Graduate Program Review

2001-2008
Mathematics and Statistics Department
University of North Carolina
Wilmington

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Executive Summary

The graduate program was previously reviewed in the spring of 2002. That review was for the period 1994-2001. This report contains the findings of the previous review and reviews the program over the period 2001-2008.

In the fall semester of 1989, the Department of Mathematical Sciences accepted its first class in a program leading to the Master of Arts or Master of Science in mathematics. The two-year program is designed to prepare students for careers in business, industry, government or teaching, as well as for further study toward the Ph.D. degree. Since the program began the department has had over 110 graduates. About a third of them are teaching, mostly in community colleges; more than a third have gone into various non-academic positions, with titles such as director of computer services or statistician and several have entered Ph.D. programs – in the mathematical sciences.

The graduate faculty of the department has members with specialization in the areas of pure and applied mathematics, operational research, and statistics. Graduate faculty members are research active and qualified to direct thesis research at the master’s level. Their research qualifications are evident from the number of research publications, presentations, and grants. Presently, faculty members are not given credit for directing thesis.

From 2001-2008, 85 degree seeking students matriculated into the mathematics graduate program. Of the matriculated students 48% have been female, 23% have been international students, and 7% have been African-American. The average time of completion is less than 2.5 years. Presently, there are 25 degree-seeking students and one non-degree student enrolled.

The department is allocated twelve graduate teaching assistantships at the rate of $10,000 per academic year, with the expectation of further financial support of $1,200 during the summer between the first and second years. The department also is allotted four out-of-state tuition remissions. Most out-of-state students receive some out-of-state remission. Duties of the teaching assistants include 20 hours per week of tutoring and grading in elementary mathematics courses. Fifteen graduate students will hold full or
partial teaching assistantships in the department in spring, 2009, two are teaching part

time in the department and are supported with part-time monies, and four are supported

by having internships with local businesses. Of course, teaching assistantships, tuition

scholarships, and out-of-state tuition remission are extremely important to the success of

the graduate program in mathematics.

The graduate program complements the undergraduate mathematics/statistics

curriculum in several ways. The department offers several cross-listed courses that are
taught at a graduate level. These offerings enable undergraduate students to take
advanced courses in mathematics and statistics that enhance their undergraduate studies.
In addition, the graduate teaching assistants offer problem sessions, grade assignments
for undergraduate mathematics and statistics courses, and tutor in the University Learning
Center. The work of the teaching assistants enables undergraduates in all programs to
receive extra help with their study in mathematics and statistics.

We offer a five year bachelors/masters program in which qualified undergraduates

majoring in mathematics in our department may count up to four graduate mathematics

or statistics courses towards both their bachelors and masters degrees, thus, enabling
them to finish both degrees in five years. We also offer a graduate certificate in statistics.

In addition to offering degree-required courses to graduate students in mathematics,
the department also offers graduate courses supporting other graduate programs,
especially in education, marine sciences and biological sciences. Students in education
with emphasis in mathematics must take MAT 541-542, (Modern Algebra I and II), MAT
511-512, (Real Analysis), and an additional six or nine hours depending on which
program the student is in. The mathematical analysis courses and modeling courses are
elective courses for the master’s program in marine science. Statistics courses are taken
by students in many areas, particularly biology.

In summary, the graduate program in the Department of Mathematics and Statistics
is a viable program that produces graduates who are able to use their graduate training
upon completion of the program.
Section I. Department Characteristics

I.1 History

The Department of Mathematics at Wilmington College was established in 1947, beginning as a one-person junior college mathematics department. Mr. Adrian D. Hurst oversaw the development of the program that was by 1961-1962, a five-person Mathematics Department. The department provided service courses in mathematics for non-majors and started graduating mathematics majors in 1963-1964. By 1963-1964, the department had become the Department of Mathematics and Engineering with nine faculty members and Wilmington College became a four-year senior institution.

With the transition to a senior institution, a teacher certification program in secondary school mathematics along with other content areas was developed. Secondary education majors were required to complete major and minor requirements in two different fields. A major in mathematics consisted of at least 30 quarter hours of mathematics at the junior-senior level. This includes five hours of differential equations and modern algebra each, and 10 hours of advanced calculus. A minor in mathematics consisted of satisfying the standard introductory calculus sequence through multivariable calculus followed by one five-hour junior-senior course.

When UNCW became a part of the UNC system in 1969, the mathematics program went through major revision and curriculum development. At this time, computing and statistics became increasingly important components of the curriculum. According to the 1969-1970 catalog, the Mathematics and Engineering Department had 10 faculty members, two with doctorates. Ten years later the faculty had increased to 14 of whom 80 percent were doctorates.

In 1970-1971, the Mathematics and Engineering Department offered for the first time both a BA and BS degree in mathematics. From 1971-1973, the department offered courses designated either as mathematics, engineering, or computer communications. In 1973, the name of the department was changed to the Mathematics and Computer Science Department. In 1975, the Mathematics and Computer Science Department
changed its name to the Department of Mathematical Sciences and expanded its degree offerings to include a B.S. in computer science. The M.S. and M.A. programs were established in 1989, and the department began offering graduate classes in the fall semester of 1989. The departmental operation had become sufficiently complex to justify the amicable reorganization of the department into two new separate departments effective July 1, 1998: the Mathematics and Statistics Department and the Computer Science Department. Statistics continued to be of major interest in the department and in fall 2002, a BS degree in statistics was established and in fall 2005, a graduate certificate in statistics was offered by the department. A bachelors/masters five year degree program was approved by the graduate school and was offered by the department beginning in fall 2003. In this program, students may count four graduate courses for both their bachelor’s degree and their master’s degree to enable them to finish both degrees in five years. At the same time the department decided to reduce the hours required for the M.S. degree from 36 to 30 so that both the M.S. and the M.A. required the same number of hours. This had the effect of having the M.S. the degree of choice of almost all the students. Also, the faculty had difficulty defining a difference between the two degrees. Thus, the M.A. degree was discontinued on August 1, 2006.

In 2008-2009, the department has 29 full-time faculty members, including three lecturers and one visiting assistant professor. Of the full time faculty who are not lecturers or visitors, 16 are in mathematics, six are in statistics, and three are in mathematics education. The support staff includes two administrative associates and several undergraduate assistants. We currently offer B.A., B.S., and M.S. degrees in mathematics, a B.S. degree and a graduate certificate in statistics, and undergraduate minors in mathematics and statistics.

I.2 Mathematics and Statistics Department Mission Statement

The Department of Mathematics and Statistics is a diversified community of scholars dedicated to excellence in teaching, scholarship, research, and service in the disciplines of mathematics, statistics, and mathematics education.
The department is dedicated to the education of our students in the fields of mathematics and statistics and to the certification of teachers in secondary education. We support curricula that lead to undergraduate and graduate degrees in mathematics and certification for teaching mathematics in secondary schools. In addition, the department offers courses in mathematics and statistics that serve the needs of other degree programs of the University. To provide for the general education of all students, the department offers courses for students of varying backgrounds in levels of mastery in mathematics. The department strives for excellence in teaching in all of these activities.

The department is dedicated to scholarship and research in the mathematical sciences, and to active participation in the professional life of its disciplines. This is done through publications and professional meetings.

The department regularly sponsors special lectures and activities to enrich the academic life of the campus and the larger community. Department members share in the role of faculty governance through committee participation at all levels within the University.

The department will continue to serve as the primary regional resource for the mathematical sciences by providing a diverse, energetic, and highly qualified faculty with the instructional and research skills necessary to fulfill our mission.

**Section II. Findings of Previous Program Review and the Department’s Response**

The M.A and M.S. programs in mathematics were reviewed by an external committee composed of Professor Paul Duvall, University of North Carolina at Greensboro and Professor Li-Yeng Sung, University of South Carolina in March, 2002 for the seven-year period 1994-2001. In June of 2002, the department sent a memo to the Dean of the College of Arts and Sciences responding to the reviewers’ recommendations. The reviewers’ report and the departmental response are included in Appendix 1. Since the
2002 reviewers’ report and departmental response, the department has made changes in response to the recommendations in that report. Below is a list of the recommendations that were summarized in the departmental response, followed by the departmental change/response.

**Recommendations**

“Overall, the graduate program of the Department of Mathematics and Statistics is successful and should be continued.”

1. “In order to sustain and improve the graduate program, it is crucial that faculty members who direct master theses and projects be given some course release time or financial compensation for their work. The current teaching loads for these faculty members are too high. The Department should also give attention to increasing the number of faculty actively involved in supervising students.” The department has discussed this several times and, of course, agrees with the recommendation. However, given the pressure on the department to offer enough basic studies courses, as well as courses for our undergraduate majors and graduate students, we have not been able to implement the recommendation. There were 40 theses submitted during spring, 2001 through spring, 2008. They were supervised by 14 faculty members. Two professors directed six theses; one directed five, two directed four; two directed three; three directed two; and three directed one.

2. “The Department should continue its recruiting efforts to increase enrollment in the master’s program in order to reach a critical mass for a healthy and sustainable program. An increase in the number of teaching assistantships, together with increases in the amount of the assistantship stipend and in the number of tuition remissions, both in-state and out-of-state, will be necessary for achieving this goal.”
   a. The Graduate Coordinator has participated in the “TA Rush” at SE Regional MAA conferences, promptly responds to inquiries about our graduate program from prospective students, and writes emails to students who have begun their applications to encourage the students to complete them.
b. Despite requests from the Graduate Coordinator to the Dean of the Graduate School to increase the number of teaching assistantships and especially out-of-state tuition remissions, the number of teaching assistantships and the number of out-of-state tuition remissions have remained steady at 12 and 4, respectively. However, the stipend for a teaching assistantship has increased from $7,500.00 in 2002 to $10,000.00 in 2008.

c. We have increased the number of students that have financial support in other ways. Students who are qualified to teach their own courses are supported with part-time instructor funds instead of TA monies. Currently in fall, 2008, we have four graduate students supported with part-time instructor funds. Some students have been able to secure internships in local industries and no longer require TA support. The U.S. Coast Guard has a program in which officers may go full time to graduate school to earn a masters’ degree in operations research as part of their regular duty. Our graduate program has been approved by the Coast Guard as satisfying the conditions for their program. In 2006, we had two Coast Guard applicants who were planning on attending UNCW but received orders to the Iraq War. We are still in correspondence with one of them and he is planning on entering our program in 2010. We hope this will lead to other applicants from this Coast Guard program.


3. “The Department should continue to explore opportunities for interdisciplinary research. Some encouraging beginnings have been made in this direction with Chemistry and Marine Biology. Statistical consulting can generate additional opportunities and provide valuable experience for graduate students, and should be given more support in both space and equipment.” The department has continued participating in interdisciplinary research with other departments. We currently have had mathematics and statistics faculty collaborating with faculty in Biology, Marine Science, Computer Science, chemistry, and Physics. The department opened a statistical consulting center. The center has attracted faculty and graduate students from other departments and has led to several interdisciplinary research projects. Several of our graduate students have written their theses in statistics, many of them
interdisciplinary in nature. Also, many graduate students have obtained internships in statistics at local businesses.

4. “The Department should cultivate closer ties with local industries by capitalizing on the network of graduates working in the local area, both for recruiting purposes and for the placement of future graduates. Strengthening the course offerings in statistics should help in this direction. The development of internship programs with local industries would also help to make the program attractive to students in the region. Establishment of an advisory committee would help the Department with its efforts in this direction.” Quite a few of our graduates have been employed by local industries in statistics and several have had internships with local businesses while they are graduate students. For example, in fall 2008, four of our graduate students had internships. We also have had several part-time students from industry pursuing a masters’ degree in mathematics with an emphasis on statistics. In spring 2005, the department organized a seminar with leaders of local businesses that employ statisticians to better understand their needs and to publicize our certificate in statistics.

5. “The Department is encouraged to follow up on plans for an accelerated masters program. The demand for such a program is not immediately obvious, but the resource implications are minimal, and such a program could help to channel undergraduates from UNCW into the master’s programs.” Our five-year program, a combined bachelors and masters program which may be completed in five years by allowing dual credit for 12 hours of graduate course work was implemented in 2003. The number of students participating in the program by academic year is: 2003-2004:5, 2004-2005:3, 2005-2006:3, 2006-2007:3, 2007-2008: 2, 2008-2009:5.

6. “The Department should encourage graduate students and faculty to take advantage of the research opportunities offered by the universities in the nearby Research Triangle. For example, graduate students can participate in the Industrial Mathematics Modeling Workshop for Graduate Students at the North Carolina State University during the summer between their first and second year, and do follow-up theses or projects with the assistance of the faculty.” Several graduate students have taken advantage of research opportunities outside of UNCW.

   a. The course, MAT 473/573 Mathematical and Experimental Modeling of Physical Processes, was offered for three years (2002-2004) to UNCW students through two way
interactive video from NCSU. The main instructors for the course were Drs. H. T. Banks and H. T. Tran from NCSU, but responsibility for the grading was done locally by the faculty coordinator Dr. G. Lugo at UNCW. During the semester, students at UNCW were required to travel four times to NCSU to conduct experiments and collect data at the Center for Scientific Research located at the Centennial Campus. Students were required to submit four major research projects in modeling based on these experiments. The instructors from NCSU came to our campus twice during the semester and delivered the on-line lectures in one of our smart classrooms. The course provided the background necessary for one of our graduate students (Soni Parker) to develop the ideas for her master thesis.

b. Three graduate students attended week long workshops at the Statistical and Applied Mathematics Science Institute (SAMSI) in the Research Triangle. Five students attended two day workshops at SAMSI.

c. Four graduate students attended and presented papers at meetings of the Eastern North American Region of the Biometric Society (ENAR) held in Atlanta and Washington D.C. One student attended and presented a paper at the Joint Statistics meeting held in Seattle.

d. Groups of undergraduate and graduate students attended two SE regional MAA conferences in Charleston and Raleigh.

