**Mathematics and Statistics**

**2015-2020 Strategic Plan**

**Approved by the department on 3/30/2015**

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| I. Executive Summary | |
| 1-2 pages | |
| **A. Mission and goals:** | 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 the 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 the 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. 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 a historically high number of math majors including future teachers. The department expects to continue to grow its undergraduate programming with attractive contemporary offerings in computational science and a minor in statistics. The department is committed to its high quality graduate programming and expects to continually increase both the size of the Ph.D. program and the number of students graduating each year. |
| **B. Summary of major objectives in strategic plan:** | Objective #1: Increase our national presence in multidisciplinary research in stochastic processes and computational modeling. This will promote multidisciplinary research and interactions with other units in the university.  Objective #2: Restore strength in traditional core research areas. This is critical to the viability of our graduate and undergraduate programs. In concert especially with this objective we will continue our efforts to increase the presence of underrepresented groups.  Objective #3: Broaden our research strength in statistics to enhance our connection to big data in response to national calls from funding agencies and professional organizations. This objective will further enhance the university’s big data initiative.  Objective #4: Continue and strengthen our innovative efforts to foster early math success for all students.  Objective #5: Continue and strengthen our efforts to recruit and prepare future high school math teachers, and in collaboration with College of Education, improve the mathematics preparation of elementary and middle school teachers.  Objective #6: Strengthen our undergraduate program to meet the challenges due to faculty departures and dramatic growth in student demand. This would include the broadening of course offerings and programmatic changes.  Objective #7: Raise the already high level of research productivity and continue to promote grant activity. |
| **C. Summary of new resources required to achieve new Objectives:** | Objective #1. Two new tenure track faculty lines in the areas of Stochastic processes, applied mathematics, and computational modeling. One replacement line in the area of inverse problems to replace a (grant-supported) faculty resignation. Additionally, any faculty departure in this area will be a high priority to be replaced.  Objective #2 and Objective #6. One or two tenure track faculty lines per year, depending on retirements, especially in the traditional core areas. Five new GTA lines.  Objective #3. One new tenure track faculty position in the area of statistics with specialization in high dimensional data.  Objective #4 and Objective #6. A large room dedicated to house a tutoring/learning center to support elementary level math/stat classes. Three new lecturer positions are needed in order to handle the increased teaching responsibilities due to the ongoing dramatic growth in freshman classes in general, to meet the special needs in delivering the newly designed MATH courses for Elementary Education majors, to supervise the proposed tutoring/learning center, and to advise math majors.  Additional offices to accommodate the increased personnel in the department (applies to all Objectives). The department is currently at capacity in terms of office space. |

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| III. New Strategic Objectives, Action Plans and Performance Outcomes for 2015-2020 |
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| A. College Goal #2: To expand the frontiers of knowledge and leverage discovery for the public benefit through innovative programs of research, creative activities, and graduate education that span the disciplines. |
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| B. Unit Objective #1: | Increase our national presence in multidisciplinary research in stochastic processes and computational modeling. This will promote multidisciplinary research and interactions with other units in the university. |

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| C. Relationship of Goal to Next Higher Reporting Unit Goal: | CLAS Goal #2 |

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| D. Action Plans to Achieve Goal: | 1. Develop and introduce a new undergraduate concentration in computational methods in scientific modeling. For example, students in this concentration will be well positioned for graduate work and for job opportunities in big data. The department has re-gained some strength in this area with the replacement of two of the three recent faculty losses. This program would be a perfect fit for the department's growing core research strength in applied computational and mathematical modeling. 2. Continue to build on the core strengths in the Applied Mathematics doctoral program to increase the breadth and range of applications of supervised doctoral and postdoctoral research. The department is on a path that fosters collaborations with other departments/disciplines through recent strategic cluster hires with departments such as bioinformatics, chemistry, geography, physics, psychology and other social science departments (through Project Mosaic). The department will continue building its strength around a strong, multidisciplinary team with a wide range of expertise including computation, numerical analysis, probability and stochastic processes, inverse problems, applied analysis, mathematical physics, and statistics. 3. A task force will be formed to explore the design and potential interest in year one. The proposal will be developed in year two and submitted in year three. Assessment of the program will be similar to the current assessment method used for other math major concentrations such as statistics or actuarial science. |
| E. Assessment Methodology: | 1. The information needed for this assessment will come from individual faculty annual reports. Assessment of team’s resource needs will be by Chair and Advisory committee. Department wide discussion meetings will be held if such meetings are deemed necessary. 2. The success and national standing will be measured by collaborations that lead to high quality publications, successful grants, and increased interest in the graduate program. 3. The Chair will be responsible for making this assessment. |
| F. Type of Evidence: | 1. An annual report from the task force to the department chair before the program is launched and an annual report from the undergraduate coordinator to the department chair after the program is launched. |
| G. Performance Goal: | 1. Proposal submitted in a timely manner. Students progressing through the program in a respectable number by year 5 and successfully graduating by years 6 and 7. 2. Suitable activity levels will depend on available resources. Performance expectations will be clarified and reviewed annually. The base level will be established in the first year. |
| H. Resources Required: | In addition to a tenure track position in the area of inverse problem to replace a (grant-supported) faculty resignation, two new tenure track with specialty in the designated areas are requested. Two new courses may be needed for this concentration (one of which may be a limited enrolment course proposed as a capstone experience in computational modeling).  The task force leader will need a course release each year in years 1 and 2. |

