**College of Liberal Arts & Sciences**

**Academic Program Review Self-Study Report**

**Academic Year: 2012-2013 (with some updates from 2013-2014)**

**Unit Name: Mathematics and Statistics**

**Unit Chair: Yuanan Diao**

**The Name of the Unit’s College: Liberal Arts and Sciences**

**College Dean: Nancy Gutierrez**

1. **EXECUTIVE SUMMARY**

Primary mission: provide highest quality instruction in modern mathematics and statistics for the manifold purposes of:

* building a foundation for students in all STEM disciplines
* specialty training for students in professional areas such as Actuarial Science, Risk Management, and Mathematical Finance
* educating and preparing future teachers of mathematics
* graduate level training in Mathematics, Statistics, and Mathematical Finance for regional employment in Financial/Business sectors and College level teaching
* advanced doctoral level training in Math, Applied Math, Statistics and Mathematics Education.
* sustain a top quality and productive research environment to advance knowledge and to inform instruction.

Strengths of the unit: Internationally recognized faculty, successful PhD program, successful collaborations in Mathematical Finance and Mathematics Education (Curriculum and Instruction), dedication and sustained success in instructional mission in the largest teaching responsibility on the campus (from advanced graduate courses to large enrollment courses ranging from College Algebra, Elementary Statistics to Linear Algebra, Calculus III and Differential Equations).

Programmatic Challenges: maintain/expand instructional capacity to keep up with student enrollment, address the problem of shrinking offerings in advanced course work and attract new talent both in teaching and research to replace retiring faculty members.

1. **MISSION AND STRATEGIC DIRECTIONS**

Mission/Vision -- The planning process was based on the understanding that the Department’s mission is three-fold:

* to provide quality programs and courses of instruction in Mathematical Sciences and Mathematics Education at both the undergraduate and graduate levels;
* to foster research and other professional activity in Mathematical Sciences and Mathematics Education;
* to interact with the larger university community and with appropriate segments of the local, state, and national communities to provide services relating to Mathematical Sciences and Mathematics Education.

The Department of Mathematics and Statistics aspires to remain at the forefront of the growth and transition of UNC Charlotte into a Research Extensive university of 35000 students by 2020 (a target set by the leadership of UNC Charlotte). The department set itself on this course early on and is sustaining its development through the extensive range of its responsibilities. The department meets the challenges of offering important and high quality general education courses such as College Algebra and Introductory Statistics to a majority of the University’s students. The department’s undergraduate programs are attracting more and more majors including future teachers. The department, mindful of the national call for more STEM graduates, the regional industrial development in the greater Charlotte area and the university’s growth target, wants (and expects) to continue its growth in its undergraduate programming with attractive contemporary offerings in computational science and a newly approved minor in statistics, as well as in its graduate programs. The department is encouraged by the job placement of our graduate students in key areas of the regional development (particularly in the financial sector) and the increased demand for our doctoral and master’s students. While the department aspires to meet this demand and to make its share of contribution to the university’s growth target and the region’s development, it faces an increasing difficulty in this regard while maintaining high program quality due to a severe shortage of human resources. As our data shows, the department has lost quite 6 tenure track faculty members since 2008 while the total student enrollment in the courses offered by the department has increased nearly 20%. Other factors such as office spaces and TA supports will also become obstacles for future growth of our graduate and undergraduate programs.

Strategic Directions

#1: Establish a national presence in Stochastic and computational modeling. Promote multi-disciplinary research and applications.

#2: Nurture and support fundamental and applied research, graduate programming, and community engagement in Statistics and Mathematical Finance, with more outreach and engagement with regional professionals.

#3: Strengthen efforts across the curriculum to encourage, support, and properly train current and future teachers of mathematics.

#4: Develop and support efforts for early math success to help, university wide, promote degree completion.

#5: Maintain a high level of research productivity and increase grant submission rates.

#6: Review and revise department assessment and advising practices for the undergraduate major programs.

#7: Improve efforts to increase the diversity of our faculty, graduate teaching assistants and future math teachers while also fostering a greater awareness of diversity among future math teachers.

1. **PEER AND ASPIRATIONAL PEER COMPARISONS**

**Summary of Comparisons of Your School/Department and Peer/Aspirational Peer Institutions (See http://apir01nt.uncc.edu/irmainpage2/ for UNC Charlotte’s peer/aspirational peer institutions)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Institution** | **Undergrad Headcount** | **Graduate Headcount** | **Tenure Track Faculty** | **Total**  **Faculty1**  **(FTE)** | **Staff FTE2** | **External Funding ($)** | **Other data** | **Rank if Available** |
| **Portland StateU** | 223 | 108 | 26 | 57 | 3 | $21,842 |  |  |
| **Old DominionU** | 170 | 40 | 23 | 41 | 3 | $681,075 | Note1 |  |
| **U Mass Lowell** | 140 | 68 | 23 | 30 | 1 | $315,339 | Note2 |  |
| **Kent State U** | 125 | 78 | 25 | 42 | 3 | $1,268,601 | Note3 |  |
| **U New Mexico** | 218 | 98 | 26 | 36 | 5 | $1,867,262 | Note4 |  |
| **UNC Charlotte** | 299 | 100+ | 44 | 52 | 5 | $894,950 | Note5 |  |
| **UNCC’s rank** | 1 | 2 | 1 | 2 | 1 | 3 |  |  |

1 Faculty includes all tenure/tenure track, lecturers, as well as clinical faculty and instructors.

2 Administrative and technical support staff

***Discussion/analysis on unit’s ranking relative to peers/aspirational peers:***

First of all, there are several details to fill in the data sheet above:

Note 1: This department does not have faculty members in mathematics education. Instead math education is part of their college of education. 3 faculty members in the area of math education are in their college of education.

Note 2: This department does not have faculty members in mathematics education. 5 faculty members in the area of math education are in their Graduate School of Education.

Note 3: This department does not have faculty members in mathematics education and has only two faculty members in statistics. 4 math education faculty members are in a different college.

Note 4: The grant amount listed includes one large award to mathematics education that is not typical to this department, as stated by the department chair.

Note 5: The external funding figures cited are 2011-2012 fiscal year numbers.

All the departments in the list are from a peer/inspirational institution of UNCC.

A. In terms of the undergraduate student enrollment, our department ranks on the top.

B. In terms of graduate student enrollment, our department has a total of more than 100 graduate students. Even if we exclude the more than 100 students in our masters mathematics finance program (jointly with Economics and Finance), we still have more than 70 students (roughly 45 in the doctoral program and 25 in the masters program). Besides, our faculty members in mathematics education supervise up to 15 graduate students from the College of Education. So our department also ranks near the top among our peer institutions in terms of graduate student head count.

C. In terms of the number of faculty members, we are the second. Notice that two of these departments do not have mathematics education faculty members. Once these factors are considered, our total number of faculty members (tenure track only or overall) is very close to four of the five peer departments surveyed. Given that our student enrollments (both in undergraduate and graduate programs) are larger, it appears that we are actually slightly under staffed compared to these institutions.

D. In the area of full time staff members, we come out to be on the top, together with one peer institution. There three main reasons that may explain our need for these staff members. (i) We have a large number of classes that require a departmental common final exam (6 courses, with a total of 70 to 80 sections). The type setting, preparation, printing, administration, collecting and grading of these exams created a huge amount of additional work during each semester. (ii) The secretary to the associate chair is loaded with some additional tasks with course information entries that were typically the job done by the associate chair. This is to lower the amount of the associate chair’s workload, because although he is officially only requires to teach one class per semester, he actually teaches two courses per semester (including one graduate course for the math finance masters program) as the department is running short in faculty members able to provide instructions in these courses. (iii) One staff member is officially a typist. The department used to have quite a few faculty members who heavily relied on our typist to type their research papers. This support certainly is needed for these faculty members to be productive in their research (in fact one of them has been very successful in obtaining external funding). This staff member is also responsible for other tasks. For example she will soon be administering weekly mathematics placement test sessions under our new math placement scheme to be implemented in Fall 2014.

E. In terms of total external funding amount, we are significantly ahead of three of the five institutions surveyed. One department received a very large one-time award to mathematics education last year, greatly distorted their normal funding amount. Once that award is discounted, our department would be very close to the top in the group. A more detailed analysis of our department’s external funding activities is given in Section VIII.

1. **UNDERGRADUATE EDUCATION**

**Undergraduate Student Profile**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | **05-06** | **06-07** | **07-08** | **08-09** | **09-10** | **10-11** | **11-12** | **College11-12** |
| **# of Fall undergrad** | Total | 182 | 197 | 214 | 238 | 231 | 225 | 250 | 7,104 |
| **% women** |  | 57.69 | 56.35 | 53.74 | 49.16 | 45.02 | 46.67 | 52.00 | 57.97 |
| **% Ethnicity** | Total |  |  |  |  |  |  |  |  |
|  | American Indian | .00 | 1.02 | .00 | .42 | .87 | .44 | .00 | .51 |
| Asian American | 2.20 | 4.57 | 6.07 | 5.46 | 6.93 | 9.33 | 7.20 | 5.17 |
| African American | 16.48 | 17.26 | 17.76 | 17.65 | 14.72 | 15.11 | 15.60 | 20.64 |
| Hispanic | 1.10 | 1.02 | 1.40 | 1.26 | 3.03 | 1.78 | 6.40 | 6.94 |
| White | 78.02 | 75.13 | 73.36 | 73.11 | 67.10 | 64.00 | 62.40 | 58.33 |
| Unknown | .00 | .00 | .00 | .00 | 3.90 | 4.89 | 2.40 | 4.73 |
| **% International** |  | 2.20 | 1.02 | 1.40 | 2.10 | 3.46 | 3.56 | 4.80 | 1.63 |
| **% Part-time** |  | 13.74 | 18.78 | 21.96 | 22.69 | 19.91 | 16.44 | 16.80 | 15.05 |
| **% returning freshman to univ.2** |  | 85.71 | 81.25 | 94.12 | 85.71 | 76.19 | 57.14 | 75.00 | N/A |
| **% returning freshman to dept3** |  | 76.19 | 65.63 | 82.35 | 61.90 | 66.67 | 52.38 | 40.00 | N/A |
| **Degrees awarded1** | Total | 30 | 47 | 51 | 63 | 62 | 75 | 70 | 1,647 |

1 Total degrees awarded for the academic year beginning in the summer and includes fall and spring semester

2 Percentage of first-time, full-time freshmen who returned to the **university** for a second year

3 Percentage of first-time, full-time freshmen who returned to the **department** for a second year

**Six year Graduation Rates by Entering Freshman Cohort 1**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Cohort** | **06-07** | **07-08** | **08-09** | **09-10** | **10-11** | **11-12** | **12-13** |
| **Dept. 6 year graduation rate1** | 45.45 | 16.67 | 33.33 | 40 | 28.57 | 25 | 47.06 |
| **At university 6 year rate** | 72.73 | 58.33 | 53.33 | 55 | 61.9 | 53.13 | 70.59 |
| **UNCC’s 6 year graduation rate1** | 48.7 | 50.5 | 50.6 | 53.9 | 55.1 | 52.6 | 53.3 |

1 Percentage of first-time, full-time freshman cohort who graduated within 6 years or less.

**Analysis:**

1. Assessment of enrollment patterns and diversity of the undergraduate student population with areas for improvement: Our enrollment has been steadily increasing over the years and the current number is actually close to 300. The percentage of women is quite high (over 50% since 2011) given that mathematics is traditionally a field where few women would major in. The percentage of minority student enrollment held steady over the years. Although there is no apparent weakness in this area, there may be a need for us to raise the admission standard given the assessments 2 and 3 below.
2. Assessment of the freshmen year persistence/retention patterns and areas of improvement: While the percentage of freshmen students returning to the department has declined in the last 2 to 3 years, the number of degrees awarded has been steady and healthy. This is an area that needs a closer examination. One possible reason is that the overall quality of the students admitted to our programs may need to be raised.
3. Assessment of the six-year graduation patterns for entering freshmen cohorts: This number greatly fluctuates from year to year since only a small percentage of the math major students declare their major in their first year, and even a smaller percentage actually stay in the major. It is thus not a good measure. In the table on the second line, we provided the 6 year graduation rate of all students who declared math major in their freshmen year and stayed at UNCC to complete their degree. That rate is actually consistently better than the university rate. The following is the response from Dr. Wayne Stone, associate director of Institutional Research at UNCC, who retrieved the data: “This particular measure is calculated only on the first-time full-time freshmen that enrolled as math majors in their first semester and then graduated in the math major within six years.   So they make up only a small subset of your majors. Most of your majors appear to be either transfer students or UNCC students who changed their major to math from another major reflected in that measure. Given that most of your majors do not enter the math program as new freshmen this may not be an appropriate measure for your undergraduate program. Also as the table shows while many of your new freshmen do not graduate in Math they do graduate in other majors at or above the overall university rate.”

**Program Inventory**

**Current Undergraduate Degree Programs Offered by Unit**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | **2005-06** | **2006-07** | **2007-08** | **2008-09** | **2009-10** | **2010-11** | **2011-12** |
| **BA in Math** | **Fall Headcount** | 150 | 159 | 177 | 187 | 179 | 177 | 201 |
| **Fall Sr. headcount** | 40 | 65 | 62 | 75 | 60 | 62 | 69 |
| **Degrees Awarded1** | 24 | 38 | 39 | 45 | 37 | 31 | 37 |
| **Graduation Ratio2** | 60% | 58% | 63% | 60% | 62% | 50% | 54% |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | **2005-06** | **2006-07** | **2007-08** | **2008-09** | **2009-10** | **2010-11** | **2011-12** |
| **BS in Math** | **Fall Headcount** | 32 | 38 | 37 | 51 | 52 | 48 | 49 |
| **Fall Sr. headcount** | 13 | 19 | 18 | 22 | 25 | 31 | 28 |
| **Degrees Awarded1** | 6 | 9 | 8 | 12 | 21 | 25 | 17 |
| **Graduation Ratio2** | 46% | 47% | 44% | 55% | 84% | 81% | 61% |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | **2005-06** | **2006-07** | **2007-08** | **2008-09** | **2009-10** | **2010-11** | **2011-12** |
| **BA/BS in Math for Business** | **Fall Headcount** |  |  | 4 | 11 | 37 | 49 | 49 |
| **Fall Sr. headcount** |  |  | 2 | 6 | 9 | 27 | 24 |
| **Degrees Awarded1** |  |  | 4 | 6 | 4 | 19 | 16 |
| **Graduation Ratio2** |  |  | 50% | 100% | 44% | 70% | 67% |

1 Total degrees awarded for academic year (summer, fall and spring semesters)

2 Percentage of degrees awarded/senior headcount

**Program Analysis:**

1. Assessment on the patterns of enrollment in degrees and certificate programs noting areas for growth, disestablishment, currency (e.g., size, viability of program). (Please provide sample programs of study in Appendix A): Our BA and BS in Mathematics programs have held steady in this review period, while our BA in Mathematics for Business program has certainly taken off and have reached a sustainable mass, which indicates that these programs have good visibility. Given the limited resources of the department, it may be a good time to think about controlling the growth rate of these programs and adding faculty strengths.

2. Assessment on graduation rates for each program and strategies for improvement: These are currently at healthy levels and will only require annual monitoring at this time.