7. “Since National Science Foundation grants in mathematics have very limited support for students in terminal master’s programs, the Department should actively explore other education related external funding sources that support master’s programs. One possibility is the NSF’s CSEMS scholarship program.” Three students applied for and received the Jan Logan Lacky scholarship given annually by the graduate school. One student in our five year program applied to attend a Research Experience for Undergraduates but was not accepted. Another student applied for a Science, Mathematics, and Research for Transformation Grant from the Department of Defense and was an alternate, but did not receive the grant. We had one student receive a summer research scholarship offered by the graduate school.
Section III. Program Description

III. 1 Graduate Program Educational Objectives

The Mathematics and Statistics Department offers programs of study leading to the Master of Science degree in mathematics. The Master of Science program is designed to prepare students for careers in business, industry, or government as well as for further study in the mathematical sciences. Applications from the sciences, industry and management are stressed in course work from the areas of classical applied mathematics, operations research, and statistics.

The graduate program complements the undergraduate mathematics/statistics curriculum in several ways. The department offers several cross-listed courses that are taught at a graduate level. These offerings enable undergraduate students to take advanced courses in mathematics and statistics that enhance their undergraduate studies. In addition, the graduate teaching assistants offer problem sessions, grade assignments for undergraduate mathematics/statistics courses, and tutor in the University Learning Center. The work of the teaching assistants enables undergraduates in all programs to receive extra help with their study in mathematics and statistics.

In addition to offering courses supporting the M.S. degree in mathematics, the department also offers graduate courses supporting other graduate programs, especially in education, marine sciences and biological sciences. Graduate students in education with emphasis in mathematics must take 15 hours of graduate mathematics courses. The mathematical analysis courses and modeling courses are elective courses for the master’s program in marine science. Statistics courses are taken by students in many areas, particularly biology.

Strong evidence of the success of our program in training our students is the impressive list of professional jobs they received and further graduate education that they have pursued. In particular, the program in mathematics has strongly supported the community colleges and high schools in the coastal area. Since 2001, 21 of our graduates became college, community college or high school instructors in the southeast (for details, see the attached list). Fifteen of our graduates went on to Ph.D. programs and 16
obtained employment in business or industry. Even though it is quite difficult for international graduates without a permanent visa to obtain jobs, all of our foreign graduates who have looked for employment have been offered good jobs utilizing their graduate training. It should be noted that applied mathematicians with skills in computing, statistics, operations research, and modeling are sought after in business and industry. A bachelor’s level mathematics education generally does not contain sufficient depth in applying mathematics for the graduate to work independently. Thus, a master’s degree with an emphasis in applied mathematics is a solution. One of the strengths of our master’s program in mathematics is our emphasis on applications. Students have the option of concentrating in statistics, operations research, or physical applications. Many of our students’ theses topics require computing for mathematical modeling or algorithm testing.

III.2 Admission Requirements

Applications for admission may be made at any time. Applicants are required to complete their application online, normally by March 15 for fall admission and November 1 for spring admission. An application must include the following:

1. Official transcripts of all college work (undergraduate and graduate).
2. Official scores on the Graduate Record Examination (GRE) aptitude test. Scores more than five years old will not be accepted. In cases where the opportunity to take the GRE may be limited, (such as in certain foreign countries), the applicant may request a waiver or modification of this requirement. Such requests will be considered by the department on their individual merit.
3. Three recommendations from individuals in professionally relevant fields.
4. Each applicant also must:
   Have a strong overall academic record and have passed, with a “B” or better average, the following undergraduate mathematics courses or their equivalent: a standard introductory calculus sequence including multivariate calculus, a course in linear algebra, and at least 15 additional semester hours of mathematics or statistics courses beyond the level of calculus.
Admissions decisions are based upon examination of several factors, and where other indicators of success warrant, individuals who fall below the established criterion in one of the areas may be considered for admission. Such individuals may be required to take additional course work to remove deficiencies or required to demonstrate proficiency in certain areas.

To ensure that the mathematical prerequisites have been met, any student not enrolled in the mathematics degree program or the MAT mathematics track must obtain permission from the Department of Mathematics and Statistics. This must be done in order to register for any graduate course offered by the department.

III.3 Degree Requirements

The Master of Science degree requires a total of 30 semester hours. To fulfill part of these requirements each student must select one of the following plans:

(1) Thesis Plan

Each student must complete two semester hours of seminar MAT 595, (Research Seminar) and four semester hours of thesis MAT 599, (Thesis). Each student must present a thesis, acceptable to the student’s thesis committee, prior to graduation. The student will report orally on the thesis to a general audience during the final semester before graduation. The thesis defense will be followed by an oral examination on the student’s course work.

(2) Non-thesis Plan

Each student must complete two semester hours of seminar MAT 595, (Research Seminar) and a one semester hour research project MAT 596, (Research Project). The student must successfully complete a written comprehensive examination over the student’s core sequences administered when the student has finished his/her core sequences or during the semester the student plans to graduate.
**Course Requirements**

Each student must complete two required core sequences:

1. Either MAT 511-512 Real Analysis I, II (3-3)
   or MAT 518-519 Applied Analytical Methods I, II (3-3)
2. Either MAT 541-542 Modern Algebra I, II (3-3)
   or MAT 535 Linear Programming (3), and
   MAT 536 Discrete Optimization (3)

The remaining hours of course work are selected in consultation with an advisor, who will assist in selecting those courses best suited to the student’s goals and interests. A student may petition the committee of Graduate Advisors to include up to six hours of graduate courses from another department. This petition must address the relevance of this course work to the student’s academic goals and to a coherent program of study.

**Grades Required**

The following system is used to indicate performance of graduate students in their courses:

- **A** - Excellent
- **I** - Work Incomplete
- **B** - Completely Satisfactory
- **S** - Satisfactory progress on thesis
- **C** - Minimal Acceptable
- **U** - Unsatisfactory progress on thesis
- **F** - Failure
- **WP** - Withdraw Passing

A grade of A-, B+, B-, or C+ may also be given, instructor option.

Students must maintain a 3.0 "B" average to remain in good standing in the program. Students who fall below a 3.0 grade point average are placed on probation and have three subsequent courses to raise their GPA to 3.0 or they may be dismissed from the program. A student who receives any grade of "F" is ineligible to continue graduate study. In addition, a student who receives grades of "C" on three courses is ineligible for additional graduate study.

A grade of "I" is assigned if the instructor determines that exceptional circumstances justify providing additional time to complete course work. The instructor
may extend the deadline for any reasonable period not to exceed one year and shall inform the student of the deadline in writing. A copy of this notification is sent to the dean of the Graduate School. The incomplete grade will automatically become an "F" unless a grade change is submitted by the instructor to the Graduate School within 12 months. Grades of A, B, C, S, F, and WP are permanent grades which can be changed only by the dean of the Graduate School in cases of arithmetical or clerical errors or as a result of grade protest. A graduate student who is required to take undergraduate courses for any reason must earn a grade of "B" or better in order to maintain eligibility for graduate study. Credits received for undergraduate courses do not contribute to the 30 hours of required graduate coursework.

C. Transfer Credits and Residency Requirements

A minimum of 24 hours of graduate courses must be completed at UNCW including both coursework and thesis. A maximum of six semester hours of graduate credit may be transferred from another accredited institution. Grades earned on transfer work must be equivalent to a grade of "B" or better. A graduate student who wishes to obtain credit for courses taken elsewhere must obtain prior approval from both the department and the dean of the Graduate School.

D. Other Requirements

1. Faculty Advisor: The graduate coordinator acts as the student advisor during the first two semesters of residence. Normally, during the summer, when the student is taking the research seminar, the student selects a thesis director who also becomes his or her academic advisor. At least two additional faculty members are selected to serve on the student’s thesis committee.

2. Comprehensive Exam: Each student who selects the non-thesis option must successfully complete a comprehensive written examination.

3. Course of Study: Each student must complete an approved course of study within five years of the date of first registration for graduate study.
4. **Thesis:** Each student who chooses to write a thesis must present and defend his or her thesis, acceptable to the committee, prior to graduation. The thesis defense is open to the public.

**E. Bachelors/Masters Five Year Degree Program**

The Department of Mathematics and Statistics has a program that enables a student majoring in mathematics to receive a Bachelors and a Masters degree in a five year period. The key feature of the program is that a student can count up to 12 hours of graduate level courses satisfying requirements for the B.A. or B.S. toward the M.S. in Mathematics.

This program is designed for students in the B.A. or B.S. program in Mathematics at UNCW who have:

1. Completed a minimum of seventy-five (75) and a maximum of ninety-eight (98) credit hours in their undergraduate programs in mathematics, including credits earned from advanced placement if they start at UNCW or are transfer students and have completed a minimum of two semesters as a full-time student at UNCW, a minimum of 24 hours.

2. Completed a minimum of nine (9) hours of 300-400 level mathematics or statistics courses.

3. A minimum accumulated grade point average (GPA) of 3.0 and minimum grade point average (GPA) of 3.0 on all 300-400 level mathematics or statistics courses at UNCW.

Departmental permission to apply to the Bachelor’s/ Master’s degree program does not guarantee admission to the Graduate School. Admission is contingent on meeting eligibility requirements at the time of entering the graduate program.

**III.4 Undergraduate Program Profile**

The Department of Mathematics and Statistics offers three undergraduate degree programs (B.A. and B.S. in Mathematics and B.S. in Statistics). A student may choose to obtain Teacher Licensure in Mathematics with the B.A. degree in mathematics. In
addition, undergraduate students may also obtain a minor in either mathematics or statistics.

The undergraduate degree programs consist of a group of core courses (33 hours for the B.A. and 34 hours for the B.S. in Mathematics, and 27-29 hours for the B.S. in Statistics) that is followed by additional course work in the particular area of interest. An overall average of 2.00 or better is required for all 300-400 level mathematics and statistics courses counted toward the major. In addition, all degree programs require an oral communication competency course. A student must successfully complete MAT 346 or any other approved oral intensive course for the B.A. degree and MAT 495 for the B.S. degree in Mathematics to satisfy the oral communication competency requirement; for the B.S. Degree in Statistics, the student must complete STT 490 or 498. A student must complete MAT 161-162, 261, and 335; STT 215 and CSC 112 or 121 to satisfy the computer competency requirement for either degree in Mathematics; for the degree in Statistics the student must complete STT 305.

The minor in Mathematics requires 20 hours in mathematics and statistics. MAT 161-162 and at least 12 hours selected from mathematics courses numbered 261 or higher, or STT 315. These hours must include one of the following: MAT 261, 275 or 335. At least six hours must be from coursework at the 300 or 400 levels.

The minor in statistics requires 18 hours in statistics. It requires STT 215, STT 315, and at least twelve additional hours in statistics at the 300 or 400 levels.

The Teaching Licensure in Mathematics requires completion of the Teacher Education Program from the Watson School of Education and the completion of the B.A. degree requirements with the specification of certain courses that are needed for licensure in North Carolina.

The Department of Mathematics and Statistics offers a series of undergraduate courses, which are taken by non-majors as part of the Basic Studies Requirement of the University. These courses, mainly at the 100-level, are used to fulfill some of the requirements in Natural Science and Mathematical Sciences Category.
Section IV. Certification and Interdisciplinary Programs

The Department of Mathematics and Statistics proactively seeks and creates interdisciplinary opportunities for faculty and graduate students. Graduate programs in marine science, biology, nursing, psychology, chemistry, and education work closely with the mathematics and statistics department to enrich their programs.

IV.1 Applied Statistics Certificate Program

The department introduced a post-baccalaureate certificate in applied statistics in the fall of 2005. The certificate program was developed to provide advanced statistical training for graduate students at the University of North Carolina Wilmington and working professionals in the surrounding area. A total of 17 hours in approved course work is needed to complete the graduate certificate. Students are given flexibility to choose courses within the Department of Mathematics and Statistics or statistically rigorous courses outside the department. Dr. James Blum is the coordinator of the Applied Statistics Certificate Program. Information regarding admission to the certificate program is shown in Table 1.

Table 1. Admissions to the Applied Statistics Certificate Program

<table>
<thead>
<tr>
<th>Year</th>
<th>Admission</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005-2006</td>
<td>6</td>
</tr>
<tr>
<td>2006-2007</td>
<td>6</td>
</tr>
<tr>
<td>2007-2008</td>
<td>7</td>
</tr>
<tr>
<td>2008-2009</td>
<td>3</td>
</tr>
</tbody>
</table>

Philosophy of the Program

Modern technology has allowed for the collection and dissemination of vast quantities of information, which has resulted in a parallel increase in the use of statistical techniques in a variety of fields. Leaders in business and industry and public administrators all have the
desire to make the most efficient and effective use of the wealth of information available to them. As a direct result, growth of enrollment in graduate programs in statistics and expansion in the hiring of trained statisticians has been steady over the last decade.