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| I. Annual progress assessment of performance outcomes: |  |
| J. Follow-up plan to make changes as a result of assessment findings: |  |

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| III. New Strategic Objectives, Action Plans and Performance Outcomes for 2015-2020 |
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| A. College Goal #1:To educate a diverse student body through an integrated academic experience that positions graduates for personal success and civic responsibility in the global environment of the 21st century. |
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| B. Unit Objective #2: | Restore strength in traditional core research areas. This is critical to the viability of our graduate and undergraduate programs. In concert with this objective we will continue our efforts to increase the presence of underrepresented groups. |

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| C. Relationship of Goal to Next Higher Reporting Unit Goal: | CLAS Goal #1 |

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| D. Action Plans to Achieve Goal: | 1. Request and fill 1 to 2 positions each year in several traditional core research areas including analysis, differential geometry/topology and algebra. The actual number requested will depend on possible faculty departures such as retirement. 2. Form a task force to research other departments and programs from other universities that are similar to ours in terms of size, research strength, and other factors. The charge of the task force is to identify several departments and programs that have done particularly well in terms of faculty and undergraduate and graduate student diversity. 3. Once these departments and programs have been identified, the department will try, via campus visits and conversations between their faculty/administrators and ours, to develop ways to enhance the diversity of our department. |
| E. Assessment Methodology: | 1. Document how many new faculty positions have been added and in which areas. 2. Document how diversity is being addressed in the recruitment of undergraduate, graduate students and faculty members and assess how effective our methods to achieve a more diverse department are. |
| F. Type of Evidence: | Annual report from the task force to the department.  More faculty and upper level undergraduate and graduate mathematics and statistics from underrepresented groups. |
| G. Performance Goal: | 1. Performance expectation on strengthening the traditional core research areas will depend on the new faculty lines granted, and will be reviewed and modified annually. 2. Performance goal on faculty diversity is to have minority candidates in the pool for each new search, leading to more faculty members from underrepresented groups in the future. |
| H. Resources Required: | 1. 1 to 2 positions each year in several traditional core research areas including analysis, differential geometry/topology and algebra. The actual number requested will depend on possible faculty departures such as retirement. 2. Up to 5 new GTA lines over the course of the plan period. |

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| III. New Strategic Objectives, Action Plans and Performance Outcomes for 2015-2020 |
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| A. College Goal #3:To engage community partners in mutually beneficial programs which enhance the economic, civic, and cultural vitality of the region. |
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| B. Unit Objective #3: | Broaden our research strength in statistics to enhance our connection to big data in response to the national calls. This objective will further enhance the university’s big data initiative. |

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| C. Relationship of Goal to Next Higher Reporting Unit Goal: | CLAS Goal #3 |

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| D. Action Plans to Achieve Goal: | 1. Request and recruit a tenure track faculty member in statistics with expertise in big data analysis. 2. Encourage and provide support for current statistics faculty members to venture into the big data research area, and to establish collaborations with faculty members associated with big data from areas such as bioinformatics and computer science. 3. Establish a partnership with the Data Science and Business Analytics program by developing the statistics courses the program needs and providing instructional support for these courses. A task force consisting of statisticians will be formed for this task. 4. Integrate a data analytic component into our new math concentration in Computational Science. At least one statistician will join this task. |
| E. Assessment Methodology: | 1. Course contents and syllabi of the stat courses will be developed in year one for the DSBA program. Course and partnership proposals (program modification) to be submitted in year 2 and courses will start being offered in year 3. The outcome will be assessed by student enrollment in these courses. 2. The corresponding component for the undergraduate math major concentration in Computational Science will be assessed as outlined in Objective #1. 3. The outcomes of the collaboration/involvement in the big data initiative will be assessed by the actual projects, publications, grant proposal submissions associated with such collaborations. |
| F. Type of Evidence: | Annual report from the task force to the department chair before the program is launched and an annual report from the undergraduate coordinator to the department chair after the program is launched. |
| G. Performance Goal: | 1. Successful development and implementation of the stat courses for the DSBA program and the partnership with the DSBA program, and 20 or more students enrolled in each of these classes. 2. Successful development and implementation of the Computational Science math major concentration, with at least 20 students enrolled in the program by the end of this strategic planning cycle (2020). 3. High quality publications, projects and successful grants awarded from collaborations and research in the areas related to big data such as bioinformatics. |
| H. Resources Required: | One tenure track faculty in the area of high dimensional data reduction (a subfield in statistics) is needed. One-course release for the task leader in year 1. |