3. List any new degrees, minors, concentrations and/or certificates that you plan to launch in the next two years: None (the department had just launched a minor in statistics in Spring 2013).

4. Discussion on service course load and other curricular offerings relative to other programmatic directions (e.g., quality, viability): The department handles the largest service load in the university. For example, the total student credit hours taught by the math department in fall of 2012 stood at 27,589 and in fall 2013 reached more than 30,000. This far exceeds the total student credit hours taught by any other departments. Each research active faculty member in our department teaches two courses per semester, typically one large class (up to 140 students per class, with an average ranging from 100 to 120) at a lower level (often a service course) and one upper or graduate level class at the regular size (usually a graduate level course or an upper level mathematics course). More detailed teaching load data is presented in Section VI (Faculty Profile). The service course load is shared by four groups of instructors: tenure-track faculty members, full time lecturers, part time lecturers and graduate teaching assistants. Because of the greatly increased enrollment and the not so much increased resources, it has become a great challenge for the department to cover the service courses with adequate and quality instructors. We have been forced to open large sections in courses such as Calculus I, Calculus II, Calculus III, Linear Algebra, Differential Equations. All of these are required courses for our math majors, many Science students, and all Engineering students, and are best taught at a regular class size setting (ideally under 30 per class), as detailed instruction/interaction as well as in depth homework grading/analysis are the best ways to teach these materials. We are struggling to maintain the quality of these courses. If this problem persists, it will inevitably affect the quality and growth of our programs and the researches/grant activities of our tenure track faculty members will also be affected ultimately.

***Additional questions:***

***Describe the undergraduate curriculum. What is the rationale for the undergraduate curriculum?***

The Department of Mathematics and Statistics at the University of North Carolina at Charlotte offers undergraduate math majors in Mathematics and Mathematics for Business leading to the B.A. and B.S. degrees. The department also offers minors in mathematics, actuarial mathematics, and statistics. Many of our students in the B.A. program are working towards the North Carolina teaching license for high school mathematics, and we work collaboratively with the Department of Middle and Secondary Education to offer appropriate courses in mathematics and mathematics education. Concentrations for mathematics majors are offered in statistics and actuarial mathematics. Concentrations for mathematics for business majors are offered in economics and finance, actuarial mathematics, and operations research.

The B.A. and B.S. programs in mathematics consist of a minimum of 34 and 40 semester hours of approved mathematics courses, respectively. Both programs require core courses in calculus (four semesters), linear algebra, differential algebra, and modern algebra. A mathematics awareness seminar and senior project are required in both programs. In addition, students in the B.A. program choose at least four courses at the upper level (3000 level or above). Students in the B.S. program choose at least six courses at the upper level. These courses must include two semesters of advanced calculus and an advanced course in modern algebra, linear algebra, statistics, analysis, or topology. Both programs require one course in computer science (ITCS1212+L).

The B.A. and B.S. programs in mathematics for business consist of a minimum of 36 to 45 semester hours of approved mathematics courses respectively. Both programs require courses in calculus (two courses for the B.A. and three courses for the B.S.), statistics (two courses for each program), linear algebra, theory of interest, applied regression, operations research, and computer applications in financial mathematics. The B.S. program requires an additional calculus course and differential equations course. At the upper-level, the B.A. program requires three approved courses. The B.S. program requires four upper-level courses in one of the concentrations – economics and finance, actuarial mathematics, and operations research.

All of the major programs offered by the department require one course in computer programming and the completion of an approved minor or 18 hours of non-math related work.

There are three guiding principles that have led us as we have planned, implemented, assessed, and changed our undergraduate programs. First, the nature of mathematics has changed and is continuing to change. These changes are driven by societal needs, changes in technology, and changes in mathematics itself. Second, we need more students to graduate from our undergraduate programs. The need for highly-qualified mathematics teachers in North Carolina and throughout the United States is well-documented. Graduates from our programs go into a variety of jobs, careers, and professions. Some are very math-intensive, such as actuaries and math teachers. While some are focused more on other areas, such as business, law, and medicine, these students will use the analytical and critical thinking skills that they developed in their math courses. Third, the population of mathematics majors is changing and needs to change even more. We recognize that students from groups that are traditionally underrepresented must be encouraged and supported to stay in and succeed in their math studies. Many of our students in the programs transfer in from community colleges. Most students change their minds about their majors sometime during their college career. All three of these principles help us plan our programs, advise our students, and teach our classes.

These organizations, National Council of Teachers of Mathematics, the Mathematical Association of America, and the Society of Actuaries, make recommendations that guide mathematics departments in the development of their programs for undergraduate students. These guidelines together with university requirements for programs are used by the undergraduate coordinator and the undergraduate curriculum committee as they make changes to the existing programs and propose new courses and programs.

***How have the programs changed in the last five years? How does the curriculum compare nationally with trends in the discipline?***

In the last five years, we have implemented three new programs: the B.A and B.S. programs in mathematics for business (described above) and a minor in statistics. The impetus for the B.A. and B.S. programs was changes in the entrance requirements into the College of Business. While some of our students join the program as their Plan B after they do not get into the College of Business, most of our students begin the program as their “first choice” major. Many of them explain that they want to be math majors and these programs give them more career-focused options. The statistics minor is the newest program and will be implemented in the fall of 2013. This program was created in a response to the needs of other departments whose majors take at least one statistics-related course in their discipline. This program (outside of our department) was included in the curriculum for the minor.

We have also revised some of our programs. Two years ago, we expanded the list of advanced courses from which students in the B.S. program in mathematics could choose to include analysis and numerical linear algebra. When the Society of Actuaries changed the content of some of their professional tests, we modified the minor in actuarial mathematics to fit the needs of these students.

Since the licensure for high school mathematics teachers in most states is guided by the standards of the National Council of Teachers of Mathematics (NCTM), our program is very similar to those of most other universities. Our actuarial programs were designed in accordance with recommendations from the Society of Actuaries as those of similar programs at other universities. According to the Mathematical Association of America, “the mathematical sciences bachelor's degree program should be consistent with the current recommendations of the MAA Committee on the Undergraduate Program in Mathematics (CUPM) Guidelines.” Our program is consistent with those recommendations as are the undergraduate programs in most accredited colleges and universities. UNCC is now on the list of colleges offering Actuarial courses by the Society of Actuaries.

***Describe the areas in which the department’s undergraduate programs are particularly strong by national standards. What evidence supports this view?***

Our department is particularly strong in the Actuarial Mathematics Concentration and the Mathematics Education component. The Actuarial Mathematics program was designed specifically to give students the background that they need to pass the first two tests required by the Society of Actuaries. Even though our program is very young (started in 2004), the number of students passing these exams has quickly and steadily increased to a very respectful number as shown in the following table.

|  |  |  |
| --- | --- | --- |
| **Year exam passed** | **Exam name** | **# of Student Passing** |
| 2005 | FM | 1 |
| P | 1 |
| 2006 | FM | 2 |
| P | 1 |
| 2008 | FM | 3 |
| P | 1 |
| 2009 | FM | 6 |
| P | 3 |
| MFE | 2 |
| 2010 | FM | 6 |
| P | 4 |
| C | 1 |
| 2011 | FM | 10 |
| P | 5 |
| MLC | 1 |
| MFE | 1 |
| 2012 | FM | 9 |
| P | 4 |

Our students also did well in terms of their internships and/or job placement after graduation: they have been hired by some well known and prestigious insurance companies such as TIAA-CREF, Lincoln Financial Group, All State and Transamerica.

The Mathematics Education component of the department is also very strong. Students who are working towards teacher licensure in grades 9 through 12 are math majors who have a minor in secondary education. They complete all of the requirements for the B.A. in mathematics and the mathematics, mathematics education, and education courses required by NCATE (National Council for Accreditation of Teacher Education) and NCTM (National Council of Teachers of Mathematics). Students who are working towards licensure in middle grades mathematics (grades 6 through 9) are in the B.A. program in Middle Grades Education. They complete a sequence of four mathematics courses and one methods course that are taught by the mathematics education faculty in our department. These four mathematics courses were planned specifically for these majors to help them develop a deeper and stronger understanding of the concepts of middle grades mathematics.

According to the 2013 UNC Teacher Preparation Effectiveness Report (prepared by the University of North Carolina General Administration), students who graduated from our secondary mathematics program outperformed teachers from all of the comparison groups except for those in two groups. These two groups were mathematics teachers in the Teach for America program and mathematics teachers with graduate degrees. All of the other groups were made up of teachers who were either international faculty or who graduated from other teacher preparation programs. Students who graduated from our middle grades program (these students received their mathematics courses from our mathematics education faculty) outperformed all groups except for teachers in the Teach for America program.

Students from both of these programs are required to take the Praxis II exam, which is a national teacher licensure test. It is very difficult to obtain hard data on the passing rate of students taking this exam (students taking it are mixed traditional 4-year programs and the post baccalaureate students) so even College of Education does not try to collect this data. However we speculate that our students in both programs must be performing reasonably well on the exam since we have never received any complaints.

***How do the department’s courses fit into the institution’s general education requirements and the service needs of other departments?***

The general education program at our university is central to our basic mission of providing all undergraduates with a high-quality liberal arts education. One goal of the program focuses on the development of students’ foundational skills that are necessary for obtaining all of the benefits of their college education. Mathematical and logical skills are particularly important to help students understand, analyze, and think critically about all aspects of their education at UNC Charlotte. All students must take two courses that are approved to meet this requirement. While most students meet this requirement by taking two mathematics courses (such as College Algebra and Introductory Statistics), some students complete the requirement with one mathematics course and a philosophy course in deductive logic. All of our freshman level courses (College Algebra, Introduction to Mathematical Thought, Pre-calculus, Calculus I, and others) are approved to meet this general education requirement.

We also offer courses that are required by other majors and serve the needs of their departments. Students in the engineering majors are required to take several calculus courses, differential equations, and a calculus-based statistics course. The mathematics minor is structured in such a way that these students only need to take one more upper-level math course to complete the minor, so many of these students are in our math minor program. Students whose majors are in the College of Computing and Informatics are also required to take several mathematics courses, so these students also are frequently math minors. The entrance requirement for all majors in the Belk College of Business includes the completion of two mathematics courses – Calculus and Introductory Statistics. This is not the calculus course that is required for math and engineering majors, so this course is populated primarily by pre-business students. This calculus course does not include trigonometric functions, and while the calculus concepts are the same as those taught in the other calculus I course, the examples and application problems focus on business-related concerns.

We work closely with the College of Education to prepare elementary school, middle grades mathematics, and high school mathematics teachers. Students working towards secondary licensure complete all of the requirements for the B.A. in mathematics. To meet the requirements of NCATE and NCTM, these students must take courses in statistics, history of mathematics, and geometry. These courses are all offered at the upper level in our department and are taken as part of the upper-level requirements for the degree. Middle school mathematics majors take all of their required mathematics courses (at least 6 courses) in our department, and we have created four courses that are very effective in teaching them the necessary concepts from all areas of the school mathematics curriculum. Elementary school majors are also required to take two mathematics methods courses that are taught by our mathematics education faculty. Faculty members in our department in the area of mathematics education have the appropriate mathematical backgrounds and experiences for teaching all levels of K-12 teacher education. Furthermore, our Math Ed faculty collaborate with the UNCC Center for Science, Technology, Engineering and Mathematics (STEM) Education in the College of Education as needed, through grants and other activities for in-service mathematics teachers.

***Describe the department’s honors program and courses, if any. What is the department’s attitude towards honors work?***

Our department does offer an honors program, and students who complete the program requirements graduate with departmental honors in mathematics. Students must apply to the department for admission to the program and, if admitted, must select a mathematics faculty member who is willing to serve as an Honors advisor. The Department then recommends math honors students for formal admission to Honors candidacy and the University Honors Council approves the candidacy of a student to the program. Two courses are required for all honors students: a junior honors seminar in which students write the proposal for their research and thesis, and a senior honors tutorial in which students complete their research and write their theses. Both of these may be repeated for credit as needed. Other requirements for graduation with honors are completion of the requirements for the B.S. degree in math with a grade point average of at least 3.00, a grade point average of at least 3.25 in all of their math courses, completion of at least six hours in honors math courses with a grade point average of at least 3.5, and final approval of the students’ thesis by the University Honors Council.

The honors program started in our department many years ago (before the current chair joined the department in 1996), but it has always been an area of low activity, with one or two students per year. Our department is very supportive of the honors program, and faculty members are the primary recruiters for the program. However the department has no intention to invest a big effort to increase the student enrollment in the honors program. Beginning in the fall of 2013, one of the tenured faculty members will provide direction and oversight for the program rather than the undergraduate program. The new program director will be the liaison between the University Honors Program and Council and will advise honors students about their proposal and thesis. (Two honors students graduated in 2013 and one is enrolled in the program in Spring 2014).

***Describe, as well as possible, what graduates of the department’s programs are doing. What is the department doing to track and record the activities of its students after graduation?***

Some of our graduates continue on into graduate school. Several students from the B.S. in Mathematics for Business program have been accepted into the Mathematical Finance program in our Belk College of Business. Other students are accepted into Master’s programs in Mathematics or Mathematics Education. One graduate from the B.S. in Mathematics program this semester will enter the doctoral program in Mathematics Education at the University of Georgia in the fall of 2013.

Our graduates are hired into a variety of careers. The list below is a list of some of our students’ jobs and employers.

* High School and Middle School Math Teachers – Students in the licensure program began teaching with their initial teaching license. Students without the license were hired by a school and issued a provisional license. These students entered a lateral entry program, and many were accepted into UNC Charlotte’s Master of Arts in Teaching program.
* Actuaries – Students in the actuarial program were hired by insurance companies such as TIAA-CREF and Lincoln Financial Group. Some of these students started with these companies as undergraduate interns.
* Management programs of large companies – Harris Teeter and Lowes Home Improvement have both hired graduates in recent years.
* Data Analysis – SCOR Global Life
* Veterinarian Office Manager – This year, one of our students was hired by an Animal Hospital because of her good number sense and analytical thinking skills.

Obviously, some of these careers require a strong background in college-level mathematics – such as for the actuaries and the math teachers. This last position is a good representative of jobs that many of our students accept. These jobs do not necessarily use the higher-level mathematical concepts and procedures that they learned in Differential Equations and Modern Algebra and other courses, but they do require a good sense of numbers and a strong ability to think independently and logically.

Immediately after graduation, students from all of the programs are asked to fill out and return a survey related to their undergraduate careers and future plans. Students report whether or not they are already employed and where and by whom. The undergraduate coordinator keeps in touch with many of the graduates informally who keep her informed about their careers and families. The coordinator of the actuarial program also maintains contact with the students in this program, and each year plans a reunion for these students. She keeps a record of students’ employment plans.

**Strategic Undergraduate Directions:** Please discuss future directions/strategic initiatives of your undergraduate program(s).

A. (#3 of the department strategic direction) Strengthen efforts across the curriculum to encourage, support, and properly train current and future teachers of mathematics.

B. (#4 of the department strategic direction) Develop and support efforts for early math success to help, University wide, promote degree completion.

C. (#6 of the department strategic direction) Review and revise department assessment and advising practices for the undergraduate major programs.