The Professional Certification Program in Applied Statistics is intended to help fill the need for qualified personnel trained in the proper use of statistical methodology. The proposed curriculum will allow for a balance between the technical and practical aspects of statistical applications, along with perspectives on reporting results to a variety of potential audiences. The overall objective of the program is to give working professionals the necessary skills to ensure their data-based inferences and decisions are based on sound statistical principles.

The certificate program is designed for:
Business and industry professionals and public administrators who have limited training in statistics but deal with data on a regular basis and would like to improve their working knowledge of data analysis, use more sophisticated techniques than those in current practice, and/or use the acquired knowledge to advance their career.

- Graduate students in other disciplines who perceive the need for statistical knowledge in their future career or are simply interested in a deeper understanding of statistical methodology as it relates to their field.
- Students who have earned undergraduate degrees in other programs who believe statistical training will give them a competitive advantage in their field.
- Those who wish to pursue an advanced degree in statistics but would prefer to gain more experience before proceeding.
- Secondary school teachers who would like to be more adequately prepared to discuss statistical techniques in their courses.
Certificate Program Curriculum

The certificate program in statistics requires 17 credit hours at the graduate level, some of which may be applicable to other graduate programs at UNCW. The required core is five credit hours and involves two capstone courses; one involving case studies in statistical consultation and the other being a student-directed project/report detailing the collection and analysis of experimental or observational data. Additionally, the student must complete at least 12 credit hours at the graduate level, choosing from courses in statistics or courses from other disciplines which contain a substantial degree of statistical theory or application. The 12 elective credit hours must be formulated as a plan of study and approved by the program coordinator.

Required courses

1. STT 590 Case Studies in Statistical Consulting (3)
2. STT 596 Research Project (2)

IV.2 Consulting Center

The department created the Statistics Consulting Center in 2002 to better accommodate the growing need of statistical consulting. The department allocated room 211 in Bear Hall for the consulting center and assigned Dr. James Blum as the Director of the Consulting Center. The director was given a one-course reduction each semester to allocate time for him to fulfill his duties. The center assisted faculty and students in nursing, biology, marine science, psychology, social work, and education. Dr. Blum was the Director of the Consulting Center from 2002 to 2008. Unfortunately, the department lost funding for the center in fall 2008

IV. 3 Courses

The department offers a variety of courses useful to graduate students in other majors. One course that was developed in 2003 was STT 500 (Statistics for Research). This
course was designed for graduate students in other majors that need extra assistance in understanding and analyzing data generated from their research. Graduate students can enroll in this course for 1-3 hours per semester depending on the needs of the student. Since its inception in 2003, the department has assisted at least 30 graduate students. However, the number of graduate students assisted by the department of mathematics and statistics is actually much higher than the number taking this course. In fact, the faculty has assisted over 50 graduate students outside the department since 2002. Another course that was developed for majors outside of the department was STT 501, Applied Statistical Methods. This course was developed to service the increasing need of statistical methods in other disciplines. Graduate students that did not have adequate preparation in statistics can enroll in STT 501 to help the students become more proficient in statistics.

In addition, a number of mathematics and statistics courses offered in our graduate program attract students from other programs. Graduate students obtaining an MED in Secondary Education with a specialty in Mathematics have taken courses in MAT 535 (Linear Programming), MAT 536 (Discrete Optimization), MAT 541-542 (Modern Algebra), MAT 511-512 (Real Analysis), MAT 531 (Linear Algebra), MAT 595 (Research Seminar) and MAT 596 (Research Project). Graduate students in psychology, marine science, and biology have taken courses in STT 511 (Design of Experiments and Analysis of Variance), STT 512, (Applied Regression and Correlation), STT 420 (Biostatistics) and STT 425 (Categorical Data Analysis). Other courses, such as MSC 591 (Underwater Acoustics and Signal Processing I), PHY 591 (Underwater Acoustics and Signal Processing II), MSC 591 (Fourier Analysis of Times Series in Physical Oceanography), MSC 591 (Fourier Analysis of Times Series in Physical Oceanography) and STT 592 (Environmetrics) have been offered as Special Topics courses that provided mathematics and statistics to graduate students outside the department.
IV.4 Thesis and other collaboration

A number of the faculty in the department have been on thesis committees in marine science, biology, and chemistry. In fact, the faculty in the department of mathematics and statistics has been involved in at least 8 thesis committees outside of the department, including one Ph.D. thesis committee. Several publications have resulted from this work, as shown in faculty CV’s. A few faculty members jointly with the chemistry department have secured a grant that has provided support for graduate students in chemistry.

Section V. Facilities

The Department of Mathematics and Statistics is housed in Bear Hall with most of the classes being held in this building. All classrooms in Bear Hall are accessible to students with disabilities. This building has ramp access and an elevator servicing the second floor.

Three computer labs are used by the department in Bear Hall. These labs are Bear Hall 161, 164, and 201-D. Room 164 originally housed an NSF funded computer laboratory. This lab, which started in Bear Hall 101, was the first test bed of using computer labs and multimedia instructor stations in the Mathematics and Statistics Department. The lab evolved into an all-purpose computer lab, which supports mostly upper level and graduate course instructional and computing needs. There are currently 20 networked student machines and one instructor machine, all of which were upgraded summer of 2008. These machines have access to a Laser Jet 4000 printer. The instructor station is connected to a ceiling mounted projector, and a Canon Video Visualizer RE-350. A panel of three sliding white boards is in front of the room along with a screen for projection.

There is a larger computer classroom across the hall in Bear 161. This classroom houses 35 networked computers. These machines have access to a Laser Jet 4000 printer. The instructor station is connected to a ceiling mounted projector, a Laser Jet 4000 printer, and Canon Video Visualizer, Model EV-350. There are three sliding white boards in the front of the room along with a screen for projection.
Bear Hall 201 D is the newest of the computer labs. This room was acquired by the department in 2007 and was converted into a working computer lab for upper-level undergraduate and graduate courses. In this room, there are currently 15 networked computers with access to a Laser Jet 4000 printer. The instructor station is connected to a ceiling mounted projector, LaserJet 4000 printer and a document camera. In the front of the room, there is a large white board with a screen for projection, and a smaller white board to the side of the room.

In addition to the computer labs, classrooms supporting the department teaching function are mostly in Bear Hall, due to the special technological needs of many of the classes. These classrooms are located in Bear Hall 101, 106, 200, 206, 208, and 219. The seating in these rooms are 28, 64, 40, 40, 42, and 38, respectively. Bear Hall 101 was once the location of the Math Lab, when the department was responsible for running it. Since the Math Lab moved over to the University Learning Center (ULC) in 2006, the department was able to retain this room and use it for classroom purposes. This room is equipped with an instructor’s station connected to a projector on the instructor’s desk. There is a screen in front of the room for projection purposes, and two, side-by-side white boards at the front of the room. There are four networked computers in this room. Rooms 206 and 208 have the same equipment. Each room has an instructor’s station connected to a ceiling mounted projector, a Canon Video Visualizer, Model EV-400AF, one white board at the front with a screen for projection, and a blackboard on one side of the room. Room 106 is equipped with an instructor’s station connected to a ceiling mounted projector, a Canon Video Visualizer, Model EV-400AF, and one white board at the front of the room with a screen for projection. Room 200 is equipped with a connection to a ceiling mounted projector, one white board at the front with a screen for projection, and a blackboard on one side of the room. Room 219 is equipped with an instructor’s station connected to a ceiling mounted projector, a Canon Video Visualizer, Model EV-400AF, one white board at the front with a screen for projection, and a blackboard on one side of the room.

There are two other projectors floating in the department. There are two VCRs, one of which is connected to a large TV and stored in the Department storeroom. A second
setup is kept in the Dean’s office for first floor use. There are also two laptop computers for faculty traveling and presentation.

Outside the Department, there are two computation resources. One resource is through the Computer Science Department, and several faculty members used the grid cluster and computer servers there over the past five years. The other resource is from the Academic Research Computing (ARC) initiative of the Department of Operations and Systems Administration in the Information Technology Systems Division. Since year 2007 ARC provides high performance virtual machines for computational analysis, and it allows users to use a verity of Windows-based or Linux-based software. Several faculty members and graduate students currently have access to this service.

Section VI. Personnel

Tenure-track Graduate Faculty (Year of initial appointment)

Professors

Dr. Jeffrey L. Brown (1984)
Ph.D. University of Georgia
Research Interests: Computer Aided Geometric Design, Manifolds and Cell Complexes/Algebraic and General Topology

Dr. Wei Feng (1988)
Ph.D. North Carolina State University

Dr. Dargan Frierson (1982)
Ph.D. University of Arizona
Research Interests: Mathematical Statistics (Sequential Analysis, Non-parametric Statistics), Data Analysis, Statistics Education

Dr. Russell Herman (1990)
Ph.D. Clarkson University
Research Interests: Nonlinear Differential and Difference Equations (Solitons, Chaos, Integrability, Perturbations, Painleve’ Analysis, Symmetry Group Analysis), Mathematical Physics (Fluid Dynamics, Nonlinear Optics, Relativity), Instructional Technology, Numerical Analysis, Transforms

Dr. John Karlof (1984)
Ph.D. University of Colorado
Research Interests: Coding and Information Theory, Operations Research

Dr. Subramanyam Kasala (1989)
Ph.D. Indian Statistical Institute
Research Interests: Multivariate Analysis, Time Series, Inference

Dr. Xin Lu (1993)
Ph.D. North Carolina State University
Research Interests: Numerical Solutions of Differential Equations, Differential Equations

**Associate Professors**

Dr. Jim Blum (2000)
Ph.D. Oklahoma State University
Research Interests: Varying Coefficient Models, Non-parametric Regression, Categorical Data Analysis, Statistics Education

Dr. Yaw Chang (1994)
Ph.D. John Hopkins University
Research Interests: Mathematical Programming, Operations Research, Coding Theory

Dr. Michael Freeze (1999)
Ph.D. University of North Carolina
Research Interests: Algebraic Number Theory, Nonunique Factorization Theory

Dr. Daniel X. Guo (1999)
Ph.D. Indiana University

Dr. Gabriel G. Lugo (1982)
Ph.D. University of California, Berkeley
Research Interests: Relativity, Differential Geometry, Instructional Technology, Quantum Mechanics, Analysis on Manifolds

Dr. Mark Lammers (2003)
Ph.D. University of Missouri
Research Interests: Functional analysis and Computational Harmonic analysis

Dr. Susan J. Simmons (2002)
Ph.D. University of South Carolina
Research Interests: Hierarchical Models, Bayesian Inference, Decision Theory, Statistical Computing, Statistics Education

Dr. Matthew TenHuisen (Chair) (1993)
Ph.D. Clemson University
Research Interests: Multiple Objective Programming, Mathematical Programming, Operations Research

Assistant Professors

Dr. Xiaojie Hou (2007)
Ph.D. The University of Iowa

Dr. Dijana Jakelic (2008)
Ph.D. Indiana University
Research Interest: Representation theory of quantum groups, Lie algebras, and Hecke algebras; Combinatorial representation theory

Dr. Nolan McMurray (2008)
Ph.D. University of Mississippi
Research Interests: Matroid Theory, Graph Theory, Combinatorics, Mathematics Education

Dr. Ginger Rhodes (2008)
Ph.D. University of Georgia
Research Interests: Mathematics Education, Professional Development, Teacher Content Knowledge, Teacher Decisions and Instructional Practices

Dr. Kelli Slaten (2007)
Ph.D. North Carolina State University
Research Interests: Mathematics Education, Preservice Teacher Education, Effective Teaching, Student Achievement

Dr. Allison Toney (2008)
Ph.D. University of Northern Colorado
Research Interests: Mathematics Education, Graduate School Related Experiences in Mathematics and Mathematics Education, Autoethnography, Educational Ethnography

Dr. Yishi Wang (2008)
Ph.D. State University of New York at Binghamton
Research Interests: Mathematical Statistics, Survival Analysis, Generalized Linear Model and Statistical Computation

Tenure-Track, Non Graduate Faculty

Associate Professors

Dr. Kenneth Spackman (1983)
Ph.D. University of Colorado
Research Interests: Number Theory, (Finite) Field Theory and Polynomials, Information and Communication

Assistant Professors

Dr. Kenneth R. Gurganus (1975)
Ph.D. University of North Carolina
Research Interests: Functions of a Complex Variable, Differential Equations/
Real Functions

Dr. Shiva K. Saksena (1980)
Ph.D. Louisiana Tech University
Research Interests: Bayesian Methods, Inference, Simulation, Biostatistics

Non Tenure-Track Faculty

Full-time Lecturers

Ms. Terry Fleck (1998)
M.A.T. University of North Carolina
Mathematical Interests: Mathematics Education, Technology in the Classroom

Ms. Sonia Parker (2003)
M.S. University of North Carolina Wilmington
Mathematical Interests: Mathematics, Math Education

Mrs. Karen Spike (1979)
M.A. Eastern Michigan University
Mathematical Interests: Mathematics Education, General Mathematics/History, Technology in the Classroom

Part-time Lecturers (fall, 08)

Mr. Murray Alford
Dr. Cuixian Chen
Ms. Katrina Daniels
Ms. Linda Gurganus
Mrs. Nancy Horton
Mr. Thomas Lupton
Ms. Rebecca Wilkinson

Graduate Students Teaching Part-Time (fall, 08)
Section VII. Graduate Students

VII.1 Student Profiles

From 2001 to 2008, the graduate program in mathematics and statistics received 120 applications of which 114 were accepted into the program (Table 1). It has become common for students interested in applying to our program to contact the graduate coordinator prior to beginning the application process with questions about the program and admission requirements. An email dialogue usually ensues that corrects misconceptions about the program and entrance requirements. This dialogue has the added benefit of having the applicants learn that students in our program receive individual attention. Another byproduct of this dialogue is that the graduate coordinator evaluates the academic record of many prospective students before they formally apply and, if requested, indicates to the student if he/she has deficiencies in the admission requirements. Thus, our acceptance rate is high since many students who would not be accepted learn there is a problem before formally applying. During the period, fall 2001-fall 2006, 60 degree seeking students matriculated into the program, 51 completed their degrees during the period spring 2003-spring 2008, and five are still working on their
theses. Thus, the graduation rate for matriculating students is approximately 93 percent. Of those graduating, 24 have been female.

