THE UNIVERSITY OF NORTH CAROLINA SYSTEM

New Academic Degree Program Request to Establish

Institution: University of North Carolina at Charlotte

Degree Program Title (e.g., M.A. in Biology): Ph.D. in Data Science

Reviewed and Approved By (Provide Name and title only. No signature required in this section.)

Review	Name	Title
Faculty Senate Chair (Or appropriate body)	Xiaoxia Newton	Faculty President
Graduate Council (If applicable)	Concepcion Godev	Graduate Council Chair
Graduate/Undergraduate Dean (If applicable)	Pinku Mukherjee	Interim Associate Provost & Graduate School Dean
Academic College/School Dean	Bojan Cukic, Robert Keynton, Catrine Tudor-Locke, John Smail, Dolly King, Bernadette Donovan-Merkert	Dean College of Computing and Informatics, Dean William State Lee College of Engineering, Dean College of Health and Human Services, Interim Dean College of Humanities & Earth and Social Sciences, Interim Dean College of Business, Interim Dean College of Science
Department Head/Chair	Douglas Hague	Executive Director
Program Director/Coordinator	Jean-Claude Thill and Monica Johar	Knight Distinguished Professor of Geography and Earth Sciences, Professor of Management Information Systems

New Academic Program Process

New academic programs are initiated and developed by faculty members. The Request to Establish a New Academic Degree Program must be reviewed and approved by the appropriate individuals listed above before submission to the UNC System Office for review.

Please provide a succinct, yet thorough response to each section. Obtain signatures from the Chancellor, Provost, and Chief Financial Officer, and submit the proposal via the PREP system to the UNC System Vice

President for Academic Program, Faculty, and Research, for review and approval by the UNC System Office. If the Request to Establish is approved by UNC System Office staff, it will be submitted the proposal for review and approval by the UNC Board of Governors.

UNC Institution Name	University of North Carolina Charlotte
Joint Degree Program (Yes or No)? If so, list partner.	No
Degree Program Title (e.g., M.A. in Biology)	Ph.D. in Data Science
CIP Code and CIP Title (May be found at National Center for Education Statistics)	11.0701 Computer Science
Require UNC Teacher Licensure Specialty Area Code (Yes or No). If yes, list suggested UNC Specialty Area Code(s).	No
Proposed Delivery Mode (campus, online, or site-based distance education). Add maximum % online, if applicable.	Campus
Will this program be offered through an Online Program Manager (OPM)? If yes, list the OPM.	NA
If requesting site-based delivery, indicate address(es), city, county, state, and maximum % offered at site.	NA
Proposed Term to Enroll First Students (e.g., Fall 2023)	Fall 2024

Do the following sections of your previously submitted and approved Request for Preliminary Authorization to Develop a New Academic Degree Program document require any change or updated information? If yes, note the items and explain.

Category	Yes or No	Explanation (if applicable)
SACSCOC Liaison Statement	No	
Review Status (campus bodies that reviewed and commented on Letter of Intent)	No	
Program Summary	No	

Student Demand	No	
Access and Affordability	No	
Societal and Labor Market Demand	No	
Doctoral Specific Questions	No	

I. Program Summary

a. Describe the proposed program, including the overall rationale for its development. Include a discussion of how this program supports the specific mission of the institution and of the broader UNC System. Why is this program a necessary addition for the institution?

Market and University Alignment

The proposed doctoral program in Data Science (DTSC) fulfills a need created by the increasing demand at the high end of the marketplace for data scientists. While most needs for data science talent are fulfilled through undergraduate and Master's programs like the existing B.S. and M.S. degrees in Data Science and Business Analytics (DSBA), Statistics, and Computer Science at UNC Charlotte, there is a gap in the production of Ph.D.s in the data science field. The proposed program offers rapid specialization for different profiles of data science professionals. The proposed Ph.D. program in Data Science will provide doctoral-level education to students seeking data science careers both in academia and in industry. As evidenced by the letters of support provided in Attachment III, Charlotte area industries, especially the finance industry, have long partnered with UNC Charlotte and are supporting this extension of the data science programs to include the Ph.D.. The proposed program is a terminal research degree that is *transdisciplinary by design* and lays emphasis on the mastery of the data science tools and methodologies from diverse disciplines (computer science, social sciences, business, etc.) and on *responsible stewardship of data* to cover the broad value of data science in various domains across society. Strong emphasis will be placed on providing students the opportunity to demonstrate mastery of knowledge in multiple data science application domains including, but not limited to, financial services, political science, sociology, marketing, management information systems, operations management, criminal justice, public administration, geography, public health, earth and environmental sciences, engineering, urban management, economics. *As opposed to discipline specific programs, the research for these students and faculty will mix and integrate methods from a broad range of disciplines as well as develop new methodologies as may be required.*