Specifically, given the challenges that the department faces, we will focus on several most important things. A: increasing the teaching capacity of the department through the hire of new tenure track faculty members and lecturers, providing necessary training and mentoring for graduate teaching assistants assigned to classroom teaching and providing training and mentoring for new faculty members (including part time instructors); B and C: continually monitoring and improving our advising practices to better inform/assist students in making the right choices toward their degree completion, trying to offer wider range of required courses (including possibly more upper level courses in the summer) to eliminate possible delays due to unavailability of required courses and trying to provide better support through increased tutoring services.

**V. GRADUATE EDUCATION**

**Graduate Student Profiles**

**Master’s Student Profile**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Master’s programs** | | **2005-06** | **2006-07** | **2007-08** | **2008-09** | **2009-10** | **2010-11** | **2011-12** | **CLAS**  **11-12** |
| **Total Fall headcount** |  | 16 | 17 | 20 | 15 | 20 | 21 | 18 | 574 |
| **Degrees awarded**1 |  | 1 | 13 | 8 | 7 | 12 | 10 | 17 | 218 |
| **% women** |  | 43.75 | 41.18 | 55.00 | 53.33 | 45.00 | 38.10 | 27.78 | 58.19 |
| **% Ethnicity** | Total |  |  |  |  |  |  |  |  |
| American Indian | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| Asian American | 6.25 | .00 | 5.00 | 13.33 | 15.00 | 9.52 | .00 | 1.57 |
| African American | 25.00 | 17.65 | 15.00 | 20.00 | 10.00 | 14.29 | 16.67 | 10.10 |
| Hispanic | .00 | 5.88 | 5.00 | .00 | .00 | 4.76 | 5.56 | 2.61 |
| White | 43.75 | 47.06 | 45.00 | 53.33 | 40.00 | 42.86 | 44.44 | 77.00 |
| Unknown | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 2.96 |
| **% International** |  | 25.00 | 29.41 | 30.00 | 13.33 | 35.00 | 28.57 | 33.33 | 4.88 |
| **% Part-time** |  | 81.25 | 47.06 | 45.00 | 46.67 | 50.00 | 38.10 | 55.56 | 63.76 |
| **Selectivity**2 |  | 100.0 | 90.91 | 93.33 | 77.78 | 88.24 | 93.33 | 100.0 | 52.53 |
| **Yield** 3 |  | 46.15 | 25.00 | 21.43 | 35.71 | 53.33 | 35.71 | 28.57 | 61.13 |
| **Average GRE** | **Verbal** | 440 | 460 | 412 | 416 | 463 | 453 | 567 | 508 |
| **Quantitative** | 742 | 776 | 697 | 676 | 720 | 684 | 707 | 569 |

1Total degrees awarded for the academic year beginning in the summer and includes fall and spring semester

2Selectivity = % of (# admitted students / # applied students)

3 Yield = % of (# enrolled students / # admitted students)

**Master’s Student Profile Analysis:**

1. Assessment of the enrollment patterns and diversity of the graduate student profile (e.g., minority students, international students and part-time and full-time students): The enrollment in our masters program has held steady, with a small decline in 2011—2012. However there is a big jump in the number of degrees awarded in 2011—2012. The average number of masters degrees awarded is slightly over 11 per year. Our students in the masters program are more diverse when comparing to the college’s averages.
2. Assessment of the quality of the master’s student population with areas for improvement: The quality of our students in the masters program is sound in general, with a few exceptions where the admitted students had very weak background and lacked the necessary skills and wills to succeed. While the GRE scores are useful and we will continue using them in our admission process, closer attention will be paid to the undergraduate transcript of the applicant, the strength of the program (where the applicant graduated from) and the performance of the candidate in key mathematics courses. Part of the problem is that we do not have a large pool of applicants, making the selection more difficult. We intend to increase our effort to make our program more visible through advertisements to other mathematics undergraduate programs and through regional as well as national mathematics conferences with undergraduate students involvement. We would also like to add some TA support lines in the masters program (we currently have close to none) to make our program more competitive.

**Doctoral Student Profile**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Doctoral programs** | | **2005-06** | **2006-07** | **2007-08** | **2008-09** | **2009-10** | **2010-11** | **2011-12** | **CLAS**  **11-12** |
| **Total Fall headcount** |  | 37 | 46 | 49 | 47 | 51 | 53 | 46 | 251 |
| **Degrees awarded**1 |  | 5 | 5 | 4 | 5 | 4 | 6 | 10 | 33 |
| **% women** |  | 37.84 | 39.13 | 44.90 | 44.68 | 37.25 | 39.62 | 36.96 | 49.40 |
| **% Ethnicity** | Total |  |  |  |  |  |  |  |  |
| American Indian | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| Asian American | 2.70 | .00 | .00 | .00 | 1.96 | 1.89 | 6.52 | 3.59 |
| African American | 8.11 | 2.17 | 4.08 | 8.51 | 7.84 | 9.43 | 6.52 | 6.37 |
| Hispanic | .00 | .00 | .00 | .00 | .00 | .00 | 2.17 | 1.99 |
| White | 21.62 | 28.26 | 30.61 | 34.04 | 27.45 | 24.53 | 21.74 | 49.80 |
| Unknown | .00 | .00 | .00 | .00 | 7.84 | 3.77 | 4.35 | 2.39 |
| **% International** |  | 67.57 | 69.57 | 65.31 | 57.45 | 54.90 | 60.38 | 58.70 | 34.66 |
| **% Part-time** |  | 59.46 | 52.17 | 34.69 | 25.53 | 27.45 | 28.30 | 30.43 | 22.31 |
| **Selectivity**2 |  | 92.86 | 80.00 | 95.45 | 93.55 | 100.0 | 96.67 | 100.0 | 41.34 |
| **Yield** 3 |  | 69.23 | 66.67 | 52.38 | 41.38 | 28.57 | 41.38 | 27.27 | 43.81 |
| **Average GRE** | **Verbal** | 430 | 407 | 453 | 422 | 471 | 410 | 465 | 536 |
| **Quantitative** | 730 | 765 | 750 | 723 | 733 | 718 | 765 | 698 |

**Doctoral Student Profile Analysis:**

1. Assessment of the enrollment patterns and diversity of the graduate student profile (e.g., minority students, international students and part-time and full-time students): The enrollment in our doctoral program has held steady and is at the capacity of the program. The average number of doctoral degrees awarded is slightly over 5 per year (our target is 5 per year). Our students in the doctoral program have a high percentage of women (for a mathematics doctoral program) and are just as diverse when comparing to the college’s averages. One weakness in our program is the low percentage of domestic students. We intend to increase our effort to make our program more visible through advertisements to other mathematics undergraduate programs and through regional as well as national mathematics conferences with undergraduate students involvement. The department is also planning on applying for an REU program.
2. Assessment of the quality of the doctoral student population with areas for improvement: The quality of our students in the doctoral program is sound in general. We need to maintain or slightly raise our current admission standard when our applicant pool grows further, as we have reached our maximum capacity (TA support funds, office spaces and faculty members etc).

**Program Inventory**

**Current Graduate Degree Programs Offered by Unit**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Graduate degrees** | | **2005-06** | **2006-07** | **2007-08** | **2008-09** | **2009-10** | **2010-11** | **2011-12** |
| **M.A. in Mathematics Education** | **Fall # of Enrollment** | 7 | 9 | 11 | 12 | 12 | 6 | 6 |
| **Degrees Awarded**1 | 3 | 4 | 1 | 6 | 4 | 4 | 3 |
| **M.S. in Mathematics** | **Fall # of Enrollment** | 16 | 17 | 20 | 15 | 20 | 22 | 18 |
| **Degrees Awarded**1 | 1 | 13 | 8 | 7 | 12 | 10 | 17 |
| **Ph.D. in Applied Mathematics** | **Fall # of Enrollment** | 37 | 46 | 49 | 47 | 51 | 53 | 46 |
| **Degrees Awarded**1 | 5 | 5 | 4 | 5 | 4 | 6 | 10 |

1 Total degrees awarded for the academic year beginning in the summer and includes fall and spring semester

**Program Analysis:**

1. Assessment of the patterns of enrollment in degrees and certificate programs (e.g., size, viability of program): The enrollment and graduation rates for both the MS and PhD programs are about what we expected given the size of the institution, its role as a major urban university, and the size of the metropolitan area forming the core of the region served by the institution. The department made a strategic decision to put almost all of its (limited) TA supports in its Ph.D. program. This has inevitably weakened the competitiveness of our master’s program. Thus the department’s expectation for the enrollment of the master’s program is at around 20. We feel our enrollment goals have generally been met. The Master’s program in mathematics education has a relatively low enrollment as well as low number of degrees awarded. This has been a somewhat persistent issue and a formal respond to this problem is attached in Appendix D: Program Review and Recommendations Form for the Masters Program in Mathematics Education.
2. Assessment of degree completion and graduation rates for masters programs and strategies for improvement: Graduation rates in the masters program are healthy and commensurate with what we expect for an institution of our size and as compared with other units. The additional data below show that the number of years to graduation averages around 2.5 years, which is again a healthy number.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Master's Program** | | | | | | |
|  |  | 2008 | 2009 | 2010 | 2011 | 2012 |
| Degrees Awarded |  | 8 | 7 | 12 | 10 | 17 |
| Ave. Years to Deg. |  | 2.98 | 2 | 2.38 | 2.47 | 2.92 |
|  |  |  |  |  |  |  |

1. Assessment of degree completion and graduation rates for doctoral programs and strategies for improvement: Graduation rates in the doctoral program are healthy and commensurate with what we expect for an institution of our size and as compared with other units. More specifically, with the expected full time doctoral students to be around 35 to 40 (up to 35 supported by TA), our goal is to graduate at least 5 doctoral students per year on the average. The data below shows that we have achieved that goal. Our attrition rates of the doctoral program have remained in the range of 40%-50% throughout these years. In an early survey we found that the attrition rates of the doctoral programs in mathematics at some major state research universities were around 25% and at some private research universities these were around 40%, thus we consider our attrition rate is at a healthy level.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Doctoral Program** | | | | | | |
|  |  | 2008 | 2009 | 2010 | 2011 | 2012 |
| Degrees Awarded |  | 4 | 5 | 4 | 6 | 10 |
|  |  |  |  |  |  |  |

1. Assessment of the direction and currency of your curricular offerings. Please highlight any unique features of your graduate curriculum: This is an area that the department faces a big challenge. On the one hand, we have a talented and diverse faculty body (in terms of research areas and interests) that is capable of offering courses and directing doctoral students. On the other hand, this also means that our doctoral students tend to choose many different research areas (such as computational mathematics, statistics, mathematics finance/probability, all under the broad umbrella “Applied Mathematics”). This in turn requires offerings of many different courses, and we simply do not have the manpower to offer these courses and also do not have enough students to fill some of these specialty classes. The department has been trying to get around this problem by cross listing courses (undergraduate and graduate levels of the same course, for example). This approach, unfortunately, can only provide very limited help. Consequently, often a faculty member ends up taking on the (very few) students (in a specialty course) as an extra load course since the department cannot afford offering it as a regular class due to low enrollment. In a long run, it adds too much burden to the faculty members. Since the department lacks proper means to reward these faculty members, it is demoralizing and we cannot expect this practice to last for long.
2. List any degrees, concentrations, and/or certificates that you plan to launch in the next two years: None.

***Additional Questions: Describe the graduate degree programs. What is the rationale for these programs, and how are they related to the overall mission and goals of the department?***

The Ph.D. in Applied Mathematics degree program is designed to enable its students to master a significant body of mathematics, including a specialty in applied mathematics; to relate this knowledge to a coherent area of science or engineering; and to carry on fundamental research in applied mathematics at a nationally competitive level. Recipients of this degree will, according to their abilities and choice of sub-specialty, be able to work effectively in a research and development environment involving mathematical or statistical analysis and modeling in business, government or industry; to teach mathematics at the college or university level; or to carry on fundamental research in their area of specialty. The student must complete an approved program of study, including a minor, typically including approximately 54 credit hours. The minor is interdisciplinary and may be satisfied by 9 hours of graduate work outside the mathematics department, by 6 credit hours for a directed project in an area of application, or by a combination of external coursework and directed project in an area of application totaling 9 credit hours. The learning outcomes include the grades of course works, the successful passing of the preliminary exam and the qualifying exam for the Ph.D. candidacy, and the successful completion and defense of the Ph.D. dissertation.

The preliminary examination has for its foundational coursework the Real Analysis I and II sequence or the Real Analysis I/Probability Theory sequence, as well as a first-year graduate course sequence in a specialized area, such as Theory of Statistics I and II, the Modern Algebra sequence, etc. The Qualifying Examination is based on the advanced coursework that comes next and in particular on the coursework that prepares the student for their dissertation research in their chosen area. After the Qualifying Examination the student is expected to concentrate on their research and is expected accordingly to register primarily dissertation research courses with a few courses devoted to filling out the minor or comprising pertinent special topics or seminars.

The curriculum is designed to enable its students to master a significant body of mathematics, including a specialty in applied mathematics, to relate this knowledge to a coherent area of science or engineering, and to carry on fundamental research in applied mathematics. The recipient of this degree will, according to his or her abilities and choice of sub-specialty, be able to work effectively in a research and development environment involving mathematical or statistical analysis and modeling in business, government, or industry; to teach mathematics at the college or university level; and to carry on fundamental research in his or her area of specialty.

***What proportion of departmental effort and resources are allocated to the graduate program?***

Of the 42 or so tenure track faculty members, about 20 of them are assigned at least one graduate course each semester. Most of the student support (in the form of graders, teaching assistantships and tuition waivers) goes to students in our graduate program (with almost all graduate teaching assistantships and tuition waivers going to doctoral students). The internal reviewers noted that the high number of graduate level courses the department offers. However, these courses include quite a few service courses. For example, the department offers 2 graduate level courses for CHHS each semester, 3 to 4 graduate level courses per semester for the joint math finance master’s program (which has more than 100 master’s students).

***Describe the areas in which the department’s graduate programs are particularly strong by national professional standards. What evidence supports this view?***

The department’s doctoral program is particularly strong in the areas of statistics and computational mathematics. This is evidenced by the placement of our graduates immediately following their graduation. The following is a partial placement list of our recent Ph.D. students. Many of our graduates got great industrial jobs in companies such as Bank of America and Wells Fargo (not listed).

NC State University (1), Johnson Smith University (2), Hunan University, China (1), US Financial Institutions (14), Virginia Commonwealth University (1), UNAM, Mexico (1), UNC Greensboro (1), Fayetteville University (1), UNC Ashville (1), Abbot Labs (1), Zhejiang University, China (1), Merck (1), Graphics and Beyond (1), Guilford Tech Community College (1), York Tech College (1), USC Lancaster (1), Postdocs (2), University of Ulan Bator, Mongolia (1), Miami University Ohio (1), KAIST, Korea (1), LSU (1).

***What do enrollment figures and attrition rates suggest about the future of the graduate program?***

The enrollment figures show that our graduate program is stable. With these enrollment numbers and an attrition rate around 40% to 50% that we have maintained, we expect that our graduate program to have a bright future. In fact, given additional resources (office and classroom spaces, graduate student support and faculty positions etc.) our graduate program can be expanded.