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| III. New Strategic Objectives, Action Plans and Performance Outcomes for 2015-2020 |
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| A. College Goal #1: To educate a diverse student body through an integrated academic experience that positions graduates for personal success and civic responsibility in the global environment of the 21st century. |
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| B. Unit Objective #4: | Continue and strengthen our innovative efforts to foster early math success for all students. |

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| C. Relationship of Goal to Next Higher Reporting Unit Goal: | CLAS Goal #1 |

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| D. Action Plans to Achieve Goal: | 1. Continue monitoring the success rate of students placed using the new math placement method; 2. Monitor the MATH0900 course and the success of the students coming out of that course in subsequent math classes, with the intention to eventually terminate the course and replace it with online self-learning resources. 3. Continue our effort in course redesign and the delivery of multi-section courses coupled with large class sizes. A redesign of Math 1100 will be a better fit for students completing an evolving Math 0900 replacement. 4. Open and operate a larger and new tutoring center that would double in size the current drop-in tutoring service with longer operating hours and better design and coordination of services. |
| E. Assessment Methodology: | 1. Overall success rate of students in math classes placed using the math placement method implemented in Fall 2014. 2. Overall success rate of students in math classes placed after completion of MATH0900. 3. Overall success rate of students in the targeted and redesigned math/stat classes. Also monitor common final exam scores in these courses. |
| F. Type of Evidence: | 1. Data pulled from Institutional Study. |
| G. Performance Goal: | 1. At least 70% of students placed in math classes according to the math placement method implemented in Fall 2014 will succeed in their first attempt. 2. At least 75% of those completing MATH0900 will be successful in their next enrolled math class. 3. At least a 75% success rate in the redesigned large enrollment classes. |
| H. Resources Required: | 1. A large room dedicated to house a tutoring/learning center to support elementary level math/stat classes. 2. Two new lecturer positions are requested: In addition to helping the department with the ongoing dramatic growth in freshman classes, they will help with supervising the proposed tutoring/learning center and with advising math major students. |

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| III. New Strategic Objectives, Action Plans and Performance Outcomes for 2015-2020 |
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| A. College Goal #1: To educate a diverse student body through an integrated academic experience that positions graduates for personal success and civic responsibility in the global environment of the 21st century. |
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| B. Unit Objective #5: | Continue and strengthen our efforts to recruit and prepare future high school math teachers, and in collaboration with College of Education, improve the mathematics preparation of elementary and middle school teachers. |

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| C. Relationship of Goal to Next Higher Reporting Unit Goal: | CLAS Goal #1 |

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| D. Action Plans to Achieve Goal: | 1. Use early advising and the Mathematics Awareness Seminar to increase our effort in reaching math majors with the information about the teaching career as a high school math teacher. 2. Work with local school systems to identify and encourage students who are interesting in teaching mathematics at the K-12 levels. 3. Carefully monitor the newly designed MATH1340 and MATH1341 classes for elementary math teachers. 4. Complete, operate and monitor the Elementary Teachers Mathematics Content Practice Test designed for ELED and SPED majors. 5. Develop a MATH minor for ELED and SPED majors. A task force will be formed for this task. 6. Review and revise the MATH courses for middle grades math teachers and the MAED courses for secondary school math teachers. |
| E. Assessment Methodology: | 1. Track record of math majors aimed at becoming high school math teachers. 2. Track students who enter the program from local high schools with which we work. 3. Analysis of student success in their standard math content tests, before and after their completion of MATH1340/1341 and the Elementary Teachers Mathematics Content Practice Test. 4. The successful development, submission and approval of the MATH minor for ELED and SPED majors. 5. The successful development, submission, and approval of the course revisions for the middle school and secondary school programs. |
| F. Type of Evidence: | 1. Graduation rates, participation in Student Teaching, GPA, and course grades from MATH majors with the secondary education minor. 2. Funded grants for recruitment of majors for the secondary education program. 3. Data pulled from Institutional Study. 4. Reports from students taking the exams. 5. Progress reports from the task force and submission, approval notice of the MATH minor for ELED and SPED majors and course revisions for the middle school and secondary school programs. |
| G. Performance Goal: | 1. An increase of math majors interested in a math teacher career. 2. A statistically significant improvement in student performance on the standard tests after completing MATH1340/1341 and the Elementary Teachers Mathematics Content Practice Test. 3. The successful development, submission and approval of the MATH minor for ELED and SPED majors and course revisions for the middle school and secondary school programs. |
| H. Resources Required: | 1. A new lecturer position to teach MATH1340/1341 and the MATH Education methods courses MAED3222/3224 for ELED and SPED majors, and other MATH Education method courses. 2. A course release or a small stipend for the task force leader of the MATH minor for ELED and SPED majors. |