<table>
<thead>
<tr>
<th>Year</th>
<th>Applied</th>
<th>Accepted</th>
<th>Enrolled</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>African American</td>
<td>Inter-nat'l</td>
</tr>
<tr>
<td>01-02</td>
<td>6f 7m</td>
<td>2f 1m</td>
<td>2f 3m</td>
</tr>
<tr>
<td>02-03</td>
<td>4f 3m</td>
<td>1f</td>
<td>2f 2m</td>
</tr>
<tr>
<td>03-04</td>
<td>5f 11m</td>
<td>0</td>
<td>5m</td>
</tr>
<tr>
<td>04-05</td>
<td>6f 11m</td>
<td>1m</td>
<td>2f 2m</td>
</tr>
<tr>
<td>05-06</td>
<td>11f 11m</td>
<td>0</td>
<td>1f 3m</td>
</tr>
<tr>
<td>06-07</td>
<td>5f 7m</td>
<td>1f</td>
<td>2f 1m</td>
</tr>
<tr>
<td>07-08</td>
<td>8f 7m</td>
<td>1f</td>
<td>3f 2m</td>
</tr>
<tr>
<td>08-09</td>
<td>10f 10m</td>
<td>1m</td>
<td>1f 2m</td>
</tr>
</tbody>
</table>

Table 1. Applicant pool information for academic years 2001-2008

The demographic data for enrolled students seeking a M.A. (before 2006) or M.S. in Mathematics are given in Table 2. One limitation in recruiting qualified out-of-state and international students is the limited number (four) of out-of-state tuition remissions.

The UNCW Graduate School and the Department of Mathematics and Statistics requires that students seeking admission to the graduate program in mathematics must hold a bachelor's degree from an accredited college or university in this country or its equivalent in a foreign institution based on a four-year program. In addition, the applicant must have a strong overall academic record with a “B” average on the basic courses prerequisite to mathematics, satisfactory scores on the Graduate Record Examination, and supporting letter of references. Exceptions to these entrance requirements have been made in extenuating circumstances such as, but not limited to, extensive work or research experience, excellent letters of recommendation, or for students demonstrating special aptitudes or skills. Under these conditions, students may be accepted "provisionally" into the program. Provisional students are expected to remedy any deficiencies in their first year and to maintain a "B" average in all courses attempted at UNCW. During the period
Table 2. Demographic data for enrolled graduate students 2001-2008 and number graduated

Fall 2003 - fall 2008, seven students were accepted provisionally. All of the students either finished their degrees or are still in the program.

Our goal is for full time students to finish the program in two years. Most students in the non-thesis option finish in two years or less. However, students in the thesis option have taken longer, on the average about 2.25 years. Over the period, 2001-2007, about 63 percent of our students choose the thesis option. A list of thesis titles are in Appendix 2.

Table 3 shows average undergraduate grade point averages and average GRE scores for students matriculating into the program since 2001. Because a large percentage of the out-of-state students are international students, their undergraduate grade point averages were not available and therefore are not included.
Table 3. Mean GRE scores and Grade Point Averages for matriculating graduate students 2001-2008.

<table>
<thead>
<tr>
<th>Year</th>
<th>GRE Verbal</th>
<th>GRE Math</th>
<th>GPA</th>
<th>GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>03-04</td>
<td>515</td>
<td>717</td>
<td>4.06</td>
<td>3.31</td>
</tr>
<tr>
<td>04-05</td>
<td>460</td>
<td>709</td>
<td>4.56</td>
<td>3.56</td>
</tr>
<tr>
<td>05-06</td>
<td>410</td>
<td>700</td>
<td>4.5</td>
<td>3.72</td>
</tr>
<tr>
<td>06-07</td>
<td>435</td>
<td>645</td>
<td>4.13</td>
<td>3.4</td>
</tr>
<tr>
<td>07-08</td>
<td>399</td>
<td>740</td>
<td>4.1</td>
<td>3.35</td>
</tr>
<tr>
<td>08-09</td>
<td>463</td>
<td>713</td>
<td>4.5</td>
<td>3.54</td>
</tr>
</tbody>
</table>

VII.2 Recruitment, orientation and advising

- **Recruitment**: The Graduate Coordinator:
  - has participated in the “TA Rush” at SE Regional MAA conferences,
  - promptly responds to inquiries about our graduate program from prospective students,
  - writes emails to students who have begun their applications to encourage the students to complete them,
  - maintains the graduate program website with information for prospective students, and
  - informs undergraduate mathematics majors at UNCW about the program and encourages them to consider applying.

- **Orientation**: The Graduate Coordinator conducts an orientation session for all new graduate students before classes begin. The graduate program is explained, students are advised, students register for classes, teaching assistant duties are discussed, and a tour of our facilities is given.

- **Advising**: The Graduate Coordinator is the advisor to all the students. He meets with them regularly and encourages them to come to his office with questions about the program, TA duties, etc. After the first year, students choose a thesis advisor or a project advisor.

We keep excellent documentation of the initial employment or further graduate study. We have data for about 90% of our master’s students. The following table shows that our
programs has been very successful in preparing students for careers in the mathematical sciences.

### VII.3 Initial Professional Activities of Master’s Students in Mathematics

<table>
<thead>
<tr>
<th>Name</th>
<th>Year</th>
<th>Position/Program/University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wei, Biaozhi</td>
<td>2001</td>
<td>Programmer analyst, PPD, Wilmington, NC</td>
</tr>
<tr>
<td>Li, Yinggang</td>
<td>2001</td>
<td>Ph.D. program in Computer Science, Indiana University, IN</td>
</tr>
<tr>
<td>Key, Michael</td>
<td>2001</td>
<td>Research associate, NASA, Huntsville, Al</td>
</tr>
<tr>
<td>Casey, Thomas</td>
<td>2001</td>
<td>Instructor, Cape Fear Community College</td>
</tr>
<tr>
<td>Ives, Sara</td>
<td>2001</td>
<td>Ph.D. program in Mathematics Education, North Carolina State University</td>
</tr>
<tr>
<td>Vadlamani, Srinath</td>
<td>2001</td>
<td>Ph.D. program in Mathematics, University of Colorado</td>
</tr>
<tr>
<td>Smith, Francine</td>
<td>2001</td>
<td>Statistical programmer, Pharma Research Inc. Wilmington</td>
</tr>
<tr>
<td>Achico, Karen</td>
<td>2002</td>
<td>Housewife</td>
</tr>
<tr>
<td>Hertzell, Brian</td>
<td>2002</td>
<td>Statistical programmer, StatTech-Services</td>
</tr>
<tr>
<td>Jones, Kennan</td>
<td>2002</td>
<td>Instructor, Cape Fear Technical CC</td>
</tr>
<tr>
<td>Dedeo, Kelly</td>
<td>2003</td>
<td>High school teacher, Topsail HS</td>
</tr>
<tr>
<td>Duggins, Jon</td>
<td>2003</td>
<td>Ph.D. program in Statistics, Cornell University</td>
</tr>
<tr>
<td>Eyl, Jen</td>
<td>2003</td>
<td>Community College Instructor</td>
</tr>
<tr>
<td>Faison, Paris</td>
<td>2003</td>
<td>Lecturer, Mathematics &amp; Statistics Dept., UNCW</td>
</tr>
<tr>
<td>Liu, Feng</td>
<td>2003</td>
<td>Ph.D. program, Indiana University</td>
</tr>
<tr>
<td>Tobin, Danny</td>
<td>2003</td>
<td>Lecturer, computer science Dept., UNCW</td>
</tr>
<tr>
<td>Zhao, Yaxi</td>
<td>2003</td>
<td>Ph.D. program in computer science, University of Kentucky</td>
</tr>
<tr>
<td>Zhou, Huajun</td>
<td>2003</td>
<td>Ph.D. program in computer science, College of William and Mary</td>
</tr>
<tr>
<td>Name</td>
<td>Year</td>
<td>Status/Position</td>
</tr>
<tr>
<td>-----------------</td>
<td>------</td>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td>Barber, Melissa</td>
<td>2003</td>
<td>High school teacher</td>
</tr>
<tr>
<td>Martin, Curtis</td>
<td>2003</td>
<td>Retired-sailing the Caribbean</td>
</tr>
<tr>
<td>Graham, Toi</td>
<td>2003</td>
<td>Assistant Professor, Dartin College, Georgia</td>
</tr>
<tr>
<td>Chen, Jinsong</td>
<td>2003</td>
<td>Part time instructor, UNCW HPER department</td>
</tr>
<tr>
<td>Parker, Sonia</td>
<td>2003</td>
<td>Lecturer, UNCW Mathematics department</td>
</tr>
<tr>
<td>Wu, Meng</td>
<td>2004</td>
<td>Ph.D. program in statistics at the University of South Carolina</td>
</tr>
<tr>
<td>Turner, Shauna</td>
<td>2004</td>
<td>Ph.D. program in mathematics, NC State</td>
</tr>
<tr>
<td>Liu, Yuan</td>
<td>2004</td>
<td>Ph.D. program in statistics at the University of South Carolina</td>
</tr>
<tr>
<td>Hocking, Peter M.</td>
<td>2004</td>
<td>Manager, Lowes, local</td>
</tr>
<tr>
<td>Honeycutt, Kelley</td>
<td>2004</td>
<td>High school teacher, local</td>
</tr>
<tr>
<td>Taylor, Laura J.</td>
<td>2004</td>
<td>High school teacher, local</td>
</tr>
<tr>
<td>Cheng, Lin</td>
<td>2005</td>
<td>Web engineer, Benefit Consultants Group, NJ</td>
</tr>
<tr>
<td>Reiter, Richard M.</td>
<td>2005</td>
<td>High school teacher, local</td>
</tr>
<tr>
<td>Young, Brent O.</td>
<td>2005</td>
<td>Ph.D. program in mathematics at Rutgers University</td>
</tr>
<tr>
<td>Zhai, Yusheng</td>
<td>2005</td>
<td>Ph.D. program in biostatistics at University of South Carolina</td>
</tr>
<tr>
<td>Adams, Ross C.</td>
<td>2006</td>
<td>High school teacher, local</td>
</tr>
<tr>
<td>Bao, Haikun</td>
<td>2006</td>
<td>Ph.D. program in biostatistics at University of South Carolina</td>
</tr>
<tr>
<td>Gunter, Shannon R.</td>
<td>2006</td>
<td>High school teacher, local</td>
</tr>
<tr>
<td>Karlton, Kathleen M.</td>
<td>2006</td>
<td>Statistical analyst, Washington D.C.</td>
</tr>
<tr>
<td>Key, Adam R.</td>
<td>2006</td>
<td>Statistical programmer, Kendle International, local</td>
</tr>
<tr>
<td>Modlin, Danny R.</td>
<td>2006</td>
<td>Ph.D. program in statistics, NC State University</td>
</tr>
<tr>
<td>Norris, Teresa E.</td>
<td>2006</td>
<td>Biostatistician at PPD, local</td>
</tr>
<tr>
<td>Psioda, Matthew A.</td>
<td>2006</td>
<td>Statistical programmer, Kendle International, local</td>
</tr>
<tr>
<td>Rose, Andrew W.</td>
<td>2006</td>
<td>Computer systems manager, local</td>
</tr>
<tr>
<td>Zichy, Michael A.</td>
<td>2006</td>
<td>Statistical programmer, Kendle International, local</td>
</tr>
<tr>
<td>Chen, Yi</td>
<td>2007</td>
<td>Actuarial for an insurance company in Dallas</td>
</tr>
<tr>
<td>Cheng, Wei</td>
<td>2007</td>
<td>Web developer for Health Monitor Network, NJ</td>
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<tr>
<td>Name</td>
<td>Year</td>
<td>Position/Institution</td>
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<tr>
<td>Greenough, Caroline</td>
<td>2007</td>
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<td>Neal, David R.</td>
<td>2007</td>
<td>Ph.D. program in bio-mathematics at University of Miami, FL</td>
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<td>Noonan, Joshua</td>
<td>2007</td>
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<td>Pearson, Caroline</td>
<td>2007</td>
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<td>Yuan, Yuan</td>
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<td>Glasier, David B.</td>
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<tr>
<td>Houmard, Alaina M.</td>
<td>2008</td>
<td>Statistical programmer, Kendle International, local</td>
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<td>Jacobs, Allison C.</td>
<td>2008</td>
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<td>Poliquit, Elmer S.</td>
<td>2008</td>
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<tr>
<td>Wilkinson, Rebecca</td>
<td>2008</td>
<td>Mathematics instructor, UNCW</td>
</tr>
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</table>

**Graduate Student Summer Research Awards:**
Yuan Liu received a summer stipend in 2004

**VII.4 Student Joint publications with Faculty (2001-2008) (Student’s name in boldface)**


Karlof, J. and Jenkins, J., “The Behavior of a Multichannel Queueing System Under Three Queue Disciplines”, *Proceedings of the 38th Annual SE InForms Conference*, Myrtle Beach, 2002. (This paper was awarded “best paper” in the Quantitative Theory and Methods track.)