**Strategic Graduate Directions:**

A. (#2 of the department strategic direction) Nurture and support fundamental and applied research, graduate programming, and community engagement in Statistics and Mathematical Finance, with more outreach and engagement with regional professionals.

B. (#4 of the department strategic direction) Develop and support efforts for early math success to help, university wide, promote degree completion.

Discussion on future directions/strategic initiatives of your graduate program(s): According to SACS recommendations, we need at least 25-30 doctoral students on GTA lines. The current number of about 35 such students is reasonably above this number and provides a good cushion against fluctuations so that we will not face a situation where the number drops below the critical mass of 25. Furthermore, the department has been rethinking about its master’s program and would like to strengthening it and expanding it. To make that program more competitive, it would help if we can allocate some TA lines to it. Thus the department is hoping to secure a total of 40 GTA lines with 5 aimed at the outstanding master’s students. Our recruiting experience is that we often have very good candidates in our applicant pool, but without financial incentives we usually fail to get them at the end. Recruiting more MS students qualified for GTA lines would be desirable as well in terms of our mission, and a goal of 5 MS students on GTA lines in any given year seems reasonable. Thus if space issues could be overcome to permit, and overall goal of 40 students on GTA lines would seem optimal by these considerations, with an additional half a dozen or so coming from the ranks of those already employed and seeking higher degrees. With such increases in our graduate enrollment, we will be able to continue building our program around our strongest areas in statistics and computational mathematics while broadening the offerings in other areas as well. However, additional resources will be needed if the department decides to expand its graduate program to support the university’s growth goal.

1. **FACULTY PROFILE**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **2005-06** | **2006-07** | **2007-08** | **2008-09** | **2009-10** | **2010-11** | **2011-12** | **College**  **11-12** |
| **Tenured / Tenure track Faculty FTE1** | 45.00 | 44.00 | 47.00 | 47.00 | 46.00 | 44.00 | 42.00 | 322.84 |
| **Tenured / Tenure track Faculty headcount2** | 45 | 44 | 47 | 47 | 46 | 44 | 42 | 323 |
| **% Women Tenured/ Tenure Track Faculty2** | 13.33% | 13.64% | 10.64% | 10.64% | 10.87% | 11.36% | 11.90% | 38.08% |
| **% Minority Tenured/ Tenure Track Faculty2** | 35.56% | 36.36% | 38.30% | 38.30% | 28.26% | 29.55% | 33.33% | 15.48% |
| **Total Faculty Headcount3** | 56 | 55 | 58 | 59 | 55 | 54 | 55 | 454 |
| **Total Faculty FTE1,3** | 56.00 | 55.00 | 58.00 | 59.00 | 55.00 | 53.50 | 53.00 | 447.84 |
| **Student FTE/Faculty FTE****1, 3 ratio4** | 3.79 | 4.20 | 4.48 | 4.81 | 5.61 | 5.95 | 6.19 | 16.25 |
| **Staff FTE1** | 5 | 6 | 5 | 6 | 6 | 5 | 5 | 89 |
| **RA/TA FTE5** | 35 | 24 | 37 | 28 | 36 | 44 | 33 | 301 |

1  Employees FTE paid from state funds only as of the end of September

2 Headcount - Full-time tenured / tenure track faculty (50% or more FTE), including department chairs

3 Total faculty, to include professors, instructors, lecturers and faculty associates from state funds only

4 This included only full time students in mathematics: undergraduate majors, master’s and doctoral students in mathematics. It does not include master students in mathematical finance (more than 100 in 2012) and any master’s or doctoral students from College of Education but directed by Math Education faculty members (average around 12 each year), and all other students that are not math majors.

5 RA/ TA FTE paid from state, local, and sponsored funds as of the end of September based Board of Regent (BOR) code

**Teaching Load Summary (Student/Instructor ratio)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
| **# of tenure track faculty** | **47** | **47** | **46** | **44** | **42** | **42** |
| # of students taught | 4134 | 4349 | 4629 | 4270 | 3996 | 4578 |
| # of students per faculty | 87.96 | 92.53 | 100.63 | 97.05 | 95.14 | 109.00 |
| **# of lecturers** | **9** | **7** | **7** | **8** | **10** | **12** |
| # of students taught | 1318 | 1328 | 1444 | 1304 | 1881 | 2362 |
| # of students per faculty | 146.44 | 189.71 | 206.29 | 163.00 | 188.10 | 196.83 |
| **# of GTAs** | **29** | **28** | **21** | **20** | **22** | **25** |
| # of students taught | 1098 | 929 | 808 | 780 | 701 | 1188 |
| # of students per GTA | 37.86 | 33.18 | 38.48 | 39.00 | 31.86 | 47.52 |
| **# of part time lecturers** | **21** | **21** | **21** | **18** | **17** | **12** |
| # of students taught | 1672 | 1959 | 2194 | 1798 | 2138 | 1907 |
| # of students per faculty | 79.62 | 93.29 | 104.48 | 99.89 | 125.76 | 158.92 |
| **# of visiting profs & post docs** | **5** | **1** | **2** | **2** | **1** | **1** |
| # of students taught | 200 | 46 | 83 | 99 | 0 | 16 |
| # of students per faculty | 40.00 | 46.00 | 41.50 | 49.50 | n/a | 16 |
|  |  |  |  |  |  |  |
| **Total # of students** | **8422** | **8611** | **9158** | **8251** | **8716** | **10051** |

**\*:** Includes 3 faculty members in their last semester of their phased retirement.

**Faculty Analysis:**

1. **Describe and evaluate the quality, effectiveness, currency, and diversity of faculty:** By the end of the spring 2013 semester, the department had 40 tenure track faculty members. Two new faculty members were hired in the spring semester of 2013 and joined the department in the fall of 2013, bringing the total number to 42 in Fall 2013. However this number includes 3 faculty members who were on phased retirement (fall 2013 was their last semester at UNCC). Of the remaining 37 faculty members (not including the two new members who joined the department in the fall of 2013), 35 are graduate faculty, 33 are frequently assigned graduate courses, 32 are active in research, 20 are active in seeking external grants and 10 hold current external grants. The department currently has 6 female tenure track faculty members (one assistant professor hired in 2013, 3 associate professors and 2 full professors). Two tenure track faculty members have just been hired in Spring 2014 and will join the department in Fall 2014. Both are women and one of them is Hispanic. This will bring the total number of women in tenure track positions to 8 (out of a total of 41 by Fall 2014). Like many mathematics departments in the US, our department has faculty members from many different cultural backgrounds including India, China, Russia, Korea and Iran. The recent new hires of the department clearly reflected the department’s willingness and commitment to build a diverse faculty body.

The department has been losing positions in the professor line. In 2008 it had 45 tenure track faculty positions and an additional 3 visiting professor lines. By fall of 2014, the department will have 41 tenure track positions and no visiting professor positions.

1. **Highlights of major accomplishments of faculty in research, teaching, and service contribution to the program mission and goals**: Prof. Wei Cai has been very successful in research and external funding. He has brought millions of dollars of external funding to UNCC and has maintained this high level of research for many years. In recent years, Prof. Michael Klibanov has also brought in significant amount of external funding. For the last 10 years, Prof. Yanqing Sun has always held two external grants: one from NSF and one from NIH. Her current NIH grant is the most prestigious NIH R37 grant that will last until 2020 and is the only R37 grant by a CLAS faculty. Other faculty members with significant research record and external grants include Profs. Molchanov, Vainberg, Dow, Oh and Diao. In 2012, Professors Cai, Klibanov and Molchanov each published a significant book in their own research field. In 2012, Prof. Molchanov was selected as a fellow of the American Mathematical Society and Prof. Sun was selected as a fellow of the American Statistical Association. Prof. Burnap is a past winner of the Bank of America Teaching Award and Prof. Reiter won the 2012 UNC Governors Award for Excellence in Public Service. The department has handled an increasing number of students in the classrooms with a decreasing resource as shown in the teaching load summary table above.

Note 1: The student/faculty ratio in the Faculty Profile Table is not a good measure since it only counted our full time math major undergraduate students and graduate students. The math department is a service department and most classes we offer are not for math major students. Thus we provide the teaching load summary table as a supplement. In an ideal classroom setting, a lower level math class should have around 45 students or less, whereas a higher level math class should have 30 students or less. Our class sizes are now much bigger than these ideal numbers and are on a growing trend. They present a big challenge for the department.

Note 2: The number of students in the teaching load summary table is the total number of students enrolled in all classes offered by the math department. It includes undergraduate and graduate students. Furthermore, the data is retrieved at the end of each fall semester, that is, the number does not include the students who withdrew from the courses. So these numbers would be 5% or 6% higher if the data were retrieved at the beginning of the semester. These numbers indicate the department’s effectiveness of teaching and the contribution of the department to the university in supporting its mission in teaching.

1. **Discuss any new faculty hires that relate to your new curricular and strategic directions (e.g., new programs, research initiatives etc.):** Dr. Michael Grabchak and Dr. Hongyu Liu were hired in 2011 in support of the department’s strategic directions #1 and #2. Dr. Michael Grabchak is specialized in probability and his specialty enables him to teach courses related to the actuarial concentration in our undergraduate program and to the mathematics finance courses in our mathematics finance masters program. Dr. Liu is specialized in PDE/Inverse Problems. The recruitments of these two faculty members will strengthen the positions of the department in achieving its strategic goals #1: Establish a national presence in Stochastic and computational modeling. Promote multi-disciplinary research and applications and #2: Nurture and support fundamental and applied research, graduate programming, and community engagement in Statistics and Mathematical Finance with more outreach and engagement with regional professionals. Both Drs. Grabchak and Liu are making good progresses/contributions in their research and teaching. It is worth noting that Dr. Liu already secured a three-year external grant from NSF. Two new faculty members (Drs. Duan Chen and Yang Li) have been hired and they will join the department in the fall of 2013. Dr. Duan Chen’s research area is in the computational mathematics with application in molecular biology and Dr. Yang Li’s research area is in statistics. Dr. Chen’s hire is aimed at the department’s strategic direction #1 and Dr. Li’s hire is aimed at the department’s strategic direction #2.

**Update:** Since the last write up of this document, Profs. Animikh Biswas and Zongwu Cai have left the department and Prof. Robert Anderson has retired. Additionally, Dr. Charlene Sheets decided to take an early retirement due to personal issues (she was responsible for teaching mathematics method courses for students majoring elementary education). The department requested and was allowed to hire two tenure track faculty members and two lecturers. The recent hire of several lecturers is the department’s effort to address the teaching challenge caused by increased student enrollment. The department now has 12 full time lecturers (however 3 of which are on 1 year terms). The department has just hired two women into the two tenure track faculty positions. Dr. Shaoyu Li is a biostatistician and Ms. Adriana Ocejo Monge will obtain her Ph.D. in mathematical finance. Their hiring will support the department’s strategic goals #1, #2, #5 and #7 (both are women and one is Hispanic). On the other hand, both newly hired lecturers are also women and one is a Ph.D. in mathematics education. Their hiring supports the department’s strategic goals #3 and #4.

*Additional Questions: What is the rationale for the composition of the faculty in terms of fields of specialization?*

Our Ph.D. in Applied Mathematics degree program is designed to enable its students to master a significant body of mathematics, including a specialty in applied mathematics; to relate this knowledge to a coherent area of science or engineering; and to carry on fundamental research in applied mathematics at a nationally competitive level. Recipients of this degree will, according to their abilities and choice of sub-specialty, be able to work effectively in a research and development environment involving mathematical or statistical analysis and modeling in business, government or industry; to teach mathematics at the college or university level; or to carry on fundamental research in their area of specialty. The student must complete an approved program of study, including a minor, typically including approximately 54 credit hours. Our Master of Science in Mathematics degree program is organized into three concentrations: the concentration in General Mathematics, the concentration in Applied Mathematics, and the concentration in Applied Statistics. The concentration in General Mathematics is a robust but flexible program that allows a student to develop a broad background in Mathematics ranging over a variety of courses chosen from both pure and applied areas, or to tailor a program toward a particular focus that may not be as closely covered by our other degree concentrations (e.g., one that is interdisciplinary in nature).  The concentration in Applied Mathematics develops analytical and computational skills focused toward applications of mathematics in the physical sciences as encountered in industry, government, and academia. The concentration in Applied Statistics provides theoretical understanding of, and training in, statistical methods applicable to particular areas of business, industry, government, and academia. Specifically, the Master of Science degree concentration in General Mathematics is designed both to provide advanced skills and knowledge for persons seeking positions in industry, government, or teaching at the community college level, and to provide professional development to persons currently in such positions. These programs demand a department with a faculty body of a wide range of research areas that is able to offer a curriculum with content and sequence appropriate to fulfill the goals and objectives of the program. The Charlotte regional industrial strength in finance, power and bio-research was and still is the main reason for the design of our graduate programs with a stress in computational mathematics, statistics, mathematics physics mathematical finance and probability. On the other hand, it is essential to have faculty members in more broad fields (including fields of pure mathematics) in order to provide a complete curriculum and solid foundation for our graduate students. The composition of our faculty in terms of their research areas is a reflection of that and our future hires will evolve around this scheme as well. The Mathematics Education faculty coordinate, supervise, and provide all instruction in the Specialization in Mathematics Education option for the Ph.D. program in Curriculum & Instruction in the College of Education. Math Ed faculty teach the Mathematics Education classes in the program and direct doctoral students who chose this program option.

*Does the department make regular attempts, by peer observation or other ways, to assess teaching performance and to make this information available to the individual faculty members?*

Yes. This is mandatory for tenure track faculty members at the rank of assistant professor and all full time lecturers. Each faculty member in this category is observed at least once a year. The observer sends a copy of the report to the faculty member (and another copy to the department chair) and discusses the issues (if any) with the faculty member being observed. For tenured faculty members at the rank of associate and full professors, the peer class observation is not mandatory, but is encouraged when a faculty experiences a persistent teaching problem.

*What is the committee structure of the department? How is committee membership determined? Are committees elected or appointed? What tasks and responsibilities does the chair ordinarily delegate to faculty and committees? In what ways is the chair regularly available to members of the department?*

*In what ways do faculty members participate in decision-making in the department?*

**Advisory Committee:** The Advisory Committee consists of five to seven faculty members who are available for consultation by the Department Chair on all matters of departmental concern for which no other standing committee has responsibility. Each year the assistant professors of the Department shall elect one of them to serve on the committee for that year and the associate professors of the Department shall elect one of them to serve on the committee for that year. The remaining members of the committee shall be professors elected by the professors of the Department to serve for terms of two years, with two professors elected in even years and the other two or three professors elected in odd years.

**Department Review Committee:**

*(a) Membership.*The Department Review Committee consists of seven members of the Department. Committee members serve for a term of one year, and are elected in the spring semester prior to the beginning of their term. The committee selects its own chair from among its members. At the time of their election, the members of the committee must either hold permanent tenure or have been recommended for permanent tenure by the Dean of the College of Liberal Arts and Sciences.

*(b) Election.* (i) The electorate for the Department Review Committee shall be all tenure track members of the Department. (ii) Eligibility carries with it automatic nomination, as well as the obligation to serve if elected. All department members who hold permanent tenure or who have been recommended by the Dean for permanent tenure are eligible except *(1)*the Chair of the Department; *(2)*Department members who are scheduled to be reviewed for promotion or to undergo Tenured Faculty Performance Review; *(3)* faculty on leave; *(4)*those who are excused by the Advisory Committee for good and sufficient reason.