As North Carolina's urban research university, UNC Charlotte is in an unparalleled position to deliver on career-building expertise. UNC Charlotte leverages its location in the state's largest city to offer internationally competitive programs of research and creative activity, exemplary undergraduate, graduate, and professional programs, and a focused set of community engagement initiatives. UNC Charlotte maintains a particular commitment to addressing the cultural, economic, educational, environmental, health, and social needs of the greater Charlotte region and beyond. UNC Charlotte recently established the School of Data Science (SDS) as the home for transdisciplinary data science and analytics programs. SDS and its predecessor, the Data Science Initiative (DSI), are key strategic priorities of the University. Six colleges participate

in program implementation within the School of Data Science: College of Computing and Informatics, College of Science, College of Humanities & Earth and Social Sciences, Belk College of Business, College of Health and Human Services, and The William States Lee College of Engineering, while the remaining colleges of Education and Arts + Architecture will be contributing as well.

Alignment with UNC Mission

By exposing students to real-world data and problems in civil society and in business organizations, the DTSC Ph.D. program will emphasize educational and research opportunities that clearly align with UNC Charlotte's mission, including social mobility, public policy, and urban analytics. The early acquisition of a $2.1 million research grant has positioned UNC Charlotte to be a national leader in fundamental and applied research in data science. More recently, the North Carolina General Assembly has invested $41.2M for "Engineering North Carolina's Future." This funding specifically calls for investments in data science along with engineering and cybersecurity. As a complement, SDS has a broad cadre of industrial and community partners including Wells Fargo, Bank of America, Lowe's, Premier, Genpact, Atrium Health, Novant Health, Duke Energy, SAS, IQVIA as well as others. The surrounding hub of top financial services, energy, retail sales and distribution, advanced manufacturing, and technology companies provides an ideal ecosystem to utilize a suite of skills only an urban research university can accommodate—data science, innovation insights, business acumen, and critical problem solving. UNC Charlotte is also responding to this sector's large workforce demand through collaborations with other universities and business partners in the Research Triangle Park (RTP). Through collaborations with NC State, UNC Chapel Hill, Wake Tech, and NC Central, App State, Winston-Salem State, UNC Greensboro, Duke, and Wake Forest, UNC Charlotte SDS is working to weave a network and strategic workforce development pipelines to expand data science capability across North Carolina. While there are no existing transdisciplinary doctoral programs in Data Science in the UNC system[1], we will continue to seek out and reinforce collaboration across UNC system institutions.

The UNC System mission is "to discover, create, transmit, and apply knowledge to address the needs of individuals and society." A critical component of data science education is to guide students to develop data acumen. This requires exposure to key concepts in data science, real-world data and problems that can reinforce the limitations of existing tools and stimulate the development of new ones, and ethical considerations that permeate many applications. Key foundational concepts related to data acumen are at the core of competitive capabilities of every business, government, or non-profit organization today. The ability of UNC institutions to incorporate data science best practices is a key component in their long-term viability, resilience, and sustainability. The proposed DTSC program perfectly aligns with this mission by providing training at the cutting edge of data science practice and research today and for the generations to come.

Necessary addition for UNC Charlotte

[1] While NC A&T has recently evolved their Computational Science and Engineering program to be a Ph.D. in Computational Data Science and Engineering, their degree's core is within Engineering with some interdisciplinary focus. The program UNC Charlotte is proposing is built from the ground up with a transdisciplinary focus. While related, we believe that these programs are very distinct and serve different markets.

As detailed in the Student Demand section of the Request for Preliminary Authorization, the national and global popularity of Master's programs in data science and our own surveys strongly suggest that there will be large student demand for a Ph.D. program in data science (details in Student Demand section). Not only is industry poised to support demand for data scientists with doctoral level of training, but the growth of undergraduate and Master's programs nationally will also require the hiring of faculty members ready to train the next generations of students in data science. In the UNC system, there are six Master's programs in data science: UNC Charlotte, NC State, UNC Wilmington, Appalachian State University, East Carolina University and Winston-Salem State University. Duke University has a Master's program in data science as well. In particular, three representative data science programs – the M.S. in DSBA at UNC Charlotte, the MSA program at NC State, and the Master's in Interdisciplinary Data Science (MIDS) at Duke University are experiencing healthy enrollment. UNC Chapel Hill has recently launched an online M.S. in Data Science and the new Foundations of Data Science M.S. at NC State is expected to grow quickly. Finally, UNC Chapel Hill has formed a School of Data Science and Society, signaling increasing demand in this growing field.