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| A. College Goal #1: To educate a diverse student body through an integrated academic experience that positions graduates for personal success and civic responsibility in the global environment of the 21st century. |
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| B. Unit Objective #6: | Strengthen our undergraduate program to meet the challenges due to faculty departures and dramatic growth in student demand. This would include the broadening of course offerings and programmatic changes. |

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| C. Relationship of Goal to Next Higher Reporting Unit Goal: | CLAS Goal #1 |

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| D. Action Plans to Achieve Goal: | 1. Increase the choices among our upper-level math courses for math majors and minors and increase the frequencies at which these courses are offered. 2. Request and fill positions that not only will strengthen the research function of the department (Goal #1) but also will strengthen the teaching mission of the department, particularly at the upper-level. 3. Revise the Senior Project (MATH 3689) to include more options for our majors. 4. Increase the number of students in the Mathematics Honors Program. 5. Revise the concentrations in the Math for Business program. 6. Identify and implement more efficient and effective methods for advising of our majors and minors. |
| E. Assessment Methodology: | 1. Track and analyze the upper-level course offerings and the student enrollment in these courses by math majors. 2. Track and analyze the graduation rates, course grades, and grade point averages of our math majors. 3. Track and analyze the impact of the increased course offerings and implemented programmatic changes on the department’s master program enrollment and Honors Program enrollment. 4. The successful development, submission, and approval of new upper-level courses and revisions to the Math for Business program. 5. Implement a senior survey with questions about advising. |
| F. Type of Evidence: | 1. Data pulled from Institutional Study. 2. Annual reports from undergraduate and graduate coordinators. 3. Data from senior survey. |
| G. Performance Goal: | 1. An increase in the number of upper-level courses that are offered, the frequency at which they are offered, and the size of the classes. We are currently teaching many upper-level courses with large enrollments. These courses focus on advanced mathematical skills and processes and could be taught much more effectively with lower enrollments. 2. More efficient and effective methods of advising. 3. An increase in the graduation rates of math majors. 4. Increased participation in the early-entry Master’s program and the undergraduate Honors program. |
| H. Resources Required: | 1. See Objective 2 recourse section for new faculty line request. 2. A full time advisor or course releases for some faculty members to devote more time to advising. This will depend on the revisions that are made to the advising process. |

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| III. New Strategic Objectives, Action Plans and Performance Outcomes for 2015-2020 |
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| **A. College Goal #2:** To expand the frontiers of knowledge and leverage discovery for the public benefit through innovative programs of research, creative activities, and graduate education that span the disciplines. |
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| B. Unit Objective #7: | Raise the already high level of research productivity and continue to promote grant activity. |

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| C. Relationship of Goal to Next Higher Reporting Unit Goal: | CLAS Goal #2 |

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| D. Action Plans to Achieve Goal: | 1. The department advocates maintaining and growing a faculty with strong core strengths with an applied focus that is adaptive and responsive. However some key areas have been weakened due to recent faculty departures that have not been replaced. We will identify and rank key areas for recruitment that will support and bridge existing strengths and replace critical losses to sustain strength in core courses. 2. Continue, and increase, the practice of faculty engagement in research and graduate education with other units. More effort at maintaining an informative department website (as well as better participation in the College site) regarding faculty research interests and accomplishments with a view to serving as a starting contact for possible external collaborations. 3. Continue to promote and sustain the many active department seminars to help maintain the culture of research and doctoral training that permeates the department. 4. Enforce the recently revised department workload policy (as much as our resources permit) to acknowledge, reward, and support productive research and graduate student training. |
| E. Assessment Methodology: | 1. Assessment of the productivity level of each faculty member as measured by publications, presentations, conferences, invited colloquium speakers and/or conference speakers. 2. Assessment of grant activity as measured by submission rate and total number of awards. |
| F. Type of Evidence: | 1. Faculty annual activity reports. 2. Grant activity data from NORM. |
| G. Performance Goal: | 1. Sustained or increased productivity level as measured by publications, presentations, conferences, invited colloquium speakers and/or conference speakers. 2. Sustained or increased grant submission rate and awards. |
| H. Resources Required: | Additional office spaces will be needed as the department is already at its capacity in terms of office space and will have no offices to house any new faculty members. |

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