*(c) Responsibilities.* (i)The Department Review Committee shall advise the Chair on all recommendations for reappointment, promotion, and conferral of permanent tenure that are duly brought before it. (ii)The Department Review Committee shall advise the Chair on any initial appointments that carry permanent tenure. (iii)The Department Review Committee shall make recommendations to the Chair on all tenured faculty performance reviews (scheduled during the term of the committee). (iv)The Department Review Committee shall meet with the Chair of the Department each spring to conduct annual performance reviews for all tenure track faculty. (v)The Department Review Committee shall undertake the annual performance review of the Chair and shall forward its evaluation to the Dean.

*(d) Procedures.* Omitted. Available upon request.

**Undergraduate Curriculum Committee.**

*(a)*The Undergraduate Curriculum Committee shall be chaired by the Undergraduate Coordinator and shall consist of 7-9 members of the Department appointed by the Chair of the Department. Appointments should be made so as to insure adequate representation of all academic areas within the Department.

*(b)*The Undergraduate Curriculum Committee shall review the Department’s undergraduate curricula as needed, and develop any required course or curriculum proposals. Upon approval by the committee these proposals shall be presented to the Department for its consideration. When this consideration is by means of an email ballot, such proposals are deemed to be approved by the Department if no more than two negative votes are cast. When three or more negative email votes are cast, the matter must be voted on at a Department meeting.

**Graduate Curriculum Committee**

*(a)*The Graduate Curriculum Committee shall be chaired by the Graduate Coordinator and shall consist of 7-9 members of the Department appointed by the Chair of the Department. Appointments should be made so as to insure adequate representation of all academic areas within the Department.

*(b)*The Graduate Curriculum Committee shall review the Department’s graduate curricula as needed, and develop any required course or curriculum proposals. Upon approval by the committee these proposals shall be presented to the graduate faculty members of the Department for its consideration. When this consideration is by means of an email ballot, such proposals are deemed to be approved by the Department if no more than two negative votes are cast. When three or more negative email votes are cast, the matter must be voted on at a meeting of the graduate faculty members of the Department.

**Other Committees.** The Chair of the Department may establish other committees to address specific issues such as recruitment, contests, prizes, colloquia, as needed.

**VII. PROGRAM RESOUCES**

1. **Describe sufficiency of resources related to technology, physical space, fiscal budgets, library, and human resources**: **Technology:** The support provided by the university in this area is adequate. Every faculty member is equipped with a computer with the common software provided by the university. The department has several servers used for classroom support (for example hosting the webwork) and more serious computations. **Physical Space**: There is a serious shortage in the office spaces for graduate teaching assistants and part time instructors. The office space for faculty members is barely adequate at this point and will become a problem with future new hires. The department is desperately in need of a resource room dedicated to the tutoring services. Update (2/2014): This problem is solved for the time being. The Department of Reading and Elementary Education has offered a dedicated classroom for our math education method courses. This freed up the classroom we used to house these courses before. However this solution is contingent on the premise that we can continue using the classroom provided by Reading and Elementary Education. **Fiscal Budgets:** Currently adequate. At the current budget, each faculty member can be supported for about one long trip or two short trips per year to attend conferences on the average and the department can support several external colloquium speakers each year. Since several faculty members have external grants to supplement their travel needs and a few research inactive faculty members rarely travel, a research active faculty member can be supported for up to 3 trips a year, provided that these are not very expensive trips and that the faculty member is willing to pay a small part of the trips. For international conferences, faculty members often can apply for an additional support from our international program or from the dean. As we increase our active research faculty proportion through the retirement-hiring cycle, this may eventually become a more serious issue. **Library:** Adequate (see the report from library). **Human Resources:** Adequate in terms of staff support. Severely inadequate in instructional support: many more faculty members (both tenure track faculty members and lecturers) are needed: our class sizes have ballooned to unsustainable levels and the lost of several faculty members in some areas crucial to our doctoral program is jeopardizing the overall quality of our program. This is clearly demonstrated in the teaching load summary table in Section VI.
2. **Describe strategic efforts and accomplishments related to research funding and development activities**: **Research Funding:** The department boasts several highly productive researchers who had brought in many external grants consistently over many years (for example Profs. Wei Cai, Alan Dow, Michael Klibanov, Stas Molchanov, Yanqing Sun and Boris Vainberg). The department’s funding level compares very favorably with the mathematics departments at our peer institutions. The department recognizes that successful external funding depends on excellence in research. The strategic efforts of the department are three folded. The first effort is to give as much support as we can to the active researchers who are already successful in securing external funding so that they may continue their success. These supports range from slightly lower teaching load, more travel money support to extra considerations in merit reviews. The second effort is to encourage those faculty members with a good research record but have yet been funded. For example, in our annual evaluations, grant proposal submission is an important contributing factor to one’s research activities. The third effort is to recruit hopeful young researchers and nurture them after they join the department. We recognize that these young faculty members need time to mature and to become excellent in their research. Thus the approach the department takes is to mentor and encourage young faculty members to start grant proposal submissions with a clear understanding that it is a long term effort and it is totally OK (and expected in most cases) to get some rejections of the grant proposals, and that these efforts will still be appreciated by the department. With these encouragements, these faculty members will keep trying and eventually succeed. Finally, the department had been planning on the creation of a center focused on computational mathematics and applied mathematics. However the establishment of such a center will require additional faculty resources that the department currently does not have. **Development activities:** The department had always encouraged and supported faculty developments in various forms. For example, for many years the department supported Prof. Harold Reiter in activities such as the high school math contests, the Julia Robinson Festivals, and the Charlotte Teacher Circles. These activities lead the winning of the UNC Board of Governors award for excellence in public service for Prof. Reiter in 2012. Another example is Dr. Wafaa Shaban, a lecturer in the department. The department supported Dr. Shaban strongly in pursuing a deep knowledge in actuarial sciences. She has passed some very advanced actuarial exams and is an expert in that field and is now in charge of the department’s actuarial program. The department is always willing and ready to support the community when possible. For example, Prof. Zhiyi Zhang had done consulting works for many local businesses and our Mathematics Finance Program had reached out to local businesses.

***Additional Questions: In what ways do the physical facilities and equipment encourage or limit the educational process for the department? In what ways do they fail to meet the department’s needs?***

* The limited office space for faculty members has forced some tenure track faculty members to be located at separated places with the rest of the department, creating some interaction difficulties;
* The limited office space for part time instructors forced us to house many (sometimes up to 5 or 6) part time instructors in the same office, making it hard for these instructors to perform their teaching functions (office hours, grading etc.);
* Same office space problem for graduate teaching assistants, especially if the department is to grow its graduate programs;
* The shortage in office space also makes it hard or impossible to host post doctoral fellows and visiting scholars (and the department sometimes has quite a few in a given semester);
* The lack of a large resource room dedicated to mathematics tutoring center makes staffing, scheduling and operation of such a center very difficult; Given the huge class sizes of some of our classes, the student support from such a center can play a crucial role to the success of these classes;
* The department is “tech heavy” in the sense that the department operates quite a few servers which are crucial to the instructional needs of many classes (from college algebra to differential equations), as well as the computational needs of some faculty members for their research and the training of PhD students. However the tech crew (the department computer technician and usually two additional student helpers) does not have a dedicated room for their work (storage, repair, testing etc.). Currently they use part of the front office for that purpose. This creates an unsightly scene at the front office hence casting a negative image on the department.

***What level of financial support would be adequate for the department to carry out its aims and functions? How does this compare with current funding levels?***

* Our current graduate student financial support allows about 35 graduate teaching assistantships (crucial for our most promising doctoral students). The local and regional demand of our graduate students indicates that we could grow our graduate program. Such growth would support the university’s growth target and the department is aspired to do so. However, more TA support will be needed.
* The funding for faculty travel and daily operation is adequately currently. This funding may become inadequate in the future when the department grows to a stage at which most faculty members are research active and all travel.
* Funding for tutors in the Math Learning Center needs to be increased in order to staff the center over a longer period of time on a daily basis and with more tutors. Our current location of the center, Fretwell 315, is actually the classroom for our math education classes and it is too small. The more and more classes with larger and larger sizes are greatly increased the demand from students. Consequently the center is over crowded most of the time and the students were not getting enough help and attention since we can only assign 3 tutors in a given shift.

***Does the department have access to adequate computer facilities? What uses are made of these facilities?***

Yes. The computers/servers that the department owns are adequate for the current need of the department.

***What other facilities does the institution provide that are used by the department? What additional facilities are needed?***

None.

**VIII. Summary and Analysis**

*1. What are the department’s outstanding characteristics and most serious limitations?*

* Strong research department with outstanding research faculty including two recently selected fellows; Prominent in certain research areas such as computational mathematics, stochastic processes and statistics.
* Strong doctoral program in applied mathematics and masters in mathematics finance;
* Strong undergraduate programs such as the actuarial program;
* Weakened in crucial areas such as analysis, mathematics finance and statistics due to retirements and resignations; Update: with the recent new hires in mathematics finance and statistics, these areas have improved, but further strengthening is still needed;
* Graduate program growth limited by university funding, especially in the master’s program;
* Severe shortage of instructional personnel (currently dealt with non-sustainable large class sizes). This shortage may explain the increased teaching load (increased class sizes, decreased opportunities such as reassignment of duties and extra teaching load in the form of directing graduate students) and the decreased funding level in the last couple of years;
* Need of new faculty members able to make contributions to university’s larger initiatives such as the big data initiative; Update: the new hire of Dr. Shaoyu Li partly addressed this issue. She has a high potential to collaborate with faculty members from Bioinformatics Department and be part of the big data effort. However more are needed;
* Space and more funding to fund a Math Learning Center to support the need of the large size classes; The success of the large classes depend on the support like this in a long term.

*2. What does the department do very well? In what areas does it need to make the most improvement?*

* Handling the huge enrollment increases with limited resources;
* Producing quality students at all levels;
* Excellent external funding record and research record.
* Need to improve the rate of graduation and time to graduation;
* Need to expand the effort in recruiting domestic graduate students;
* The department heavily depends on a few faculty members for bringing in substantial external funding. The following table shows the external funding activities of the department members. In years 09-10 and 10-11, these few faculty members brought in much more money than they usually do. Although it is not the expectation of the department to sustain such high level of external funding, more faculty members need to get involved. Indeed, in the recent hires, the department is placing a higher priority on the potential of the new hires for obtaining external funding. A new faculty member (Hongyu Liu) successfully obtained a 3 year NSF grant during his first year at UNCC.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 09-10 | 10-11 | 11-12 | 12-13 |
| # submissions | 22 | 17 | 20 | 14 |
| # awards | 14 | 11 | 8 | 5 |
| total dollar amount | $1,662,087 | $1,438,535 | $894,950 | $537,944 |

*3. What are its most promising prospects for future development?*

* The graduate program may rise to a nationally recognized one (it has been ranked at 110 among 220 mathematics departments with doctoral programs nationwide by US News);
* Recruiting new faculty members with potential to become excellent in research, teaching and obtaining grant funding.
* Building a well-rounded department with the ability and willingness to engage in interdisciplinary research within the college, the university or beyond.

*4. What worries the department the most? What specific steps might be taken to eliminate these worries? If they cannot be eliminated, what can be done to work effectively around them? Which areas of concern should receive the attention of the department this year? In the next five years?*

* Its desperate needs in faculty lines in terms of teaching and research being neglected;
* Its overall heavy teaching load not recognized and appreciated;
* The key areas where the department has been greatly weakened due to recent retirements and resignations are not filled promptly, weakening the entire program, affecting the quality of certain course offerings and causing delay in the graduation of some advanced graduate students. It is even more worrisome since the department has several key faculty members approaching retirement so if this trend continues the effects could be devastating to its international stature and the integrity of its doctoral programming.
* The department is doing all it can at this time to cover the classes/students that were covered/supervised by the faculty members left, but is very strained.

Some data relevant to the concerns of the department: In 2008-09, the department had 47 tenure-track faculty members (without anyone on phased retirement), 3 visiting faculty lines, 7 full time (permanent) lecturers and one temporary full time lecturer. That is a total of 57 full time faculty members. In 2012-13, the department had 42 tenure-track faculty members (four of them on phased retirement so each can only be counted as .5 full time), no visiting faculty line, 7 full time (permanent) lecturers and 3 temporary full time lecturers. That translates into 50 full time faculty members. So the department had lost quite a few positions during this time period. However during the same time period, the overall enrollment in all mathematics classes has greatly increased. See the teaching load summary table in Section VI. Furthermore, during this time period our undergraduate program has expanded greatly (especially in math for business and special concentration such as actuarial sciences) and graduate program has maintained its size, adding more demands on the need of more tenure-track faculty members, as well as lecturers who are able to teach math and stat courses beyond the elementary level. More specifically, in order to bring the student FTE/faculty FTE ratio to a more manageable and sustainable level (say at the 2008 level), the department would need to add 5 to 6 tenure track positions and 5 to 6 lecturers.

*5. What previously unnoticed areas for growth or change emerged from taking a close look at the department? What specific steps might be taken to fulfill unrealized opportunities (elaborate)?*

* None.