With over 800 alumni, the DSBA program at UNC Charlotte will provide a natural pipeline of prospective students for this proposed Ph.D. program. In a recent survey of DSBA alumni, 15% indicated they would be interested in a Ph.D. program in Data Science at UNC Charlotte[2]. To be prepared for challenging coursework and rigorous research at the highest level, student applicants are expected to have demonstrable knowledge in calculus, linear algebra, probability and statistics along with proficiency in programming languages. They will be well qualified recruits for the planned Ph.D. program. Students interested in transdisciplinary work and approaches from multiple domains are expected to be attracted to this program.

b. What are the key objectives of the program? What are the expected benefits for the student who graduates from the program? What are the expected public benefits (at the local, regional, state, or national level) of this program?

Program objectives

The goal of the proposed program is to produce researchers fluent in the emerging field of data science and to develop an environment for their education and training. The objectives of the Data Science Ph.D. include:

- Preparing research data scientists, professional data scientists, and scholars/academicians who will be leaders in developing, maintaining, and managing data ethically and effectually to sustain the economic and social vibrancy of North Carolina and the United States;
- Developing research data scientists who have a deep understanding of data, statistics, computing, and ethics frameworks such that they can build new knowledge across fields and society by appropriate data collection, methods development, and deep analysis.;
- Providing a range of educational and research experiences for a diverse group of students to participate in research initiatives at UNC Charlotte, Private, Public, and International institutions; and,

[2] See the appendix of our Preliminary Authorization for complete survey results.

- Preparing future data science educators, and scholars, who are at the frontiers of understanding and disseminating data science knowledge.

Expected benefits to students, the region, state and nation

The demand for doctoral education in data science within the state of North Carolina is particularly acute. Only three tangentially related doctoral programs are located in the state of North Carolina: the Ph.D. in Geospatial Analytics at NCSU, the Ph.D. in Health Informatics at UNC at Chapel Hill, and the renamed Ph.D. in Computational Data Science and Engineering at NC A&T. Two of these programs are only concentrated on particular specialty domains (geospatial analytics and health informatics) and the third evolved from a Ph.D. in Computational Science and Engineering and retains its focus on engineering. While the proposed program is most similar to the NC A&T program, the proposed Ph.D. in Data Science at UNC Charlotte is a broader, transdisciplinary program capturing diverse application domains based on data science techniques such as marketing, management information systems, operations management, education, public policy, urban and environmental sciences, and computational social sciences; it will be the first comprehensive doctoral program in data science in the state of North Carolina. Producing higher numbers of Ph.D. graduates in this field is necessary to ensure sufficient supply of graduates to fill positions at academic institutions. With the demand for Ph.D.s in data science, the proposed program will provide a contribution to the labor force. As shown in the Preliminary Authorization, there has been a significant growth in the academic data science programs across the country. While academia has been pulling faculty from many fields to teach data science courses, the specialized education of a Ph.D. in data science would benefit the many programs across the country and allow data science faculty to teach across the curriculum. Today most faculty teaching in data science are limited to teaching a narrow portion of the courses offered within a curriculum. Having faculty with a data science Ph.D. will enable broader participation of faculty across the curriculum.

Another factor in play is the demand for data science Ph.D.s in industry. As an example, several of our industry partners in Charlotte have over 100 Ph.D. graduates in data science working inside their corporations. These teams are expected to continue to grow over time as more companies and industries are hiring data scientists. This results in a competition for data science Ph.D.s between industry and academia. As documented in the Preliminary Authorization, industry compensation is considerably higher than what is typically offered in academia. This difference necessitates the need to deliver even more graduates to serve the needs of North Carolina and our nation. Launching this program will enable our industry partners to directly support Ph.D. students and help UNC Charlotte provide funding and support to students and faculty research.

Across the nation, universities are launching data science Schools, Institutes and other forms of academic and research focused units. Enabling a Ph.D. in Data Science at UNC Charlotte will enable UNC Charlotte to better partner and collaborate with these emerging units. UNC Charlotte's School of Data Science has already initiated collaborations with Schools of Data Science at University of Virginia, University of Texas, San Antonio, and UNC Chapel Hill as well as other units at NC State and University of Michigan.