VII.5 Presentations Given by Graduate Students at Professional Meetings (2001-2008)


Anna Maeser (student in BS/MS five year program), Colonial Academic Alliance for Undergraduate Research, 2008.

VII.6 Student Support

The department maintains one large office for the graduate students and a smaller office for the graduate students teaching their own classes. Both offices have several computers. We have a departmental “commons” room. A pot of hot coffee and a microwave are always available in the commons room and it is a gathering place for both faculty and graduate students. The department has the following financial support available for graduate students: (all students including TA’s are required to pay tuition)

- 12 teaching assistantships at $10,00.00 per year (TA’s are assigned a total of 20 hours per week of tutoring in the Learning Center and/or grading for departmental faculty), $1,200.00 summer TA for those students taking the research seminar during the summer,
- $7,000.00 in in-state tuition scholarships (these are allocated to the students in $500.00 increments),
- four out-of-state tuition remissions,
- two $500.00 “new scholar awards” for outstanding applicants,
- opportunity for students with at least 18 graduate hours in mathematics to teach their own courses paid with part-time money instead of a TA,
- the graduate school offers travel grants to graduate students attending professional conferences, and
- the graduate school offers summer research awards, and four scholarships open to all graduate students at the university.

**Section VIII. Affirmative Action**

The University of North Carolina at Wilmington emphatically states that it will provide equal employment opportunities for all persons regardless of race, color, national origin, creed, religion, sex, age, handicapping condition, or political affiliation, except where religion, sex, or age are bona fide job related employment requirements. This is in keeping with Title VII of the Civil Rights Act of 1964 as amended, Executive Order 11246, the Rehabilitation Act of 1973, the Civil Rights Restoration Act of 1987, NC G. S. 126-16 and 126-17, and other applicable federal and State laws.

In furtherance of this policy, UNC Wilmington prohibits retaliatory action of any kind taken by any employee of the university against any other employee or applicant for employment because that person made a charge, testified, assisted or participated in any manner in a hearing, proceeding, or investigation of employment discrimination.

To ensure that equal employment opportunity exists throughout the university, a results oriented equal employment opportunity/affirmative action program will be implemented to overcome the effects of past discrimination and to eliminate any artificial barriers to employment opportunities for all qualified individuals that may exist in any of our programs.

This program shall ensure greater utilization of all persons by identifying the under-utilized groups in the work force (especially minority, female, and handicapped workers), and making special efforts to increase their participation in recruitment, selection, training, development, upward mobility programs, and any other term, condition, or privilege of employment.
Goals and timetables shall be established to reduce and eliminate the underutilization of all groups through the equal employment opportunity/affirmative action plan and program. Responsibility for the development of this plan and program is hereby assigned to the EEO/AA Officer and Director of Human Resources. However, responsibility for the implementation of and compliance with the plan and program will be shared by all managers and supervisors.

The equal employment opportunity/affirmative action program will be evaluated and monitored continuously. Periodic reports on the progress of this program will be presented to the chancellor by the EEO/AA Officer and to the Board of Trustees by the chancellor.

The University of North Carolina at Wilmington is committed to this program and is aware that with its implementation, positive benefits will be received from the greater utilization and development of previously under-utilized human resources.

Section IX. Summary of Research and Scholarship

Faculty in the Department of Mathematics and Statistics are engaged in a variety of forms of research and scholarship. As seen below, the faculty have brought in numerous grants with others on campus and off, totaling over two million dollars for UNCW. They have disseminated their research in over one hundred publications and 173 presentations at conferences. At the same time faculty members contribute to their fields by referring for journals with 174 reported reviews over the past eight years.

FACULTY RESEARCH ACCOMPLISHMENTS 2001-2008*

<table>
<thead>
<tr>
<th>Year</th>
<th>Refereed Publications</th>
<th>Non-refereed Publications</th>
<th>Conference Presentations</th>
<th>External Grants</th>
<th>Editorships</th>
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<tr>
<td>Year</td>
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<td>173</td>
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</table>

*This data was submitted by 19 faculty members.*

There are also several faculty who are editors of journals and book proceedings of conferences.

1. **Dr. Wei Feng**, Associate Editor, *Communications in Pure and Applied Analysis*, 2005-present.

2. **Dr. Wei Feng**, Issue Editor (with Professor Zhaosheng Feng), on a Theme Issue “Dynamical Systems and Applications in Engineering and Biology”, *Discrete and Continuous Dynamical Systems - Series S*, 2008-2009.


9. **Dr. Ginger Rhodes** was Editor, *The Mathematics Educator* ([www.coe.uga.edu/TME](http://www.coe.uga.edu/TME)), 2005 – 2006

10. **Dr. Russell Herman** is the Editor-in-Chief of *The Journal of Effective Teaching*, 2006-present. This is a peer reviewed electronic journal devoted to the discussion of teaching excellence in colleges and universities. ([http://www.uncw.edu/cte/et/](http://www.uncw.edu/cte/et/))


**IX.1 Selected Research Grants**

Members of the faculty have been awarded many internal and external grants. These have been used to promote international conferences, instructional technology, STEM digital libraries, grid computing, and public school instruction. Some of the larger grants are listed below.
Dr. Xin Lu, Dr. Wei Feng and Dr. Yaw Chang have obtained NSF grant money to support the International Conference on Dynamical System and Differential Equations. See more in the next section.

- **Dr. Xin Lu** joint with Jianzhong Su, in the amount of $25,000 for the International Conference on Dynamical System and Differential Equations Year 2008 held in Arlington Texas, approved by NSF in Feb. 2008. The funding is used to support graduate students, recent PhDs participating in the conference.

- **Dr. Xin Lu** joint with **Dr. Yaw Chang**, in the amount of $18,000 for the International Conference on Dynamical System and Differential Equations Year 2006 held in Poitiers France, approved by NSF in Feb. 2006. The funding is used to support graduate students, recent PhDs participating in the conference.

- **Dr. Xin Lu** joint with **Dr. Wei Feng**, in the amount of $14,000 for the International Conference on Dynamical System and Differential Equations Year 2002 held in UNCW was submitted in September 2001 and approved by NSF in March 2002.

Dr. Jeffrey Brown works with others across campus to bring in funding to support grid computing and mobile technologies. Some recent grants are


In 2006 Dr. Russell Herman and Dr. Gabriel Lugo were inducted into the Million Dollar Club, an honor granted by UNCW’s Office of Research and Sponsored Programs for bringing in grants totaling more than one million dollars. Their grants over the period of this report began with grants awarded in 2000. This work has ranged from mobile learning environments (Pocket PCs and other handheld devices, Tablet PCs, Probeware) to digital libraries (working with NSDL and MathDL). Examples of recent grants are shown below.


- Increasing and Retaining STEM Majors through Virtual Learning Communities, C. Ward, G. Lugo, R. Herman, R. Vetter, J. Reeves, and D. Cohen, NSF CCLI-EMD Program, Award for $124,485; Grant period: May 1, 2005 - April 30, 2007.

Several faculty have been involved with regional public education and NC-PIMS grants, Dr. Jeffrey Brown, Dr. Dargan Frierson, Dr. Russell Herman, and Dr. Gabriel Lugo. One example of such a grant is

- Partnership for Improving Mathematical Understanding of Students and Teachers, awarded by the North Carolina Department of Public Instruction, Karen Shafer; Dargan Frierson, Jr.; Gabriel G. Lugo; and Laurie J. Patterson. Award for $68,820; Grant period August 2007 – July 2010
IX.2 Hosting and Participating in Professional Conference

The Mathematics and Statistics Department had a tremendous success in hosting the Fourth International Conference on Dynamical Systems and Differential Equations on the UNCW campus May 24-27, 2002. This was the most fruitful conference in the biennial Conference Series “Dynamical Systems and Differential Equations” at the time. More than 400 leading experts in the fields from about 40 countries, including some award-winning scientists and invited speakers at the International Congress of Mathematicians attended the conference. The Organizing Committee was Dr. Chang, Dr. Freeze, Dr. Guo, Dr. Gurganus, Dr. Lu (chair), and Dr. TenHuisen.

The operation fund of the conference was partially supported by the Office of Academic Affairs and the College of Arts and Sciences at University of North Carolina at Wilmington, and the Qualcomm Corporation. Dr. Wei Feng and Dr. Xin Lu were granted $12,000 from the National Science Foundation for travel support of more than 40 graduate students and recent Ph.D.’s attending the conference. The two-volume proceedings of the conference, edited by Dr. Feng and Dr. Lu, were published in 2003.

X. Strengths and Weaknesses

X.1 Strengths

- Student Body

Program enrollment in the review period was consistently near or over 20 students each year. The student body is diverse both in cultural and academic backgrounds. The moderate number of students in the program contributes to a close-knit peer group dynamic that fosters enthusiasm for and dedication to academic and professional success and one on one faculty interaction.

- Graduate Faculty

The department has diverse, well-qualified graduate faculty in pure mathematics, applied mathematics, operations research, and statistics. The graduate faculty are dedicated to excellence in both teaching and research, and work diligently to maintain a challenging intellectual climate for themselves and for their students. The graduate faculty often interact with students outside the classroom.
• Research Emphasis
Research is a major emphasis of the graduate program. Each student completes a research seminar during the summer between the first and second year. The research seminar provides each student opportunity to improve research skills and identify research interests. The research seminar is offered during the first summer session. The department is able to provide teaching assistantships for those in the seminar as well as a few graduate students not taking the seminar. A majority of the students chose the thesis option and have written and in large part have written impressive theses in the areas of pure mathematics, applied mathematics, operations research, and statistics. Roughly a fourth of the theses and projects during the review period have been accepted or submitted for publication and presentation.

• Student Facilities
The graduate students have good office space and computer support and have access to area for faculty and students. The main graduate student office is a gathering place and helps to foster a close knit graduate student community.

• Undergraduate Involvement
Since inception in Fall 2003, the Bachelor’s/Master’s Five-year Program has encouraged many of our talented upper-level undergraduates to undertake additional advanced mathematics and statistics coursework. Many of these students work together with graduate students to provide tutoring for basic studies mathematics and statistics courses in the University Learning Center. Their efforts have been instrumental in increasing learning opportunities for all students taking mathematics and statistics courses. Also, the graduate students together with the undergraduate mathematics majors have taken an active role the Mathematics and Statistics Club.

• After Graduation
The graduates of the program have consistently obtained good jobs in industry and in teaching. Those interested in further study have been funded at a strong, diverse group of research universities.

X.2 Weaknesses
• Financial Support for Graduate Students
The number of teaching assistantships and out-of-state tuition remissions allocated to the graduate program has remained stagnant at 12 and 4 respectively since 1989. Even students receiving a TA are expected to pay tuition. That together with the relatively low TA stipend puts many students in a financial bind and limits the ability of the program to be competitive with comparable regional universities in recruiting high quality students.

- **Student Recruitment**

The graduate program recognizes its need to continue its recruiting efforts to increase enrollment to ensure a stable learning environment for its students and the support by the university administration. The department is forced to cancel most graduate classes with enrollment under five. This limits our ability to provide the students with a diverse curriculum. However, the number of students in the program is consistent with or above other programs around the state, but needs to be larger in order to alleviate difficulties in scheduling graduate courses.

- **Lack of Release Time for Faculty Directing Theses**

The graduate faculty do not receive release time for directing theses. Lack of release time for the handful of faculty who are most active in directing student research strains the ability of those faculty to meet the teaching, research, and service demands placed on them.

- **Lack of Professional Support**

Support for technical needs is inadequate. Maintenance of software and hardware for research projects and office use is left for individual faculty to confront. Support for regular external speakers continues to be unavailable.

### X.3 Activities to Overcome the Weaknesses

- Even though, we have only 12 teaching assistantships, we have developed other ways to support our graduate students: some students are teaching their own classes and we use part time money to support them, the department has a computer lab open to students in the evenings and until this year had separate funds available to staff the lab – a graduate student was supported with these
funds, and several students have internships in local industry and are supported with outside funds.