**Appendices:**

**Appendix A — Sample Programs of Study**

**Appendix B — Library Report of the Unit**

**Appendix C — Faculty Current CVs**

Appendix A

|  |  |
| --- | --- |
| **UNCC_Logo_4c** | **B.A. in Mathematics for Business**  **Academic Plan of Study**  *College of Liberal Arts & Sciences*  *Department of Mathematics and Statistics*  [*math.uncc.edu*](http://math.uncc.edu) |

**Program Summary**

* ***Credit Hours:*** 120 hours
* ***Concentrations:*** No
* ***Declaring the Major:*** Minimum GPA of 2.0 required; no pre-requisite courses; change of major form accepted year-round; orientation/advising session required after declaration
* ***Advising (For the Major):*** Required on admission to the major, at the end of the fourth semester, and before the beginning of the senior year. Recommended more frequently. Assigned advisors available by appointment
* ***Advising (For General Education):*** By Mathematics Department advisors or by CLAS advising center
* ***Minimum Grades/GPA:*** GPA of at least 2.0 in all the MATH, STAT, and OPRS courses taken and GPA of at least 2.0 in all MATH, STAT, and OPRS courses at the 2000 level and above.
* ***Teacher Licensure:*** No.
* ***Evening Classes Available:*** No
* ***Weekend Classes Available:*** No
* ***Other Information:*** Departmental Honors, Internships, Co-ops
* ***Contact(s):*** Dr. Kim Harris, Undergraduate Coordinator for MATH, [mkharris@uncc.edu](mailto:emailaddress@uncc.edu) ; Dr. Robert Anderson, MABU, [rfanders@uncc.edu](mailto:emailaddress@uncc.edu)

**Program Requirements**

Mathematics for Business (MABU) offers the BA degree which is a *relatively structured* program. In their first year MABU students in the BA degree should complete MATH 1120 in which they must make a C or better in order to progress to MATH 2120. Students are also required to take a computer programming course, Linear Algebra, Theory of Interest, and required courses in Statistics and Operations Research. Teacher licensure is not available in this program. Students who take Calculus in their freshman year and begin their major as sophomores can complete the degree on time ***if they consult regularly with their advisors***. Students are also required to complete either a formal minor or 18 credit hours of *related work* (in consultation with their advisor).

|  |  |  |
| --- | --- | --- |
| Areas | Credit Hours | Description |
| Pre-Major/ Prerequisites | - |  |
| Major | 36 | Required courses in the major will satisfy General Education requirements for mathematics and oral and written communication. |
| General Education  *(not satisfied by other  major requirements)* | 31 | The number of hours reflects the general education coursework outside the major. |
| Related Work | 21 | ITCS 1212 + L  The requirement for Related Work can be completed with a minor from another department or with 18 hours of approved courses with a common theme. Related work that is not an official minor must be approved by the student’s advisor. |
| Foreign Language | 0-8 | Proficiency in a foreign language can be demonstrated by successful completion of FORL 1202, a placement test given by the Department of Languages and Culture Studies, or three years of high school courses in the SAME language. |
| Electives | 24-32 | As needed to complete 120 hours total. |
| Total Credit Hours | 120 |  |

**Suggested Plan of Study – B.A. in Mathematics for Business**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Freshman Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 1120 | Calculus | 3 | X |  | A placement test is required to begin in MATH 1120. |
| ENGL 1101 | Writing and Inquiry in Academic Contexts I | 3 | X |  |  |
| LBST 110X | The Arts and Society | 3 | X |  | Chosen from LBST 1101, 1102, 1103, 1104, 1105 |
| FORL 1201 | Foreign Language | 4 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 2120 | Intermediate Applied Calculus | 3 | X |  | Grade of C or better in MATH 1120 is required. |
| ENGL 1102 | Writing and Inquiry in Academic Contexts II | 3 | X |  |  |
| XXXX | Social Science | 3 | X |  | Chosen from ANTH 1101, ECON 1101 or 2101, GEOG 1105, POLS 1110, SOCY 1101 |
| FORL 1202 | Foreign Language | 4 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |

**32 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sophomore Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| STAT 1220 | Elements of Statistics I | 3 |  |  |  |
| MATH 2428 | Theory of Interest | 3 |  |  |  |
| LBST 2101 | Western Cultural and Historical Awareness | 3 | X |  |  |
| ITCS 1212+L | Introduction to Computer Science | 3 |  |  | Class and lab must be taken concurrently. |
| XXXX | Related Work or Minor | 3 |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| STAT 2223 | Elements of Statistics II | 3 |  |  |  |
| MATH 2164 | Linear Algebra | 3 |  |  |  |
| LBST 2102 | Global and Intercultural Connections | 3 | X |  |  |
| LBST 221X | Ethical and Cultural Critique | 3 | X |  | Chosen from LBST 2211, 2212, 2213, 2214, 2215 |
| XXXX | Related Work or Minor | 3 |  |  |  |
|  |  |  |  |  |  |

**30 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Junior Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| OPRS 3111 | Operations Research: Deterministic Models | 3 |  |  |  |
| MATH 3XXX | Upper-Level Math Elective | 3 |  |  | Must be MATH, STAT, or OPRS  3000-level or above |
| XXXX | Science | 3 | X |  | Chosen from list of approved courses. |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| STAT 3110 | Applied Regression | 3 | X | W |  |
| XXXX | Writing Intensive Course | 3 | X | W |  |
| XXXX | Science w/ Lab | 4 | X |  | Chosen from list of approved courses. |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Elective | 3 |  |  |  |

**31 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Senior Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 4051 | Computer Exploration and Generation of Data | 3 | X | O |  |
| MATH 3XXX | Upper-Level Math Elective | 3 |  |  | Must be MATH, STAT, or OPRS  3000-level or above |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Electives | 6 |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 3XXX | Upper-Level Math Elective | 3 |  |  | Must be MATH, STAT, or OPRS  3000-level or above |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Electives | 6 |  |  |  |
|  |  |  |  |  |  |

**27 Credit Hours for Year**

|  |  |
| --- | --- |
| **UNCC_Logo_4c** | **B.S. in Mathematics for Business**  **Academic Plan of Study**  *College of Liberal Arts & Sciences*  *Department of Mathematics and Statistics*  [*math.uncc.edu*](http://math.uncc.edu) |

**Program Summary**

* ***Credit Hours:*** 120 hours
* ***Concentrations:*** Yes: Economics/Finance, Actuarial Science, Operations Research
* ***Declaring the Major:*** Minimum GPA of 2.0 required; no pre-requisite courses; change of major form accepted year-round; orientation/advising session required after declaration
* ***Advising (For the Major):*** Required on admission to the major, at the end of the fourth semester, and before the beginning of the senior year. Recommended more frequently. Assigned advisors available by appointment
* ***Advising (For General Education):*** By Mathematics Department advisors or by CLAS advising center
* ***Minimum Grades/GPA:*** GPA of at least 2.0 in all the MATH, STAT, and OPRS courses taken and GPA of at least 2.0 in all MATH, STAT, and OPRS courses at the 2000 level and above.
* ***Teacher Licensure:*** No.
* ***Evening Classes Available:*** No
* ***Weekend Classes Available:*** No
* ***Other Information:*** Departmental Honors, Internships, Co-ops
* ***Contact(s):*** Dr. Kim Harris, Undergraduate Coordinator for MATH, [mkharris@uncc.edu](mailto:emailaddress@uncc.edu) ; Dr. Robert Anderson, MABU, [rfanders@uncc.edu](mailto:emailaddress@uncc.edu)

**Program Requirements**

Math for Business offers the BS degree with concentrations in Economics/Finance, Actuarial Science, or Operations Research. Students are required to choose a concentration. The BS degree is a *very structured* program*.* The program requires three semesters of calculus that must be taken in order. A grade of at least a C in each of the first two courses is required to progress to the next calculus course. Students are also required to take Linear Algebra, Differential Equations, Theory of Interest, Computer Exploration, and specific courses in Statistics and Operations Research. A course in computer programming and four additional upper-level MATH, OPRS, or STAT courses are also required as determined by the concentration choice. Students who take Calculus I in their freshman year and begin their major as sophomores can complete the degree on time ***if they consult regularly with their advisors***. Students are required to complete either a formal minor or 18 credit hours of *related work* (in consultation with their advisor).

|  |  |  |
| --- | --- | --- |
| Areas | Credit Hours | Description |
| Pre-Major/ Prerequisites | - |  |
| Major | 45 | Required courses in the major will satisfy General Education requirements for mathematics and oral and written communication. |
| General Education  *(not satisfied by other  major requirements)* | 31 | The number of hours reflects the general education coursework required outside the major. |
| Related Work | 21 | ITCS 1212 + L  The requirement for Related Work can be completed with a minor from another department or with 18 hours of approved courses with a common theme. Related work that is not an official minor must be approved by the student’s advisor. |
| Foreign Language | 0-8 | Proficiency in a foreign language can be demonstrated by successful completion of FORL 1202, a placement test given by the Department of Languages and Culture Studies, or three years of high school courses in the SAME language. |
| Electives | 15-23 | As needed to complete 120 hours total. |
| Total Credit Hours | 120 |  |

**Suggested Plan of Study – B.S. in Mathematics for Business with Actuarial Science Concentration**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Freshman Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 1241 | Calculus I | 3 | X |  | A placement test is required to begin in MATH 1241. |
| ENGL 1101 | Writing and Inquiry in Academic Contexts I | 3 | X |  |  |
| LBST 110X | The Arts and Society | 3 | X |  | Chosen from LBST 1101, 1102, 1103, 1104, 1105 |
| FORL 1201 | Foreign Language | 4 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 1242 | Calculus II | 3 | X |  | Grade of C or better in MATH 1241 is required |
| ENGL 1102 | Writing and Inquiry in Academic Contexts II | 3 | X |  |  |
| XXXX | Social Science | 3 | X |  | Chosen from ANTH 1101, ECON 1101 or 2101, GEOG 1105, POLS 1110, SOCY 1101 |
| FORL 1202 | Foreign Language | 4 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |

**32 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sophomore Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 2241 | Calculus III | 3 |  |  | Grade of C or better in MATH 1242 is required. |
| MATH 2428 | Theory of Interest | 3 |  |  |  |
| LBST 2101 | Western Cultural and Historical Awareness | 3 | X |  |  |
| ITCS 1212+L | Introduction to Computer Science | 3 |  |  | Class and lab must be taken concurrently. |
| XXXX | Related Work or Minor | 3 |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 2171 | Differential Equations | 3 |  |  |  |
| MATH 3128 | Actuarial Science I | 3 |  |  |  |
| LBST 2102 | Global and Intercultural Connections | 3 | X |  |  |
| LBST 221X | Ethical and Cultural Critique | 3 | X |  | Chosen from LBST 2211, 2212, 2213, 2214, 2215 |
| XXXX | Related Work or Minor | 3 |  |  |  |
|  |  |  |  |  |  |

**30 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Junior Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 3129 | Actuarial Science II | 3 |  |  |  |
| STAT 2122 or STAT 3122 | Introduction to Probability and Statistics or  Probability and Statistics I | 3 |  |  |  |
| XXXX | Science | 3 | X |  | Chosen from list of approved courses. |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| STAT 2223 or STAT 3123 | Elements of Statistics II or  Probability and Statistics II | 3 |  |  |  |
| STAT 3110 | Applied Regression | 3 | X | W |  |
| XXXX | Writing Intensive Course | 3 | X | W |  |
| XXXX | Science w/ Lab | 4 | X |  | Chosen from list of approved courses. |
| XXXX | Related Work or Minor | 3 |  |  |  |
|  |  |  |  |  |  |

**31 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Senior Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 4051 | Computer Exploration and Generation of Data | 3 | X | O |  |
| OPRS 3111 | Operations Research: Deterministic Models | 3 |  |  |  |
| MATH 2164 | Linear Algebra | 3 |  |  |  |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 4128 | Risk Theory | 3 |  |  |  |
| MATH 3XXX | Upper-Level Math Elective | 3 |  |  | Must be MATH, STAT, or OPRS  3000-level or above |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |

**27 Credit Hours for Year**

**Suggested Plan of Study – B.S. in Mathematics for Business with Economics/Finance Concentration**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Freshman Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 1241 | Calculus I | 3 | X |  | A placement test is required to begin in MATH 1241. |
| ENGL 1101 | Writing and Inquiry in Academic Contexts I | 3 | X |  |  |
| LBST 110X | The Arts and Society | 3 | X |  | Chosen from LBST 1101, 1102, 1103, 1104, 1105 |
| FORL 1201 | Foreign Language | 4 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 1242 | Calculus II | 3 | X |  | Grade of C or better in MATH 1241 is required |
| ENGL 1102 | Writing and Inquiry in Academic Contexts II | 3 | X |  |  |
| XXXX | Social Science | 3 | X |  | Chosen from ANTH 1101, ECON 1101 or 2101, GEOG 1105, POLS 1110, SOCY 1101 |
| FORL 1202 | Foreign Language | 4 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |

**32 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sophomore Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 2241 | Calculus III | 3 |  |  | Grade of C or better in MATH 1242 is required. |
| MATH 2428 | Theory of Interest | 3 |  |  |  |
| LBST 2101 | Western Cultural and Historical Awareness | 3 | X |  |  |
| ITCS 1212+L | Introduction to Computer Science | 3 |  |  | Class and lab must be taken concurrently. |
| XXXX | Related Work or Minor | 3 |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 2171 | Differential Equations | 3 |  |  |  |
| STAT 3110 | Applied Regression | 3 | X | W |  |
| LBST 2102 | Global and Intercultural Connections | 3 | X |  |  |
| LBST 221X | Ethical and Cultural Critique | 3 | X |  | Chosen from LBST 2211, 2212, 2213, 2214, 2215 |
| XXXX | Related Work or Minor | 3 |  |  |  |
|  |  |  |  |  |  |

**30 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Junior Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 2164 | Linear Algebra | 3 |  |  |  |
| STAT 2122 or STAT 3122 | Introduction to Probability and Statistics or  Probability and Statistics I | 3 |  |  |  |
| XXXX | Science | 3 | X |  | Chosen from list of approved courses. |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| STAT 2223 or STAT 3123 | Elements of Statistics II or  Probability and Statistics II | 3 |  |  |  |
| MATH 4122 | Probability and Stochastic Models | 3 |  |  |  |
| XXXX | Writing Intensive Course | 3 | X | W |  |
| XXXX | Science w/ Lab | 4 | X |  | Chosen from list of approved courses. |
| XXXX | Related Work or Minor | 3 |  |  |  |
|  |  |  |  |  |  |

**31 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Senior Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 4051 | Computer Exploration and Generation of Data | 3 | X | O |  |
| OPRS 3111 | Operations Research: Deterministic Models | 3 |  |  |  |
| MATH 3XXX | Upper-Level Math Elective | 3 |  |  | Must be MATH, STAT, or OPRS 3000 level or above. |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 4128 | Risk Theory | 3 |  |  |  |
| STAT 3150 | Time Series Analysis | 3 |  |  |  |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |

**27 Credit Hours for Year**

**Suggested Plan of Study – B.S. in Mathematics for Business with Operations Research Concentration**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Freshman Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 1241 | Calculus I | 3 | X |  | A placement test is required to begin in MATH 1241. |
| ENGL 1101 | Writing and Inquiry in Academic Contexts I | 3 | X |  |  |
| LBST 110X | The Arts and Society | 3 | X |  | Chosen from LBST 1101, 1102, 1103, 1104, 1105 |
| FORL 1201 | Foreign Language | 4 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 1242 | Calculus II | 3 | X |  | Grade of C or better in MATH 1241 is required |
| ENGL 1102 | Writing and Inquiry in Academic Contexts II | 3 | X |  |  |
| XXXX | Social Science | 3 | X |  | Chosen from ANTH 1101, ECON 1101 or 2101, GEOG 1105, POLS 1110, SOCY 1101 |
| FORL 1202 | Foreign Language | 4 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |

**32 Credit Hours for Year**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sophomore Year | | | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | | **Notes** | |
| *Fall Semester* |  |  |  |  | |  | |
| MATH 2241 | Calculus III | 3 |  |  | | Grade of C or better in MATH 1242 is required. | |
| MATH 2428 | Theory of Interest | 3 |  |  | |  | |
| LBST 2101 | Western Cultural and Historical Awareness | 3 | X |  | |  | |
| ITCS 1212+L | Introduction to Computer Science | 3 |  |  | | Class and lab must be taken concurrently. | |
| XXXX | Related Work or Minor | 3 |  |  | |  | |
|  |  |  |  |  | |  | |
|  |  |  |  |  | |  | |
| *Spring Semester* |  |  |  |  | |  | |
| MATH 2171 | Differential Equations | 3 |  |  | |  | |
| STAT 3110 | Applied Regression | 3 | X | | W | |  |
| LBST 2102 | Global and Intercultural Connections | 3 | X |  | |  | |
| LBST 221X | Ethical and Cultural Critique | 3 | X |  | | Chosen from LBST 2211, 2212, 2213, 2214, 2215 | |
| XXXX | Related Work or Minor | 3 |  |  | |  | |
|  |  |  |  |  | |  | |

