In particular, the Ph.D. Program produces scientifically proficient graduates who function as part of the technology leadership needed to make the state and the nation economically competitive.

Mathematics, traditionally used in the sciences and engineering, is now employed in a fundamental way in almost every area. Few careers these days do not require sophisticated quantitative skills, and some of the most explosive areas of growth in mathematical applications have been in the social, biological and behavioral sciences. Today, even artists and musicians use mathematically based computer algorithms to enhance their scholarly work.

The Department has a pervasive presence in the curriculum of the University and this reflects the universal recognition that numeracy is a hallmark of the educated person, and that quantitative reasoning is required of all students regardless of their discipline.

2. Quality of the Program/Faculty

All faculty possess the terminal degree and teach both at the undergraduate and graduate levels. During the last five years, twelve of 27 faculty have obtained extramural support for their scholarly programs. Much of this support has come from the National Science Foundation and it is worth noting that mathematics funding from such national agencies is extremely competitive, far more so than in the sciences or engineering. During the last five years, the faculty have produced more than 300 articles in referred journals, and their work and that of their graduate students is an important part of the research programs of the National Science Foundation, the National Security Agency, and the Mathematical Science Research Institute at Berkeley, California.

Over the last five years, faculty in the Department have won numerous university teaching awards, and departmental GTAs have been winners of both the Stamey Graduate Student Teaching Award and the Presidential Award for Teaching Excellence.

3. Quality of the Program/Curriculum and Students

The Department's emphasis on team research through the *Center for the Integration of Undergraduate, Graduate, and Postdoctoral Research (I-Center)* is unique among Regents' Universities. The I-Center administers an NSF supported *Research Experience for Undergraduates*, which has a national reputation for excellence. The Graduate Program offers training in many specialties in pure and applied mathematics, some of which are unique in the region. Several indicators speak to the quality of undergraduate and graduate instruction in mathematics. In particular, it should be noted that departmental teams have been very successful in the national Putnam and Modeling Team competitions. Departmental students have been very successful in the Goldwater Scholarship Program, and undergraduate students are engaged in research programs at Argonne and Oakridge National Laboratories, the NASA Goddard Space Flight Center, and at

many universities, both in the United States and abroad. With respect to Goldwater Scholars, the Department's production record is better than most Universities in the Nation with all majors combined. Recent Kansas State mathematics B.S. degree graduates have been accepted to advanced degree programs at the most prestigious universities in the world, such as MIT and the University of Chicago. One recent Ph.D. graduate is a professor at Princeton University and another recently accepted a postdoctoral position at Yale.

The Ph.D. Program in Mathematics was initiated in the 1960s, and was for many years ranked by the American Mathematical Society as a group three program. However, the latest report in 1995 has elevated the Ph.D. Program to group two status – the only program in the state ranked this high. This ranking reflects the reputation of the faculty, their success in attracting grant support, the currency of the Ph.D. Program and the reputation of its graduates.

4. Student Need and Employer Demand

Mathematics is a central core discipline and at Kansas State four emphases are available for undergraduate majors: an actuarial mathematics emphasis for students wishing to become actuaries or seeking a career in the financial sector; an applied mathematics emphasis for students seeking a career in business, government or industry; a pre-graduate emphasis for students intending to enter graduate school; a mathematics education emphasis for students who intend to become secondary school mathematics teachers. The I-Center provides directed research experience for undergraduate majors as soon as possible and in an area of their choice.

The masters degree program prepares graduates for high school and community college mathematics teaching and for a variety of technical and administrative careers in industry and government.

The Ph.D program is designed to educate mathematicians who intend to make research or teaching at the University level their career.

These degree programs, each in its own way, serve the need of the state and the nation for a work force with a high level of technical sophistication.

5. Service Provided to the Discipline, the University and Beyond

We have remarked elsewhere on the contributions of the faculty and students of the Mathematics Department to the discipline. The impact of the Mathematics Department and its programs on the University is substantial and fundamental. Every student at the University takes mathematics classes, and the Department has made its service obligations a very high priority. In particular, we note that the success rate for students enrolled in college algebra is far above the nation wide average, and this derives from the serious attention paid to these students and their needs by the Mathematics Department. Through the Department's *Center for Quantitative Education (Q-Center)*, studio courses are offered in college algebra in a technologically rich environment. The Q-Center also delivers on-line homework to students in various courses such as Trigonometry, Calculus, and Mathematics Education.

6. Cost Effectiveness

The Department of Mathematics production of student credit hours makes it a leading department on campus, and generates student credit hours per full time equivalent at a rate substantially in excess of the college average, for ranked faculty, for instructors, and for GTAs.

We note that student credit hour costs for the University are less than most mathematics programs offering Ph.D. Degrees, and in part, this is a reflection of a relatively small faculty (27.5) and extensive National Science Foundation support.