- The students are required to take two sequences one of MAT 511-512 (real analysis) or MAT 518-519 (applied analytical methods) and one of MAT 541-542 (modern algebra) or MAT 535-536 (linear programming/discrete optimization). They have offered all four sequences every year. This has caused two problems. Some of the sequences run with low enrollment which puts pressure on the program from the administration. It also limits the number of other courses we may offer. The committee of graduate advisors will consider ways to revise the program to take care of this difficulty.

- Continue interaction with local businesses so that our graduate students will continue to receive internships.

- Continue to make the case for a technical support person in Bear hall.

- Recruiting efforts have been made internationally. Dr. Feng spoke with students about our graduate program while at a conference at Shanghai Normal University and Dr. Karlof did the same while working with Professors Biglieri and Viterbo at Politecnico di Torino in Italy.
Appendix 1

1.1 2002 Reviewers’ Report

General Impressions. The reviewers visited the UNC Wilmington Department of Mathematics and Statistics on March 21 and 22, 2002. We spent the two days touring the department and discussing the department’s graduate program with administrators, faculty, and students. We thoroughly enjoyed the hospitality shown by all concerned, and we were helped by the extensive, carefully written self-study prepared by the faculty.

We felt that the Department offers strong master’s programs that serve the University and the surrounding region. The Department has a dedicated, hard working, and well-qualified faculty, and the curriculum offered is well conceived. Departmental leadership is strong, and the Department appears to have a good vision for future directions. Although the Department has made progress in recruitment, the programs suffer from lower than ideal enrollment, a problem which is common to most of the mathematics master’s programs in the UNC system and elsewhere. University support for the programs is marginal, especially in the areas of assistantships, tuition waivers, and faculty workloads.

Details of our observations are given below. Again, we thank the faculty for their hard work in preparation and for their gracious cooperation during our visit.

Curriculum/Program. The Department has recently made changes in requirements and course offerings in response to the previous review, and these have had a positive effect. The number of graduate courses in the catalogue has been slimmed down to a level appropriate for the size of the program, and attention has been given to consistency in the frequency of offering the courses. The current course offerings have a good mix of fundamental training and specialized electives, and should provide a sustainable core for the program. Simplifying the degree requirements should also help with scheduling. The addition of a non-thesis option is a reasonable step, which gives students some flexibility in tailoring their individual study plans to their own career goals. The present curriculum, as a whole, is well conceived, and has both depth and rigor.
One very positive feature of the master’s program is the Research Seminar. The seminar has been moved to the summer between the first and second year as recommended by the previous review committee. The feedback from students concerning the seminar is very positive, and they are aware that they benefit from both the content and the experience gained from the seminar. Since the timeframe for the seminar is tight and the library resources at UNCW are limited, it would be helpful to the students if more of the relevant literature could be made available to them before the start of the seminar, allowing them more time to obtain materials not available on campus through interlibrary loan or other means as needed.

The program as presently offered has potential for growth in its interaction with nearby industries. A sizable number of graduates are now working in local industries, and they should provide valuable contacts for recruiting students from the ranks of the professionals working in these industries. There is also the possibility of establishing mutually beneficial co-op or intern programs in the future. The training provided by courses and research in the areas of statistics and operations research strengthens the appeal of the programs for these purposes. The Department should consider establishing a formal advisory committee with representatives from industries and regional organizations to help facilitate its outreach activities.

The reviewers had the opportunity to examine a fair number of master’s theses during their visit and found the quality very high. The examples we saw were well written as well as technically strong. It is impressive that roughly a third of the theses/projects during the period 1993-2001 evolved into journal publications. It is notable that roughly half of the 42 theses/projects written from 1994 to 2001 were directed by Professors Karlof, Feng, and Herman. To sustain a healthy program for the long run, the efforts of the graduate faculty must be more evenly distributed. This problem should lessen to a certain degree as the junior faculty members mature and take up more responsibilities, but a system that rewards such efforts should also be put in place.

Students and Recruitment. The average enrollment in the seven academic years from 1994-1995 to 2000-2001 is 16. While this level of enrollment is consistent with other programs around the state, it is less than desirable. The small number of students creates difficulties in the offering of
certain graduate courses on a regular basis, and despite recent efforts to streamline course offerings, students often have to take individual reading courses. This is not an efficient way of utilizing the resources of the department. To alleviate this problem, the Department should target a long-term enrollment level of 20 or more students. Having said this, the reviewers acknowledge and commend the energy that the Department has devoted to recruitment, especially in the light of available resources. The number of current full-time students is almost double the number that can be supported with assistantships. This is an indication of a strong recruitment effort, since it is common for the correspondence between the number of students and the number of teaching assistantships in a terminal master’s program in mathematics to be close to one-to-one.

It is a national trend that the success of mathematics graduate programs relies more and more on the recruitment of well-qualified students from abroad. The program at UNC Wilmington has recruited a large number (in percentage) of international students who contribute to the vitality of the program and also to the diversity of the student body. These efforts are to be commended in view of the meager availability of tuition waivers.

It is the reviewers’ impression that the graduate students in the department are talented and enthusiastic about the program. This impression is supported by the average scores of the students in the quantitative and analytical portions of the GRE, which is above the national average for the period 1996-2001 for students intending to study in the fields of physical sciences and engineering. There is, however, a sizable gap between the GRE scores of the in-state and out-of-state students in recent years. Additional efforts should be made to improve the quality of the in-state students. Again, this is a challenging goal in the face of national and regional trends in student interests. Perhaps it would be useful to exchange recruiting visits with other programs across the state. Recruitment of in-state students would certainly be helped by a more competitive stipend for the assistantships.

While it is desirable for the program to have more students, the Department is doing a service to the region with the graduates it is currently producing. Placement of graduates shows a healthy mix of industrial and educational employment, and all graduates find employment that utilizes the
training they received from the master’s program. This is a clear demonstration that the program is on the right track.

**Leadership and faculty.** Leadership by the Department Head and Graduate Coordinator is strong and appears to have the support of the faculty. The reviewers have the impression that most of the senior faculty members are doing their part in sharing leadership and administrative tasks as needed. Morale in the Department appears to be very good, especially for these troubling budget times when resources are scarce. From the point of view of these reviewers, all indications are that the department’s faculty members are dedicated, collegial, and well educated, and that they are working to maintain a high level intellectual climate for themselves and their students. They are certainly qualified to deliver the Department’s master’s programs.

The faculty’s research is commendable in the light of the heavy teaching responsibilities. They acknowledge, and sincerely care about the importance of teaching. But the faculty members have many responsibilities, and they are doing yeoman’s work in meeting the Department’s service and programmatic obligations. It is unrealistic to expect significant research funding or increased research productivity among persons teaching nine or more hours per semester.

The Department’s junior faculty members are very good. They have strong academic credentials, and show good potential for meaningful research. They have already begun to make some interdisciplinary connections on campus.

**Resources and support.** The most glaring support issue is the lack of release from teaching load for the activities of the faculty in research and thesis supervision. Faculty active in research must compete for grants and journal space against professors whose teaching loads are often less than two courses per semester. The supervision of a thesis project requires substantial intellectual energy and commitment of time, sometimes as much as a three-hour course. The faculty’s willingness to devote their efforts to the high quality theses produced in the UNCW program is commendable. The lack of support for research and thesis direction was noted by the previous reviewing team, and has received much discussion, but very little has been done to correct the situation.
Overall computer support for the Department is marginal. Faculty members seem to have the hardware and software resources they need at present, but there does not appear to be sufficient technical support. Computer support for graduate students is inadequate, both in terms of equipment and technical support. For example, the Department has the commendable policy of requiring students to learn the mathematical typesetting language LaTeX for the Research Seminar, but it is awkward for the students to gain sufficient computer access and systems help necessary to use the features of LaTeX efficiently.

Other kinds of professional support for the faculty are poorly funded. Professional travel to meetings and conferences is essential for maintaining the vitality of the faculty, but support in this area has been weak historically; it is completely inadequate in the present budgetary environment. The reviewers were also surprised to learn that the Department has, for all practical purposes, no support for external speakers. In the mathematical sciences, perhaps the most efficient way for specialists to exchange ideas is through face-to-face conversations. Conferences and colloquium talks are the lifeblood of scientific communication, and the lack of institutional support for these activities put the faculty at a professional disadvantage.

The reviewers are aware that North Carolina’s attitude toward tuition and fee waivers is a burden for all of UNC’s graduate programs, but it must be mentioned that the extremely low level of state support for graduate students makes it very difficult for the Department to recruit students. The Department’s allocation of twelve assistantships and four out-of-state tuition waivers is far from adequate, and as mentioned above, the faculty has done a good job of using these resources effectively in recruiting. However, they have achieved about all that can be expected without increased support. The assistantship stipends are too low to be competitive, and will remain so even with the expected increase to $8000 in the fall. Realistically, it will be difficult for the program to reach and maintain an appropriate enrollment level without additional (3-5) assistantships and out-of-state tuition waivers (4-6).

Benefits of the program. The program is producing well-trained graduates for the regional work force in both education and industry. Notably, the program is providing support for nearby
pharmaceutical companies and the community college system. Some of the graduates also go on to doctoral programs in mathematics, computer science and engineering. The program thus functions as a pipeline for the training of future leaders in these fields and serves an important national need.

The presence of a graduate program is an important factor in the recruitment of quality faculty. Several excellent junior faculty members have been added to the department since the last external review. These faculty members have remained very active in research and have begun to explore opportunities for interdisciplinary research with faculty in the Marine Biology Department and the Chemistry Department. They would not have been willing to come to Wilmington without the prospect of teaching advanced courses and working with graduate students.

The graduate program enhances undergraduate education in mathematics and graduate education in other disciplines. The presence of research active faculty has a stimulating effect on the upper-level undergraduate students and the students have an opportunity to take some advanced mathematics courses that would not be available otherwise. This is extremely important for those who intend to pursue an advanced degree after graduating from UNCW. The advanced mathematics and statistics courses also support the training of graduate students in many other departments. Furthermore, statistical consulting is being provided to faculty and students across the campus as part of the graduate training in the Mathematics and Statistics Department.

The Department’s graduate assistants contribute to the overall teaching effort of the University. In particular, they provide high quality tutoring for the Mathematics Lab, which is an excellent facility supporting students in general education mathematics courses. Without these graduate students, the lab would be dependent upon advanced undergraduates, who cannot, in the long run, provide the expertise and stability that the graduate assistants can offer. The Department’s graduate students also provide a source for staffing the remedial mathematics courses offered by the nearby community colleges.

Recommendations. Overall, the graduate program of the Department of Mathematics and Statistics is successful and should be continued.
In order to sustain and improve the graduate program, it is crucial that faculty members who direct master theses and projects be given some course release time or financial compensation for their work. The current teaching loads for these faculty members are too high. The Department should also give attention to increasing the number of faculty actively involved in supervising students.

The Department should continue its recruiting efforts to increase enrollment in the master’s program in order to reach a critical mass for a healthy and sustainable program. An increase in the number of teaching assistantships, together with increases in the amount of the assistantship stipend and in the number of tuition remissions, both in-state and out-of-state, will be necessary for achieving this goal.

The Department should continue to explore opportunities for interdisciplinary research. Some encouraging beginnings have been made in this direction with Chemistry and Marine Biology. Statistical consulting can generate additional opportunities and provide valuable experience for graduate students, and should be given more support in both space and equipment.

The Department should cultivate closer ties with local industries by capitalizing on the network of graduates working in the local area, both for recruiting purposes, and for the placement of future graduates. Strengthening the course offerings in statistics should help in this direction. The development of internship programs with local industries would also help to make the program attractive to students in the region. Establishment of an advisory committee would help the Department with its efforts in this direction.

The Department is encouraged to follow up on plans for an accelerated masters program. The demand for such a program is not immediately obvious, but the resource implications are minimal, and such a program could help to channel undergraduates from UNCW into the master’s programs.

The Department should encourage graduate students and faculty to take advantage of the research opportunities offered by the universities in the nearby Research Triangle. For example, graduate students can participate in the Industrial Mathematics Modeling Workshop for Graduate Students at the North Carolina State University during the summer between their first and second year and do follow-up theses or projects with the assistance of the faculty.

Since National Science Foundation grants in mathematics have very limited support for students in terminal master’s programs, the Department should actively explore other education related
external funding sources that support master’s programs. One possibility is the NSF’s CSEMS scholarship program.

The core of the recommendations offered here obviously have budgetary implications that cannot be accommodated instantly. We offer them as suggestions for objectives to be pursued over time. The reviewers feel that the Department has done its part in designing and delivering a viable program; we hope that it receives encouragement and continued support from the University.

Respectfully submitted,

Paul Duvall
University of North Carolina at Greensboro

Li-yeng Sung
University of South Carolina

1.2 Departmental Response

MEMORANDUM

TO: Jo Ann Seiple, Dean
    College of Arts and Science

FROM: Wei Feng, Chair, Mathematics and Statistics Department

DATE: June 26, 2002

RE: 2002 Review of Graduate Programs Report

The review of the Master of Arts/Master of Science degrees in Mathematics was conducted during the 2001-2002 academic year. The external reviewers made seven
recommendations. The Graduate Advisors Committee has studied these recommendations, and it feels that all of these recommendations are consistent with the goals of the department. The Graduate Advisors Committee met in May and responded to each of these. Beginning fall semester, the committee will pursue additional ways to implement each of the recommendations.