**30 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Junior Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| OPRS 3111 | Operations Research: Deterministic Models | 3 |  |  |  |
| STAT 2122 or STAT 3122 | Introduction to Probability and Statistics or  Probability and Statistics I | 3 |  |  |  |
| XXXX | Science | 3 | X |  | Chosen from list of approved courses. |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| OPRS 3113 | Operations Research: Probabilistic Models | 3 |  |  |  |
| STAT 2223 or STAT 3123 | Elements of Statistics II or  Probability and Statistics II | 3 |  |  |  |
| XXXX | Writing Intensive Course | 3 | X | W |  |
| XXXX | Science w/ Lab | 4 | X |  | Chosen from list of approved courses. |
| XXXX | Related Work or Minor | 3 |  |  |  |
|  |  |  |  |  |  |

**31 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Senior Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 4051 | Computer Exploration and Generation of Data | 3 | X | O |  |
| OPRS 4113 | Game Theory | 3 |  |  |  |
| MATH 3XXX | Upper-Level Math Elective | 3 |  |  | Must be MATH, STAT, or OPRS  3000-level or above |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 2164 | Linear Algebra | 3 |  |  |  |
| OPRS 4114 | Dynamic Programming | 3 |  |  |  |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |

**27 Credit Hours for Year**

|  |  |
| --- | --- |
| **UNCC_Logo_4c** | **B.A. in Mathematics**  **Academic Plan of Study**  *College of Liberal Arts & Sciences*  *Department of Mathematics and Statistics*  [*math.uncc.edu*](http://math.uncc.edu) |

**Program Summary**

* ***Credit Hours:*** 120 hours
* ***Concentrations:*** Actuarial Science, Statistics
* ***Declaring the Major:*** Minimum GPA of 2.0 required; no pre-requisite courses; change of major form accepted year-round; orientation/advising session required after declaration
* ***Advising (For the Major):*** Required on admission to the major, at the end of the fourth semester, and before the beginning of the senior year. Recommended more frequently. Assigned advisors available by appointment
* ***Advising (For General Education):*** By Mathematics Department advisors or by CLAS advising center
* ***Minimum Grades/GPA:*** GPA of at least 2.0 in all the MATH, STAT, and OPRS courses taken and GPA of at least 2.0 in all MATH, STAT, and OPRS courses at the 2000 level and above.
* ***Teacher Licensure:*** YES in MATH, requires specified coursework in Mathematics and Mathematics Education and a minor in Secondary Education
* ***Evening Classes Available:*** YES (with proper planning can be completed at night)
* ***Weekend Classes Available:*** NO
* ***Other Information:*** Departmental Honors, Internships, Co-ops
* ***Contact(s):*** Dr. Kim Harris, Undergraduate Coordinator [mkharris@uncc.edu](mailto:emailaddress@uncc.edu)

**Program Requirements**

MATH offers the BA degree with the option of choosing the Statistics or Actuarial Science concentration. Students who want to teach high school level mathematics would complete the BA program and the minor in secondary education. Students in the secondary education program MUST make a C or better in each of their MATH, MAED, STAT, and ITCS courses required for the degree. The BA degree is a *relatively structured* program*.* The program requires four semesters of calculus that must be taken in order. A grade of at least a C in each of the first three courses is required to progress to the next calculus course. Students are also required to take Linear Algebra, Differential Equations, Modern Algebra, Math Awareness Seminar, and the Senior Project. A course in computer programming and four additional upper-level MATH, OPRS, or STAT courses are also required. Students who take Calculus I in their freshman year and begin their major as sophomores can complete the degree on time ***if they consult regularly with their advisors***. Students are required to complete either a formal minor or 18 credit hours of *related work* (in consultation with their advisor).

|  |  |  |
| --- | --- | --- |
| ­ | Credit Hours | Description |
| Pre-Major/ Prerequisites | - |  |
| Major | 34-37 | Hours vary depending upon concentration. Required courses in the major will satisfy General Education requirements for Mathematics & Logical Reasoning, Writing Intensive course in the discipline, and Oral Communication. |
| General Education  *(not satisfied by other  major requirements)* | 28-31 | The number of hours reflects the general education coursework required outside the major. |
| Related Work | 21 | ITCS 1212 + L (3 hours)  The requirement for Related Work can be completed with a minor from another department or with 18 hours of approved courses with a common theme. Related work that is not an official minor must be approved by the student’s advisor. |
| Foreign Language | 0-8 | Proficiency in a foreign language can be demonstrated by successful completion of FORL 1202, a placement test given by the Department of Languages and Culture Studies, or three years of high school courses in the SAME language. |
| Electives | 23-37 | As needed to complete 120 hours total. |
| Total Credit Hours | 120 |  |

**Suggested Plan of Study – B.A. in Mathematics**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Freshman Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 1241 | Calculus I | 3 | X |  | A placement test is required to begin in MATH 1241. |
| ENGL 1101 | Writing and Inquiry in Academic Contexts I | 3 | X |  |  |
| LBST 110X | The Arts and Society | 3 | X |  | Chosen from LBST 1101, 1102, 1103, 1104, 1105 |
| FORL 1201 | Foreign Language | 4 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 1242 | Calculus II | 3 | X |  | Grade of C or better in MATH 1241 is required |
| ENGL 1102 | Writing and Inquiry in Academic Contexts II | 3 | X |  |  |
| XXXX | Social Science | 3 | X |  | Chosen from ANTH 1101, ECON 1101 or 2101, GEOG 1105, POLS 1110, SOCY 1101 |
| FORL 1202 | Foreign Language | 4 |  |  |  |
| XXXX | Elective | 3 |  |  |  |

**32 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sophomore Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 2241 | Calculus III | 3 |  |  | Grade of C or better in MATH 1242 is required. |
| MATH 2164 | Linear Algebra | 3 |  |  |  |
| LBST 2101 | Western Cultural and Historical Awareness | 3 | X |  |  |
| ITCS 1212+L | Introduction to Computer Science | 3 |  |  | Class and lab must be taken concurrently. |
| XXXX | Related Work or Minor | 3 |  |  |  |
| MATH 3688 | Math Awareness Seminar | 0 |  |  | This course is only offered in the fall semester. |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 2242 | Calculus IV | 3 |  |  | Grade of C or better in MATH 2241 is required. |
| MATH 2171 | Differential Equations | 3 |  |  |  |
| LBST 2102 | Global and Intercultural Connections | 3 | X |  |  |
| LBST 221X | Ethical and Cultural Critique | 3 | X |  | Chosen from LBST 2211, 2212, 2213, 2214, 2215 |
| XXXX | Related Work or Minor | 3 |  |  |  |

**30 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Junior Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 3163 | Modern Algebra | 3 | X | W |  |
| MATH 3XXX | Upper-Level Math Elective | 3 |  |  | Must be MATH, STAT, or OPRS  3000-level or above |
| XXXX | Science | 3 | X |  | Chosen from list of approved courses. |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 3XXX | Upper-Level Math Elective | 3 |  |  | Must be MATH, STAT, or OPRS  3000-level or above |
| XXXX | Writing Intensive Course | 3 | X | W |  |
| XXXX | Science w/ Lab | 4 | X |  |  |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Elective | 3 |  |  |  |

**31 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Senior Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 3XXX | Upper-Level Math Elective | 3 |  |  | Must be MATH, STAT, or OPRS  3000-level or abovE |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Electives | 9 |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 3XXX | Upper-Level Math Elective | 3 |  |  | Must be MATH, STAT, or OPRS  3000-level or above |
| MATH 3689 | Mathematics Project Seminar | 1 | X | O |  |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Electives | 5 |  |  |  |
|  |  |  |  |  |  |

**27 Credit Hours for Year**

**Suggested Plan of Study – B.A. in Math with Minor in Secondary**

**Education**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Freshman Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 1241 | Calculus I | 3 | X |  | A placement test is required to begin in MATH 1241. |
| ENGL 1101 | Writing and Inquiry in Academic Contexts I | 3 | X |  |  |
| LBST 110X | The Arts and Society | 3 | X |  | Chosen from LBST 1101, 1102, 1103, 1104, 1105 |
| FORL 1201 | Foreign Langauge | 4 |  |  |  |
| XXXX | Science | 3 | X |  | Chosen from list of approved courses. |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 1242 | Calculus II | 3 | X |  | Grade of C or better in MATH 1241 is required |
| ENGL 1102 | Writing and Inquiry in Academic Contexts II | 3 | X |  |  |
| XXXX | Social Science | 3 | X |  | Chosen from ANTH 1101, ECON 1101 or 2101, GEOG 1105, POLS 1110, SOCY 1101 |
| FORL 1202 | Foreign Language | 4 |  |  |  |
| XXXX | Elective | 3 |  |  |  |

**32 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sophomore Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 2241 | Calculus III | 3 |  |  | Grade of C or better in MATH 1242 is required. |
| MATH 2164 | Linear Algebra | 3 |  |  |  |
| LBST 2101 | Western Cultural and Historical Awareness | 3 | X |  |  |
| ITCS 1212+l | Introduction to Computer Programming | 3 |  |  | Class and lab must be taken concurrently. |
| MDSK 2100 | Diversity and Inclusion in Secondary Schools | 3 |  |  | Students apply for Teacher Education program after taking this course. |
| MATH 3688 | Math Awareness Seminar | 0 |  |  | This course is only offered in the fall semester. |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 2242 | Calculus IV | 3 |  |  | Grade of C or better in MATH 2241 is required. |
| MATH 2171 | Differential Equations | 3 |  |  |  |
| LBST 2102 | Global and Intercultural Connections | 3 | X |  |  |
| XXXX | Science w/ Lab | 3 | X |  | Chosen from list of approved courses. |
| XXXX | Elective | 3 |  |  |  |

**30 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Junior Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 3163 | Modern Algebra | 3 | X | W |  |
| MATH 3181 | Fundamental Concepts of Geometry | 3 |  |  |  |
| MDSK 3151 | Instructional Design and the Use of Technology with Middle and Secondary School Learners | 3 |  |  | Acceptance into Teacher Education program is required. |
| MAED 4105 | Geometry in the Secondary School Curriculum | 3 |  |  |  |
| SECD 4140 | Adolescence and Secondary Schools | 3 |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 4109 | History of Mathematics | 3 |  |  | Required for Teacher Licensure |
| MATH 3XXX | Upper-Level Mathematics | 3 |  |  | If students have not had statistics, they are required to take MATH/STAT 3122 or STAT 3128. If they have taken statistics, this can be any upper-level course. |
| LBST 221X | Ethical and Cultural Critique | 3 | X |  | Chosen from LBST 2211, 2212, 2213, 2214, 2215 |
| READ 3255 | Integrating Reading & Writing across Content Areas | 3 | X | W |  |
| MAED 4103 | Using Technology to Teach Secondary School Mathematics | 3 |  |  |  |
|  |  |  |  |  |  |

**30 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Senior Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 3XXX | Upper-Level Math Elective | 3 |  |  | Must be MATH, STAT, or OPRS  3000-level or above |
| MATH 3689 | Mathematics Project Seminar | 1 | X | O |  |
| MAED 4252 | Teaching Mathematics to Secondary School Learners | 3 |  |  |  |
| EDUC 4291 | Modifying Instruction for Students with Diverse Needs | 3 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| SECD 4452 | Student Teaching | 12 |  |  |  |
| MDSK 4150 | Assessment, Reflection, and Management Practices | 3 |  |  |  |
|  |  |  |  |  |  |

**28 Credit Hours for Year**

**Suggested Plan of Study – B.A. in Mathematics, Concentration: Actuarial Science**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Freshman Year | | | | | | | | |
| Course Number | | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | | **Notes** | |
| *Fall Semester* | |  |  |  |  | |  | |
| MATH 1241 | | Calculus I | 3 | X |  | | A placement test is required to begin in MATH 1241. | |
| ENGL 1101 | | Writing and Inquiry in Academic Contexts I | 3 | X |  | |  | |
| LBST 110X | | The Arts and Society | 3 | X |  | | Chosen from LBST 1101, 1102, 1103, 1104, 1105 | |
| FORL 1201 | | Foreign Language | 4 |  |  | |  | |
| XXXX | | Elective | 3 |  |  | |  | |
|  | |  |  |  |  | |  | |
| *Spring Semester* | |  |  |  |  | |  | |
| MATH 1242 | | Calculus II | 3 | X |  | | Grade of C or better in MATH 1241 is required | |
| ENGL 1102 | | Writing and Inquiry in Academic Contexts II | 3 | X |  | |  | |
| ITCS 1212+l | Introduction to Computer Science | | 3 |  | |  | | Class and lab must be taken concurrently. |
| FORL 1202 | | Foreign Language | 4 |  |  | |  | |
| XXXX | | Elective | 3 |  |  | |  | |
|  | |  |  |  |  | |  | |

**32 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sophomore Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 2241 | Calculus III | 3 |  |  | Grade of C or better in MATH 1242 is required. |
| MATH 2164 | Linear Algebra | 3 |  |  |  |
| LBST 2101 | Western Cultural and Historical Awareness | 3 | X |  |  |
| ACCT 2121 | Principles of Accounting I | 3 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 2242 | Calculus IV | 3 |  |  | Grade of C or better in MATH 2241 is required. |
| MATH 2171 | Differential Equations | 3 |  |  |  |
| LBST 2102 | Global and Intercultural Connections | 3 | X |  |  |
| LBST 221X | Ethical and Cultural Critique | 3 | X |  | Chosen from LBST 2211, 2212, 2213, 2214, 2215 |
| ACCT 2122 | Principles of Accounting II (ACCT 2122) | 3 |  |  |  |
|  |  |  |  |  |  |

**30 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Junior Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 3163 | Modern Algebra | 3 | X | W |  |
| MATH 2428 | Theory of Interest | 3 |  |  | Prerequisite for MATH 3128. |
| XXXX | Science | 3 | X |  | Chosen from list of approved courses. |
| ECON 2101 | Principles of Economics –Micro | 3 | X |  |  |
| XXXX | Elective | 3 |  |  |  |
| MATH 3688 | Math Awareness Seminar | 0 |  |  | Offered in Fall only |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 3128 | Actuarial Mathematics I | 3 |  |  |  |
| XXXX | Writing Intensive Course | 3 | X | W |  |
| XXXX | Science w/ Lab (General Education) | 4 | X |  |  |
| ECON 2102 | Principles of Economics – Macro | 3 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |

**31 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Senior Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 3129 | Actuarial Mathematics II | 3 |  |  |  |
| MATH 3122 | Probability and Statistics I | 3 |  |  |  |
| FINN 3120 | Financial Management | 3 |  |  |  |
| XXXX | Electives | 6 |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 3123 | Probability and Statistics II | 3 |  |  |  |
| MATH 3689 | Senior Project | 1 | X | O |  |
| FINN 3271 | Principles of Risk Management and Insurance | 3 |  |  |  |
| XXXX | Electives | 5 |  |  |  |
|  |  |  |  |  |  |

**27 Credit Hours for Year**

**Suggested Plan of Study – B.A. in Mathematics, Concentration: Statistics**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Freshman Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 1241 | Calculus I | 3 | X |  | A placement test is required to begin in MATH 1241. |
| ENGL 1101 | Writing and Inquiry in Academic Contexts I | 3 | X |  |  |
| LBST 110X | The Arts and Society | 3 | X |  | Chosen from LBST 1101, 1102, 1103, 1104, 1105 |
| FORL 1201 | Foreign Language | 4 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 1242 | Calculus II | 3 | X |  | Grade of C or better in MATH 1241 is required |
| ENGL 1102 | Writing and Inquiry in Academic Contexts II | 3 | X |  |  |
| XXXX | Social Science | 3 | X |  | Chosen from ANTH 1101, ECON 1101 or 2101, GEOG 1105, POLS 1110, SOCY 1101 |
| FORL 1202 | Foreign Language | 4 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |

