

**Request for Authorization to Establish a
Master of Science in Data Science
(M.S., CIP 11.0802) at
University of North Carolina at Wilmington**

I. Program Highlights

- Designed to prepare students with advanced data analytics skills in demand across industry sectors through a combined focus on computer science, applied statistics, and applied business analytics
- Required courses in scientific visualization, pattern recognition, statistical foundations and time series, categorical data analysis, machine learning, and computational methods for large datasets.
- Capstone projects and internships required.
- Designed to meet Professional Science Master's (PSM) affiliation criteria.
- 36 credit hours
- 30 full-time students projected at steady state
- Resources needed to launch the program include three Data Science cluster faculty hires, through internal reallocations, and adjunct faculty needs and graduate stipends through enrollment growth funds. Differential tuition of \$2500 per FTE per year will be requested upon program approval. Differential tuition will support specialized computational needs for infrastructure and data analysis services, as well as some advertising and communication costs.

II. BOG Academic Program Planning Criteria (UNC Policy 400.1)

1. **Existing Programs (Number, Location, Mode of Delivery).** Appalachian State University, North Carolina State University, and UNC Charlotte offer related master's degree programs in the area of data analytics and/or business analytics. All are approved for on-campus delivery. The programs at NC State and UNC Charlotte are also designated as Professional Science Master's affiliates.
2. **Relation to Campus Distinctiveness and Mission.** The program is designed to align with UNCW's mission stating, "Our commitment to student engagement, creative inquiry, critical thinking, thoughtful expression and responsible citizenship is expressed in our baccalaureate and master's programs..." The proposed program closely aligns with UNCW's Strategic Plan 2016-2021 Goals 2 and 3, to advance research and to prepare students for post-graduation success.
3. **Demand (Local, regional, state).** UNCW maintains healthy enrollments in its existing master's degree programs in computer science and in mathematics, as well as in a related Applied Statistics certificate offering. UNCW undergraduate students are expected to be strong feeders into the proposed program; in spring 2015, over 50 UNCW undergraduates attended an interest session for NC State's master's in analytics, and during the proposal process, UNCW began assembling and maintaining an interest list. Related programs offered by NC State and by UNC Charlotte show strong applicant pools with acceptance rates ranging from only 10-20%.

- 4. Potential for Unnecessary Duplication.** NC State University and UNC Charlotte provided letters of support for the proposed program, confirming that the industry demand for graduates with analytic skills outpaces the capacity of the university system.
- 5. Employment Opportunities for Graduates.** A 2011 McKinsey report estimates that the nation will face a severe shortage of professionals, estimated 140,000-190,000 individuals, with deep analytical skills. They also estimate another 1.5 million managers and analysts to be required with the know-how to use the analysis from data scientists in order to make effective decisions. Analyses from Indeed.com show a more than 500% increase in job postings related to analytics and data science from 2009-2014. Existing degree programs in UNC also report nearly 100% graduate placement rates and, in the case of NC State, average starting salaries for program graduates approach \$100,000. The proposal included support letters from SAS, ATMC, PPD, Trillium Health Resources, Live Oak Bank, and General Electric. Several of these industry representatives agreed to serve as advisory board members (a requirement for Professional Science Master's programs) and/or to provide internship and student learning experiences.
- 6. Faculty Quality and Number.** Sixteen faculty across information technology, electrical engineering, computer science, and statistics will be directly involved in launching the program. Among them, one has direct experience in developing a professional science master's in data management and analytics at a previous institution.
- 7. Availability of Campus Resources (library, space, etc.).** Library and facilities resources are adequate to launch the program. The program will require additional hardware and software, to be covered through differential tuition.
- 8. Relevant Lower-level and Cognate Programs.** The proposed program will draw upon expertise in UNCW's existing master's in computer science and information systems, also an affiliated PSM program, and the master's in mathematics. Both programs currently exhibit strong enrollments of 30-35 students a year.
- 9. Impact on Access and Affordability.** The differential tuition amount requested is similar to that charged by UNCW's MBA and MS in Accountancy programs and is competitive when compared to UNC Charlotte and NC State tuition differentials.
- 10. Expected Quality.** As evidenced by support letters, the proposed program will enjoy strong industry support and engagement. Also stated earlier, the proposed program will build upon related disciplines at UNCW with successful master's degree programs in computer science and mathematics. These departments have already demonstrated success in placing students in employment positions such as biostatisticians, SAS programmers, data analysts, database managers, and others.
- 11. Feasibility of Collaborative Program.** The proposed program represents significant collaboration between two departments at UNCW – computer science, and mathematics and statistics.
- 12. Other Considerations.** None.

III. Summary of Review Processes

Campus Review Process and Feedback. The proposal was reviewed and approved by a program committee composed of chairs of related departments before going to the UNCW Graduate Council, Dean of the College of Arts and Sciences, Dean of the Graduate School, Provost, and Chancellor for review and approval. More than twenty faculty across campuses were consulted throughout the process. No substantive issues were raised during the review process, and edits regarding the curriculum plan were incorporated along the way.

UNC General Administration Review Process and Feedback. Throughout the review process, UNC Wilmington responded to questions from UNC General Administration regarding the professional science master's focus and commitments, student demand, program classification, budget and resources. Reviewers from six UNC system institutions evaluated the proposal. Reviewers affirmed the strong demand and need for graduates with advanced analytic skills and applauded the collaboration among disciplines. While most reviewers in most categories found the proposal to be "acceptable" or "acceptable with some considerations," reviewers supported those ratings with several substantive comments across various aspects of the program proposal. UNC Wilmington responded to questions related to the relationship with the business school, regional and local demand for graduates, student demand, collaborative opportunities, program requirements and curriculum, faculty sufficiency, and budget.

UNCW responded to questions about the program's approach to including business skills by highlighting a quote from a SAS support letter, which stated:

"Programs that are run independently, such as that of NCSU, often do an excellent job training their students in statistical methods and basic business concepts. Programs such as those of UNC Charlotte and Appalachian State reflect that they are run through business schools and do an excellent job of teaching business skills and basic data analysis. What is unique about the proposed UNC Wilmington program is that it is a collaboration between the departments of mathematics, statistics, computer science, and the business community, resulting in an emphasis on teaching not only traditional data analysis methods but also more current machine learning methods and programming skills. This is exactly the mix of skills that my consulting art at SAS Institute needs and, I believe, that the larger community of data science needs."

UNCW strengthened its student demand and employer demand evidence with support letters from local and regional businesses who support the proposed program. They also noted a recent regional survey conducted through several other universities (Campbell, UNC Pembroke, and others) that has yielded additional evidence of student interest in the proposed program. They clarified their decision-making related to select core course and elective courses and expanded the information provided on faculty scholarship and external funding. Some reviewers questioned the small number of planned student assistantships. UNCW responded that they anticipate the professional science master's designation will attract students willing to pay because of the demand for skills and corresponding salary upon completion of the program.

Benefits of program approval include an affordable, industry-informed degree offering that meets a critical gap for advanced skills as seen at national, regional and local levels. For these reasons, we do not recommend any alternatives to implementing the degree program.

IV. Recommendation

It is recommended that the Board of Governors approve UNC Wilmington's request to establish a Master of Science (M.S.) in Data Science degree program (CIP 11.0802) to enroll students starting Fall 2017.