Each recommendation is stated below and response is given to each.

**Recommendations.**

“**Overall, the graduate program of the Department of Mathematics and Statistics is successful and should be continued.**”

**Recommendation 1:** “In order to sustain and improve the graduate program, it is crucial that faculty members who direct master theses and projects be given some course release time or financial compensation for their work. The current teaching loads for these faculty members are too high. The Department should also give attention to increasing the number of faculty actively involved in supervising students.”

Response:
The graduate advisors discussed ways to implement this recommendation that addresses workload for individual faculty directing theses and projects. Within the department, the workload is usually ten or eleven hours whereas most research active faculty throughout the university have a nine-hour workload. The graduate advisors decided to make the following recommendation to the Executive Committee: Faculty who direct theses and projects will be given a nine-hour workload during the semester in which they are directing the thesis or project. If the Executive Committee approves it, the recommendation will go to the department.

**Recommendation 2:** “The Department should continue its recruiting efforts to increase enrollment in the master’s program in order to reach a critical mass for a healthy and sustainable program. An increase in the number of teaching assistantships, together with
increases in the amount of the assistantship stipend and in the number of tuition remissions, both in-state and out-of-state, will be necessary for achieving this goal.”

Response:
The Department plans to continue and increase its recruiting efforts. The Department has put emphasis on recruiting from its own graduating seniors. It plans to continue this practice. We also plan to put additional emphasis on recruiting students from local industry, particularly from the pharmaceutical companies. Recently, we have been able to fill the allotted GTA’s and feel that we could fill several, additional GTA’s. We will request additional ones from the Graduate School. We plan to request an increase in our stipends, (which has not been increased while other departments at UNCW have received increases), from $7500 to $8500.

**Recommendation 3:** “The Department should continue to explore opportunities for interdisciplinary research. Some encouraging beginnings have been made in this direction with Chemistry and Marine Biology. Statistical consulting can generate additional opportunities and provide valuable experience for graduate students, and should be given more support in both space and equipment.”

Response:
The Department is enthusiastic about continuing interdisciplinary research with other departments. We currently have mathematics and statistics faculty collaborating with faculty in Biology, Marine Science, Computer Science, HPER and Physics. At each new hire, consideration will be given to the credentials of candidates in this area.

The Department plans to pursue opportunities in the area of statistical consulting and has designated a certain area in Bear Hall as a consulting center. The graduate advisors and the statistics faculty are coordinating efforts to provide additional opportunities and experience for graduate students.

**Recommendation 4:** “The Department should cultivate closer ties with local industries by capitalizing on the network of graduates working in the local area, both for recruiting
purposes and for the placement of future graduates. Strengthening the course offerings in
statistics should help in this direction. The development of internship programs with local
industries would also help to make the program attractive to students in the region.
Establishment of an advisory committee would help the Department with its efforts in this
direction.”

Response:
As shown in our report, our Master’s Program already had quite a few graduates employed by
local industries. We also have several part-time students from industry pursuing masters in
mathematics with an emphasis on statistics. Beginning in the fall, the graduate advisors plans to
further study ways to implement this recommendation, including contacting local pharmaceutical
companies on their needs in personnel training and inviting their statisticians to offer clinical data
analysis courses to our students.

**Recommendation 5:** “The Department is encouraged to follow up on plans for an
accelerated masters program. The demand for such a program is not immediately obvious,
but the resource implications are minimal, and such a program could help to channel
undergraduates from UNCW into the master’s programs.”

Response:
This recommendation addresses the five-year program, a combined bachelors and
masters program which can be completed in five years by allowing dual credit for
some work. The graduate advisors have investigated programs at other institutions
and plans to begin working on the development of this program this fall.

**Recommendation 6:** “The Department should encourage graduate students and faculty to
take advantage of the research opportunities offered by the universities in the nearby
Research Triangle. For example, graduate students can participate in the Industrial
Mathematics Modeling Workshop for Graduate Students at the North Carolina State
University during the summer between their first and second year and do follow-up theses or projects with the assistance of the faculty.”

Response:
During the last academic year, two students were enrolled in a distance-learning mathematical modeling course at NCSU. A couple of students applied for the Summer Modeling Workshop offered at NCSU but did not get accepted. The department chair and graduate coordinator will continue to make information available to students and faculty about research opportunities at the above institutions, and encourage their participation.

Recommendation 7: “Since National Science Foundation grants in mathematics have very limited support for students in terminal master’s programs, the Department should actively explore other education related external funding sources that support master’s programs. One possibility is the NSF’s CSEMS scholarship program.”

Response:
Dr. Wei Feng, the department chair had discussed with the reviewers about the possibility of NSF funding for scholarships. We have already obtained guidelines of the CSEMS scholarship program and a sample proposal from UNC Greensboro. A joint proposal with Computer Science and the “two plus two” Engineering Program will be submitted in February 2003.

The visiting team concluded by saying:

“The core of the recommendations offered here obviously has budgetary implications that cannot be accommodated instantly. We offer them as suggestions for objectives to be pursued over time. The reviewers feel that the Department has done its part in designing and delivering a viable program; we hope that it receives encouragement and continued support from the University.”
Appendix 2
Thesis Titles

Michael Key. ...........................................................................................................2001
Thesis directed by Dr. Herman
Thesis title: A Model of Ocean Ridge Scattering for the One and Two Layer Linear Quasi
Geostrophic Rossby Wave

Yinggang Li .................................................................................................2001
Thesis directed by Dr. Karlof
Thesis title: An Efficient LaGrangean Algorithm for Optimally Locating Low-Level Radioactive
Waste Dump Sites

Francine A. Smith ..........................................................................................2001
Thesis directed by Dr. Frierson
Thesis title: A Regression Tree Approach to Linking School Accountability to College
Performance

Michael D. Key ..............................................................................................2001
Thesis directed by Dr. Herman
Thesis title: A Model of Ocean Ridge Scattering for the One and Two-Layer Linear Quasi-
Geostrophic Rossby Wave

Wenjie Wang .................................................................................................2001
Thesis directed by Dr. Feng
Thesis title: Dynamics of a 3-Species Food Chain System with Harmless Time Delays
Biaozhi Wei .................................................................2001

Thesis directed by Dr. Feng

Thesis title: A Mathematical Model of Two-Stage Chemical Reaction

Srinath Vadlamani ..........................................................2001

Thesis directed by Dr. Herman

Thesis title: Study of Lie Symmetries of the Vaidya Equations

Sarah Ives ..............................................................2001

Thesis directed by Dr. Herman

Thesis title: Julia Sets of the Riemann Zeta Function

Ying Wang .................................................................2002

Thesis directed by Dr. Frierson

Thesis title: Application of the Empirical Bayes Method in a Comparative Microarray Experiment

Jody L. Hinson ............................................................2002

Thesis directed by Dr. Feng

Thesis title: Population Dynamics of Two Diffusively Coupled Predator-Prey Interactions

Emily H. Johnson ........................................................2002

Thesis directed by Dr. Frierson

Thesis title: Exploratory Microarray Analysis of Gene Expressions

Keenan E. Jones ..........................................................2002
Thesis directed by Dr. Dankel

Thesis title: Primitive Roots, the Cardogan Partition, and the 3X+1 Problem

Fang Liu ........................................................................................................2003

Thesis directed by Dr. Lu

Thesis title: Numerical Solutions of Nonlinear Elliptic Problem Using Combined-Block Iterative Methods

Jinsong Chen ..................................................................................................2003

Thesis directed by Dr. Blum

Thesis title: Variance Analysis for Kernel Smoothing of a Varying-Coefficient Model with Longitudinal Data

C. Wayne Martin ...............................................................................................2003

Thesis directed by Dr. Karlof

Thesis title: Quantization using Permutation Codes with a Uniform Source

Jonathan W. Duggins .......................................................................................2003

Thesis directed by Dr. Blum

Thesis title: Simultaneous Confidence Bands for Nonparametric, Polynomial-Trigonometric Regression Estimators

Jennifer S. Eyl .................................................................................................2003

Thesis directed by Dr. Freeze

Thesis title: Spanning Subsets of a Finite Abelian Group of Order pq
Yaxi Zhao ........................................................................................................2003

Thesis directed by Dr. Lu

Thesis title: Numerical Solutions of Nonlinear Parabolic Problems Using Combined-Block Iterative Methods

Huajun Zhou ........................................................................................................2003

Thesis directed by Dr. Karlof

Thesis title: The CON Job Scheduling Problem on a Single and Parallel Machines

Yuan Liu ........................................................................................................2004

Thesis directed by Dr. Blum

Thesis title: Mixed Anova Model Analysis of Microarray Experiments with Locally Pooled Error

Peter M. Hocking ........................................................................................................2004

Thesis directed by Dr. Karlof

Thesis title: Solving The Binary Integer Bi-Level Linear Programming Problem

Meng Wu ........................................................................................................2004

Thesis directed by Dr. Simmons

Thesis title: Data Mining DNA Microarray Experiment with a GEE Approach

Brent O. J. Young ........................................................................................................2005

Thesis directed by Dr. Freeze

Thesis title: An Examination of Class Number for $Q(\sqrt{d})$ where $\sqrt{d}$ has Continued Fraction
Expansion of Period Three

**Yusheng Zhai** .................................................................2005

Thesis directed by Dr. Ricanek

Thesis title: Time Series Forecasting Competition Among Three Sophisticated Paradigms

**David Randolph Lorek** .......................................................2005

Thesis directed by Dr. Chang

Thesis title: Approximating Shortest Paths in Large Networks

**Lin Cheng** ........................................................................2005

Thesis directed by Dr. Chang


**Richard M. Reiter** ..............................................................2005

Thesis directed by Dr. Frierson


**Andrew Rose** .................................................................2006

Thesis directed by Dr. Herman

Thesis title: Numerical Simulations of the Stochastic KDV Equation

**Danny Robert Modlin** .......................................................2006

Thesis directed by Dr. Blum

Thesis title: Utilizing Time Series Analysis to Forecast Long-Term Electrical Consumption
Matthew Psioda

Thesis directed by Dr. Freeze

Thesis title: An Examination of the Structure of Extension Families of Irreducible Polynomials Over Finite Fields

Adam R. Key

Thesis directed by Dr. Lammers

Thesis title: The Search for the Heisenberg Inequality over Finite Frames

Michael Andrew Zichy

Thesis directed by Dr. Lammers

Thesis title: $\sum \Delta$ Quantization with the Hexagon Norm in $C$

Kathleen Mary Karlon

Thesis directed by Dr. Boone and Dr. Ricanek

Thesis title: Determining Optimal Architecture for Dynamic Linear Models in Time Series Applications

Teresa Emilea Norris

Thesis directed by Dr. Simmons

Thesis title: Metabolomics

Haikun Bao

Thesis directed by Dr. Simmons

Thesis title: Bayesian Hierarchical Regression Model to Detect Quantitative Trait Loci
Caroline Pearson 2007
Thesis directed by Dr. Simmons
Thesis title: Analysis of a Hierarchical Bayesian Method for Quantitative Trait Loci

David R. Neal 2007
Thesis directed by Dr. Herman
Thesis title: Finite Difference Approximations of Advection-Diffusion Equations for Modeling Shark Populations

Wei Cheng 2007
Thesis directed by Dr. Karlof
Thesis title: Heuristics for Two-Machine Flowshop Scheduling with Setup Times and an Availability Constraint

Yi Chen 2007
Thesis directed by Dr. Simmons
Thesis title: QTL Detection from Stochastic Process by Bayesian Hierarchical Regression Model

Rebecca Wilkinson 2008
Thesis directed by Dr. Herman
Thesis title: Numerical Explorations of Cake Baking Using the Nonlinear Heat Equation

Elmer Poliquit 2008
Thesis directed by Dr. Karlof
Thesis title: A Method for Solving the Minimization of the Maximum Number of Open Stacks Problem within a Cutting Process
Appendix 3: Graduate Class Enrollments

(In cross listed classes, u indicates undergraduate students and g indicates graduate students)