**32 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sophomore Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 2241 | Calculus III | 3 |  |  | Grade of C or better in MATH 1242 is required. |
| MATH 2164 | Linear Algebra | 3 |  |  |  |
| LBST 2101 | Western Cultural and Historical Awareness | 3 | X |  |  |
| ITCS 1212+L | Introduction to Computer Science | 3 |  |  | Class and lab must be taken concurrently. |
| XXXX | Related Work or Minor | 3 |  |  |  |
| MATH 3688 | Math Awareness Seminar | 0 |  |  | This course is only offered in the fall semester. |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 2242 | Calculus IV | 3 |  |  | Grade of C or better in MATH 2241 is required. |
| STAT 2122 | Introduction to Probability and Statistics | 3 |  |  |  |
| LBST 2102 | Global and Intercultural Awareness | 3 | X |  |  |
| LBST 221X | Ethical and Cultural Critique | 3 | X |  | Chosen from LBST 2211, 2212, 2213, 2214, 2215 |
| XXXX | Related Work or Minor | 3 |  |  |  |
|  |  |  |  |  |  |

**30 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Junior Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| STAT 2223 | Elements of Statistics II | 3 |  |  |  |
| XXXX | Writing Intensive Course | 3 | X | W |  |
| XXXX | Science | 3 | X |  | Chosen from list of approved courses. |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| STAT 3110 | Applied Regression | 3 | X | W |  |
| XXXX | Science w/ Lab | 4 | X |  |  |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Elective | 6 |  |  |  |
|  |  |  |  |  |  |

**31 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Senior Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| STAT 3XXX | Upper-Level STAT Course | 3 |  |  | Chosen from STAT 3140, 3150, 3160, and 4116. |
| STAT 3XXX | Upper-Level STAT Course | 3 |  |  | Chosen from STAT 3140, 3150, 3160, and 4116. |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Electives | 6 |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| STAT 3XXX | Upper-Level STAT Course | 3 |  |  | Chosen from STAT 3140, 3150, 3160, and 4116. |
| MATH 3689 | Mathematics Project Seminar | 1 | X | O |  |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Electives | 5 |  |  |  |
|  |  |  |  |  |  |

**27 Credit Hours for Year**

|  |  |
| --- | --- |
| **UNCC_Logo_4c** | **B.S. in Mathematics**  **Academic Plan of Study**  *College of Liberal Arts & Sciences*  *Department of Mathematics and Statistics*  [*math.uncc.edu*](http://math.uncc.edu) |

**Program Summary**

* ***Credit Hours:*** 120 hours
* ***Concentrations:*** Statistics
* ***Declaring the Major:*** Minimum GPA of 2.0 required; no pre-requisite courses; change of major form accepted year-round; orientation/advising session required after declaration
* ***Advising (For the Major):*** Required on admission to the major, at the end of the fourth semester, and before the beginning of the senior year. Recommended more frequently. Assigned advisors available by appointment
* ***Advising (For General Education):*** By Mathematics Department advisors or by CLAS advising center
* ***Minimum Grades/GPA:*** GPA of at least 2.0 in all the MATH, STAT, and OPRS courses taken and GPA of at least 2.0 in all MATH, STAT, and OPRS courses at the 2000 level and above.
* ***Teacher Licensure:*** YES in MATH, requires specified coursework in Mathematics and Mathematics Education and a minor in Secondary Education
* ***Evening Classes Available:*** YES (with proper planning can be completed at night)
* ***Weekend Classes Available:*** NO
* ***Other Information:*** Departmental Honors, Internships, Co-ops
* ***Contact(s):*** Dr. Kim Harris, Undergraduate Coordinator [mkharris@uncc.edu](mailto:emailaddress@uncc.edu)

**Program Requirements**

MATH offers the BS degree with the option of choosing the Statistics concentration. Students who want to teach high school level mathematics would complete the BA or BS program and the minor in secondary education. The BS degree is a *relatively structured* program*.* The program requires four semesters of calculus that must be taken in order. A grade of at least a C in each of the first three courses is required to progress to the next calculus course. Students are also required to take Linear Algebra, Differential Equations, Modern Algebra, Math Awareness Seminar, and the Senior Project. A course in computer programming and six additional upper-level MATH, OPRS, or STAT courses are also required. Two of these upper-level courses must be two semesters of Advanced Calculus, and one of the courses must be an advanced course in another branch of mathematics. Students who take Calculus I in their freshman year and begin their major as sophomores can complete the degree on time ***if they consult regularly with their advisors***. Students are required to complete either a formal minor or 18 credit hours of *related work* (in consultation with their advisor).

|  |  |  |
| --- | --- | --- |
| Areas | Credit Hours | Description |
| Pre-Major/ Prerequisites | - |  |
| Major | 40-43 | Hours vary depending on concentration. Required courses in the major will satisfy General Education requirements for Mathematics & Logical Reasoning, Writing Intensive course in the discipline, and Oral Communication. |
| General Education  *(not satisfied by other  major requirements)* | 31 | The number of hours reflects the general education coursework required outside the major. |
| Related Work | 21 | ITCS 1212 + L (3 hours)  The requirement for Related Work can be completed with a minor from another department or with 18 hours of approved courses with a common theme. Related work that is not an official minor must be approved by the student’s advisor. |
| Foreign Language | 0-8 | Proficiency in a foreign language can be demonstrated by successful completion of FORL 1202, a placement test given by the Department of Languages and Culture Studies, or three years of high school courses in the SAME language |
| Science | 4 | BS students must take an additional science course with a lab for a total of 11 hours in science. |
| Electives | 16-24 | As needed to complete 120 hours total. |
| Total Credit Hours | 120 |  |

**Suggested Plan of Study – B.S. in Mathematics**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Freshman Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 1241 | Calculus I | 3 | X |  | A placement test is required to begin in MATH 1241. |
| ENGL 1101 | Writing and Inquiry in Academic Contexts I | 3 | X |  |  |
| LBST 110X | The Arts and Society | 3 | X |  | Chosen from LBST 1101, 1102, 1103, 1104, 1105 |
| FORL 1201 | Foreign Language | 4 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 1242 | Calculus II | 3 | X |  | Grade of C or better in MATH 1241 is required |
| ENGL 1102 | Writing and Inquiry in Academic Contexts II | 3 | X |  |  |
| XXXX | Social Science | 3 | X |  | Chosen from ANTH 1101, ECON 1101 or 2101, GEOG 1105, POLS 1110, SOCY 1101 |
| FORL 1202 | Foreign Language | 4 |  |  |  |
| XXXX | Elective | 3 |  |  |  |

**32 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sophomore Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 2241 | Calculus III | 3 |  |  | Grade of C or better in MATH 1242 is required. |
| MATH 2164 | Linear Algebra | 3 |  |  |  |
| LBST 2101 | Western Cultural and Historical Awareness | 3 | X |  |  |
| ITCS 1212+L | Introduction to Computer Science | 3 |  |  | Class and lab must be taken concurrently. |
| XXXX | Related Work or Minor | 3 |  |  |  |
| MATH 3688 | Math Awareness Seminar | 0 |  |  | This course is only offered in the fall semester. |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 2242 | Calculus IV | 3 |  |  | Grade of C or better in MATH 2241 is required. |
| MATH 2171 | Differential Equations | 3 |  |  |  |
| LBST 2102 | Global and Intercultural Connections | 3 | X |  |  |
| LBST 221X | Ethical and Cultural Critique | 3 | X |  | Chosen from LBST 2211, 2212, 2213, 2214, 2215 |
| XXXX | Related Work or Minor | 3 |  |  |  |

**30 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Junior Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 3163 | Modern Algebra | 3 | X | W |  |
| MATH 3XXX | Upper-Level Math Elective | 3 |  |  | Must be MATH, STAT, or OPRS  3000-level or above |
| XXXX | Science w/ Lab | 4 | X |  | Chosen from list of approved courses. |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 3XXX | Upper-Level Math Elective | 3 |  |  | Must be chosen from STAT 3123, MATH 4163, MATH4164, MATH 4181 |
| XXXX | Writing Intensive Course | 3 | X | W |  |
| XXXX | Science | 3 | X |  |  |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Science w/ Lab | 4 |  |  | Required for BS degree. |

**32 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Senior Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 3141 | Advanced Calculus of One Variable | 3 |  |  |  |
| MATH 3XXX | Upper-Level Math Elective | 3 |  |  | Must be MATH, STAT, or OPRS  3000-level or above |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Electives | 6 |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 3142 | Advanced Calculus of Several Variables | 3 |  |  |  |
| MATH 3XXX | Upper-Level Math Elective | 3 |  |  | Must be MATH, STAT, or OPRS  3000-level or above |
| MATH 3689 | Mathematics Project Seminar | 1 | X | O |  |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Electives | 1 |  |  |  |
|  |  |  |  |  |  |

**26 Credit Hours for Year**

**Suggested Plan of Study – B.S. in Mathematics, Concentration: Statistics**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Freshman Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 1241 | Calculus I | 3 | X |  | A placement test is required to begin in MATH 1241. |
| ENGL 1101 | Writing and Inquiry in Academic Contexts I | 3 | X |  |  |
| LBST 110X | The Arts and Society | 3 | X |  | Chosen from LBST 1101, 1102, 1103, 1104, 1105 |
| FORL 1201 | Foreign Language | 4 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 1242 | Calculus II | 3 | X |  | Grade of C or better in MATH 1241 is required |
| ENGL 1102 | Writing and Inquiry in Academic Contexts II | 3 | X |  |  |
| XXXX | Social Science | 3 | X |  | Chosen from ANTH 1101, ECON 1101 or 2101, GEOG 1105, POLS 1110, SOCY 1101 |
| FORL 1202 | Foreign Language | 4 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |

**32 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sophomore Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 2241 | Calculus III | 3 |  |  | Grade of C or better in MATH 1242 is required. |
| STAT 2122 | Introduction to Probability and Statistics | 3 |  |  |  |
| LBST 2101 | Western Cultural and Historical Awareness | 3 | X |  |  |
| ITCS 1212+L | Introduction to Computer Science | 3 |  |  | Class and lab must be taken concurrently. |
| XXXX | Related Work or Minor | 3 |  |  |  |
| MATH 3688 | Math Awareness Seminar | 0 |  |  | This course is only offered in the fall semester. |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| MATH 2242 | Calculus IV | 3 |  |  | Grade of C or better in MATH 2241 is required. |
| STAT 3110 | Applied Regression | 3 |  |  |  |
| LBST 2102 | Global and Intercultural Awareness | 3 | X |  |  |
| LBST 221X | Ethical and Cultural Critique | 3 | X |  | Chosen from LBST 2211, 2212, 2213, 2214, 2215 |
| XXXX | Related Work or Minor | 3 |  |  |  |
|  |  |  |  |  |  |

**30 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Junior Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| STAT 3122 | Probability and Statistics I | 3 |  |  |  |
| MATH 2164 | Linear Algebra | 3 |  |  |  |
| XXXX | Writing Intensive Course | 3 | X | W |  |
| XXXX | Science | 3 | X |  | Chosen from list of approved courses. |
| XXXX | Related Work or Minor | 3 |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| STAT 3XXX | Upper-Level STAT Course | 3 |  |  | Chosen from STAT 3140, 3150, 3160, and 4116. |
| STAT 3123 | Probability and Statistics II | 3 |  |  |  |
| XXXX | Science w/ Lab | 4 | X |  |  |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Elective | 3 |  |  |  |
|  |  |  |  |  |  |

**31 Credit Hours for Year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Senior Year | | | | | |
| Course Number | **Course Title** | **Credit Hours** | **General Education** | **W/O Course** | **Notes** |
| *Fall Semester* |  |  |  |  |  |
| MATH 3141 | Advanced Calculus of One Variable | 3 |  |  |  |
| STAT 3XXX | Upper-Level STAT Course | 3 |  |  | Chosen from STAT 3140, 3150, 3160, and 4116. |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Electives | 6 |  |  |  |
|  |  |  |  |  |  |
| *Spring Semester* |  |  |  |  |  |
| STAT 3XXX | Upper-Level STAT Course | 3 |  |  | Chosen from STAT 3140, 3150, 3160, and 4116. |
| MATH 3689 | Mathematics Project Seminar | 1 | X | O |  |
| XXXX | Related Work or Minor | 3 |  |  |  |
| XXXX | Electives | 5 |  |  |  |
|  |  |  |  |  |  |

**27 Credit Hours for Year**

Appendix B

**Mathematics and Statistics Library Resources**

**May 2013**

*Prepared by Alison Bradley, STEM Librarian*

***Collections***

J. Murrey Atkins Library has a wealth of resources supporting the Mathematics and Statistics Department for both research and curricular needs. The Library of Congress main classification for mathematics is QA. Within that classification number, there are currently 24,675 titles, including 4,592 electronic resources (online journals and eBooks). Below is a breakdown of the QAs by date:

|  |  |
| --- | --- |
| **Date** | **No. of Titles** |
| 2010-13 | 513 |
| 2000-09 | 4,351 |
| 1990-99 | 4,384 |
| Older than 1990 or undated | 15,427 |

In addition to books, the library provides students and faculty with access to journals, and the databases that provide topic-oriented access to the articles published in those journals. For item-level search and access to scholarly work, Atkins Library subscribes to MathSciNet, an electronic publication offering access to a carefully maintained and easily searchable database of reviews, abstracts and bibliographic information for much of the mathematical sciences literature.

The Library also subscribes to a number of other broader coverage databases that include high quality research articles in the field of mathematics and statistics. *Web of Science* is a database that indexes scholarly literature broadly across the sciences and social sciences. It includes journal articles, conference proceedings, and papers from symposia, seminars, colloquia, and workshops. Students and faculty also have access to *ScienceDirect, SpringerLink, Academic Search Complete, JSTOR* and many other interdisciplinary databases.

Journal subscriptions are of course a significant portion of the library’s support for the department. We currently subscribe to 151 different journals related to mathematics and statistics. Of these subscriptions, 112 are available online only, 24 in print only, and 15 both in print and online.

For research needs not covered by our existing holdings and subscriptions, students and faculty may borrow articles, conference papers, and monographs from libraries around the world through our Interlibrary Loan service.

**Budget**

Library financial support for monograph and other one-time cost purchases for the Department of Mathematics and Statistics has remained relatively stable at about $7,000 per year. Journal subscriptions for this area cost slightly less than $200,000 in 2012.

**Instruction/Research Services**

The Library provides a number of additional services to support teaching and research in the Department of Mathematics and Statistics. The STEM Library Liaison will work with faculty to provide research instruction for students. As part of this service the librarian will provide face-to-face instruction, create course-specific online research guides which can be embedded in class Moodle pages, and will work individually with students via email, chat and/or face-to-face office consultations. The STEM Liaison is also available to assist faculty with their research needs via phone, email and/or face-to-face consultations.