<table>
<thead>
<tr>
<th>Enrollment by Course - Mathematics</th>
<th>2002 - 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(02-03)</td>
</tr>
<tr>
<td>MAT 411/511 (Real Analysis I)</td>
<td>6u 4g</td>
</tr>
<tr>
<td>MAT 412/512 (Real Analysis II)</td>
<td>1u 3g</td>
</tr>
<tr>
<td>MAT 415/515 (Complex Variables)</td>
<td>3u 2g</td>
</tr>
<tr>
<td>MAT 418/518 (Applied Analytic Mths I)</td>
<td>5u 4g</td>
</tr>
<tr>
<td>MAT 419/519 (Applied Analytic Mths II)</td>
<td>2u 4g</td>
</tr>
<tr>
<td>MAT 421/521(Number Theory)</td>
<td></td>
</tr>
<tr>
<td>MAT 425/525 (Numerical Analysis)</td>
<td>1u 4g</td>
</tr>
<tr>
<td>MAT 435/535 (Linear Programming)</td>
<td>3u 5g</td>
</tr>
<tr>
<td>MAT 436/536 (Discrete Optimization)</td>
<td>3g</td>
</tr>
<tr>
<td>MAT 451/551 (Topology)</td>
<td></td>
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<tr>
<td>MAT 457557 (Differential Geometry)</td>
<td>2u 3g</td>
</tr>
<tr>
<td>MAT 463563 (ODE)</td>
<td>2u 4g</td>
</tr>
<tr>
<td>MAT 465/565 (Applied Probability)</td>
<td>2u 4g</td>
</tr>
<tr>
<td>MAT 531(Linear Algebra)</td>
<td>5</td>
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<tr>
<td>MAT 541(Modern Algebra I)</td>
<td>4</td>
</tr>
<tr>
<td>MAT 542 (Modern Algebra II)</td>
<td>3</td>
</tr>
<tr>
<td>MAT 564 (Applied Analytic Models)</td>
<td></td>
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<tr>
<td>MAT 569 (Stochastic Models in OR)</td>
<td></td>
</tr>
<tr>
<td>MAT 592 (Topics in Mathematics)</td>
<td>11</td>
</tr>
<tr>
<td>Course Description</td>
<td>(02-03)</td>
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<td>--------------------------------------------------------</td>
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</tr>
<tr>
<td>STT 411/511 (Desn of Expers &amp;Anly of Var)</td>
<td>5u 13g</td>
</tr>
<tr>
<td>STT 412/512 (Appl Reg &amp; Corr)</td>
<td>14u 6g</td>
</tr>
<tr>
<td>STT 420/520 (Biostatistical Analysis)</td>
<td>9u 5g</td>
</tr>
<tr>
<td>STT 425/525 (Catagorical Data Analysis)</td>
<td>9u 2g</td>
</tr>
<tr>
<td>STT 430/530 (Non-parametric Statistics)</td>
<td>5u 1g</td>
</tr>
<tr>
<td>STT 466/566 (Mathematical Statistics I)</td>
<td></td>
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<tr>
<td>STT 467/567 (Mathematical Statistics II)</td>
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<tr>
<td>STT 592 (Topics in Statistics)</td>
<td>1</td>
</tr>
</tbody>
</table>
Report of the Visiting Team on the Graduate Program in Mathematics at UNC-Wilmington

Dr. Chal Benson
Professor of Mathematics and Director of Graduate Studies in Mathematics, East Carolina University

Dr. Holly Hirst
Professor of Mathematics and Associate Dean for Graduate Studies, Appalachian State University

The reviewers were sent the departmental self-study covering the time period of 2001 through 2008. The self-study, prepared by the committee of Graduate Advisors, is well written and informative. It documents the productivity of the program during the past seven years and details changes made in response to a previous program review.

We visited the UNC Wilmington Department of Mathematics and Statistics on March 26 and 27, 2009. After being charged by the Dean of the Graduate School, we met with the Graduate Director, the Dean of Arts and Sciences, the Department Chair, faculty, and graduate students. We appreciate the hospitality and welcome we received from all of the UNC Wilmington faculty, staff, and students.

In our view the Mathematics graduate program is well thought out and well functioning, filling a need in the Wilmington area. The Mathematics Department merits institutional support in the continued development of this program.

We were impressed by the overall quality of the program, especially as regards the engagement of students with faculty in meaningful research. A number of points are particularly noteworthy:

• In contrast to comparable programs a large majority of enrolled students elect the thesis option. In total, the program has produced 40 theses during the 2001-2008 period.
• These theses are of high quality and some have resulted in publications and conference presentations. This is relatively rare for Mathematics master’s theses.
• More than one quarter of the program graduates since 2001 were subsequently admitted to PhD programs elsewhere.
• Other recent graduates are gainfully employed in positions that use their mathematical expertise, either in industry or as instructors at the college, community college and high school levels. Graduates have had great success realizing their career goals.

Compared to other master’s-only graduate programs in mathematics, the program is healthy in size and stable in its enrollment:

• Program enrollment (including non-degree seeking students) has averaged 23 students per year during the past eight years.
• 26 students are currently enrolled.
• The program has produced on average 8.4 graduates per year during the 2001-2008 period.

A combined bachelor’s – master’s program was introduced in 2003, allowing 12 credit hours to count towards both degree components. To date between two and five students have participated in this “4+1” program each year. The program appears to be functioning well. It provides a head start for the department’s better undergraduates and a modest boost in graduate enrollment. The faculty regard the students involved as being among the best of their graduate cohort.

The department has attempted to address the recommendations from the last review. The Graduate School has increased the stipend, some additional recruiting is taking place, the four-plus-one combined bachelor’s – master’s program has been implemented, the MA degree has been discontinued, and the department has sought closer ties with both local business and with nearby doctoral institutions.

Our review of the self-study document and further conversations with faculty and students led us to the following assessment of the program.
Strengths

• The department faculty are actively engaged in research, some of which results in publications coauthored with students, despite an 18 hour annual teaching load.
• Because of the Wilmington location, the department has opportunities to work with business and industry on research and internship opportunities. Some students are attracted by the natural beauty of the coastal area.
• The students are quite satisfied with the program, including the quality and rigor of the courses, the accessibility of the faculty, and their perception of the utility of the degree once they graduate.
• The department has had excellent success in recruiting and enrolling international students, in comparison with other master’s-only programs.
• The faculty is willing to offer courses late in the day to accommodate non-traditional, working students, although that population is still a small portion of the student body.

Weaknesses

• The inability to waive tuition and fees for graduate assistants makes it difficult to attract strong applicants, particularly in competition with universities from surrounding states. In addition, students in mathematics have the option of proceeding directly into a doctoral program, so the competition for the top students also includes doctoral programs, which generally offer more competitive financial packages.
• The self-identified strengths of the program were “master’s students can get an assistantship” and “we give personal attention to our students.” While these attributes mark the program as different from a master’s in a PhD granting department, they do not distinguish the programs from other, master’s only programs (for example, ECU, Appalachian, Western Carolina, UNC-Greensboro).
• There is little “proactive” recruiting on the part of the department to identify prospective students. However, once a prospect is identified, the department is very responsive to requests for information and follows up with prospective students as they navigate the application process.
• Only about one third of the faculty seem to be actively involved in the graduate program, as evidenced by who is teaching and mentoring students on a regular basis.
• Office space and computational resources made available to graduate assistants are inadequate.

Opportunities

• The majority of theses have been involved applications of mathematics and statistics; this could be used to provide a focus to the program.
• The emerging requirement that programs produce expectations for and assessment of student learning outcomes could provide an impetus for the faculty to clarify and solidify the goals and objectives for the program beyond “The two year program is designed to prepare students for careers in business, industry, government or teaching, as well as for further study toward the Ph.D. degree.”

Threats

• The vast majority of students choose to complete a thesis, and the amount of mentoring needed to ensure quality products strains faculty resources. There is a danger of more faculty choosing not to participate in the graduate program.
• Having four introductory sequences, of which students must choose two, forces four of the offerings each semester to be pre-determined. Offering additional courses results in a need to run them as senior-graduate courses or very low enrolled – or both.
• The increased pressure to ensure that graduate courses have five or more students enrolled will force the department to reduce its offerings, further eliminating choices for the students.

Recommendations:
(1) We recommend that the department compensate the faculty for thesis mentoring. Forty theses have been completed in the last seven years, and despite the addition of a non-thesis option, the vast majority students still elect to complete a thesis. This has created a large mentoring workload, which is largely uncompensated. Such compensation could be handled by implementing the current policy of a one course reassignment based on chairing three thesis committees. Probably this policy is insufficient but represents, at least, a starting point. This recommendation was also made in the previous program review, and although the policy was established, it does not appear to be uniformly implemented.

(2) We recommend that GAs each have individual desk space, preferably lockable so that they have a secure location to leave personal items and the papers that they are responsible for grading. The facilities for the graduate assistants – secure office space and technology – are insufficient. In addition, GAs should have access to computers capable of running current software without having to schedule their work between classes in a lab or late at night when the computer system maintenance interferes with running software.

(3) We recommend that the department continue its self-study process beyond the report prepared for the review and investigate a more specific mission statement, program goals, objectives, and learning outcomes. In fact, such a process may be required for purposes of accreditation. During this process we encourage the department to consider the following questions:

(a) Is it possible to focus the program and provide more definition for the qualities that differentiate this program from other master’s-only programs? Is a professional science master’s (http://www.sciencemasters.com) a viable option?

(b) Are there ways in which the curriculum can be redesigned to focus the program, perhaps combining in some fashion the pure and applied sequences? Having one pair of required analysis courses and one pair of required algebra courses that may not be a sequence? Eliminating this choice for entering students might open up more choices for students later in the program after they have a better idea of the research they wish to participate in.

(c) Are there ways in which the GAs can be “repurposed” to provide a more meaningful experience for the students and more support for the faculty? Would RAs be useful for some faculty? Would GTAs that assist in class in ways other than grading? Does the benefit provided to the department and the GAs by math tutoring duties outweigh the cost (half of the GA resources are only indirectly benefiting the department)?

(d) Given the research focus of the programs, there may be funding available for additional graduate assistantships or fellowships. Would the federal programs GK12 (http://www.nsf.gov/funding/pgm_list.jsp?type=xcut) or GANN (http://www.ed.gov/programs/gaann/index.html) or SSTEM (http://nsf.gov/pubs/2006/nsf06527/nsf06527.htm) be possibilities?
MEMORANDUM

TO: Bob Roer, Dean
Graduate School

FROM: John Karlof, Graduate Coordinator
Mathematics and Statistics Department

DATE: August 31, 2009

RE: 2009 Review of Graduate Programs Report

The external review of the science degree program in mathematics was conducted March 26, 27, 2009. The external reviewers made three recommendations. The department believes these recommendations are consistent with the goals of the program. Each of the recommendations is addressed below.

Recommendations.

“In our view the Mathematics graduate program is well thought out and well functioning, filling a need in the Wilmington area. The Mathematics Department merits institutional support in the continued development of this program.”

(1) “We recommend that the department compensate the faculty for thesis mentoring. Forty theses have been completed in the last seven years, and despite the addition of a non-thesis option, the vast majority students still elect to complete a thesis. This has created a large mentoring workload, which is largely uncompensated. Such compensation could be handled by implementing the current policy of a one course reassignment based on chairing three thesis committees. Probably this policy is insufficient but represents, at least, a starting point. This recommendation was also made in the previous program review, and although the policy was established, it does not appear to be uniformly implemented.”

Response:
The 2002 reviewers report contained a similar recommendation and the department instituted what is called the current policy in the recommendation. However, it has never been implemented because the department has not been able to afford course releases for thesis mentoring because of the pressure of offering enough basic study sections of mathematics and statistics.

(2) “We recommend that GAs each have individual desk space, preferably lockable so that they have a secure location to leave personal items and the papers that they are responsible for grading. The facilities for the graduate assistants – secure office space and technology – are insufficient. In addition, GAs should have access to computers capable of running current software without having to schedule their work between classes in a lab or late at night when the computer system maintenance interferes with running software.”
Response:
The department whole heartedly agrees with the recommendation. However, we have not been able to secure more space from the University for more GA offices.

(3) “We recommend that the department continue its self-study process beyond the report prepared for the review and investigate a more specific mission statement, program goals, objectives, and learning outcomes. In fact, such a process may be required for purposes of accreditation. During this process we encourage the department to consider the following questions:

a) Is it possible to focus the program and provide more definition for the qualities that differentiate this program from other master’s-only programs? Is a professional science master’s (http://www.sciencemasters.com) a viable option?

b) Are there ways in which the curriculum can be redesigned to focus the program, perhaps combining in some fashion the pure and applied sequences? Having one pair of required analysis courses and one pair of required algebra courses that may not be a sequence? Eliminating this choice for entering students might open up more choices for students later in the program after they have a better idea of the research they wish to participate in.

c) Are there ways in which the GAs can be “repurposed” to provide a more meaningful experience for the students and more support for the faculty? Would RAs be useful for some faculty? Would GTAs that assist in class in ways other than grading? Does the benefit provided to the department and the GAs by math tutoring duties outweigh the cost (half of the GA resources are only indirectly benefiting the department)?

d) Given the research focus of the programs, there may be funding available for additional graduate assistantships or fellowships. Would the federal programs GK12(http://www.nsf.gov/funding/pgm_list.jsp?type=xcut) or GANN(http://www.ed.gov/programs/gaann/index.html) or SSTEM(http://nsf.gov/pubs/2006/nsf06527/nsf06527.htm) be possibilities?.”

Response:
This recommendation will be on the agenda of the Graduate Advisors Committee for fall, 2009. The committee anticipates making recommendations to the department on the following issues:

- Program focus, goals, and objectives.
- How to emphasize program qualities that differentiate it from other masters’ programs.
- Reconsider the curriculum with the goal of emphasizing the program’s focus, goals, and objectives and to make course offerings more efficient.
- Reconsider the roles of GA’s in the department.
- Graduate student funding from outside sources.