The proposed Ph.D. program is expected to be a key part of many new research centers at UNC Charlotte, including the Center for TAIMing AI, the Center for Leadership Science, the Center for

GeoSpatial Sensing and Analytics as well as many research proposals related to AI, data science, and their applications.

II. Program Planning and Unnecessary Duplication:

a. List all other public and private four-year institutions of higher education in North Carolina currently operating programs similar to the proposed new degree program, including their mode of delivery (use the 4-digit CIP as a guide). Show a four-year history of applications, acceptances, enrollments, and degrees awarded in similar programs offered at other UNC institutions (using the format below for each institution with a similar program). If data was not available, mark not available. Programs at UNC institutions may be found on the UNC System website.

There are only three tangentially related doctoral programs located in the state of North Carolina: the Ph.D. in Geospatial Analytics at NCSU, the Ph.D. in Health Informatics at UNC at Chapel Hill, and the renamed Ph.D. in Computational Data Science and Engineering at NC A&T. After review and discussions, NC A&T is the only one that we view as somewhat similar to our proposed degree (even though it is in CIP 14.9999 (Engineering, Other). None of them has the transdisciplinary breadth that is central to our proposed program.

Institution	**North Carolina A&T University**			
Program Title	Ph.D. in Computational Data Science and Engineering* (CIP 14.9999)			
Academic Year	AY21	AY22	AY23	AY24
Applications	Not available	Not available	47	70
Acceptances	Not available	Not available	13	22
New Enrollment	6	9	3	9
Total Enrollment	46	42	32	36
Total Degrees Awarded	5	2	1	TBD

*Data received from Marwan Bikdash, Chair Computational Data Science and Engineering, NC A&T, November 28, 2023

b. Describe what was learned in consultation with other programs regarding their experience with student demand and job placement. Indicate how their experiences influenced your enrollment projections.

UNC Charlotte's Executive Director of the School of Data Science, Dr. Hague, is a member of the national Board of Directors of the Academic Data Science Alliance. Through this group, there is active discussion on all levels of academic data science programs and research opportunities. Dr. Hague has a quarterly meeting to discuss programs and operations with the Dean of the School of Data Science at University of Virginia and the Executive Director of the School of Data Science at University of Texas at San Antonio. Dr. Hague has also had discussions with the leadership of

the Ph.D. Program in Data Science at Kennesaw State University. UNC Charlotte expects to continue these collaborations. As one example of the information exchanged, for the Fall 2023, University of Virginia had 240 Ph.D. applications for 8 slots. Applications and enrollment have been strong in these programs, exceeding the expectations and with no sign of tapering in interest for doctoral education in Data Science.

Given the UVA example, we believe that our program would have more than enough applications to select 8 students per year that we have in our forecast. A separate assuming is the mix between the advanced standing and the direct from BS students. The NC A&T program has both an advanced standing and direct from BS option. Over time, they have come to have the majority of their students enter with advanced standing. For BS level students that are interested in their program, they suggest that they enter their MS program first and as they near completion, they apply to the PhD program for entry as an advanced standing student. In discussions with A&T, they indicated less than half come to their program from their MS degree. The next largest fields of entering students are computer science and then mathematics. In our forecast for students, we estimated that 50% of our students would be advanced standing students. We wanted to be conservative in our estimate as if the percentage of advanced standing students is higher, the costs to support students will be lower and our financial case better. We also expect a significant portion of our students to first complete our MS degree in Data Science and Business Analytics. We are also in the process of adding a thesis option to our MS degree for those students that would like to start a research path prior to completing their MS degree.

c. Identify opportunities for collaboration with institutions offering related degrees and discuss what steps have been or will be taken to actively pursue those opportunities where appropriate and advantageous.

The UNC Charlotte School of Data Science has been collaborating with UNC System schools for over 5 years through the National Consortium for Data Science run by RENCI at UNC Chapel Hill. We have a subcommittee on the academics of data science where we actively collaborate with the new School of Data Science and Society at UNC Chapel Hill and the Data Science Academy at NC State; other UNC System Schools periodically participate in these meetings as well (e.g., App State, NCCU). UNC Charlotte expects to continue these collaborations. In our discussion with NC A&T, we discussed the potential to collaborate with them on the development of the BS level of data science there.

d. Present documentation that the establishment of this program would not create unnecessary program duplication. In cases where other UNC institutions provided similar online, site-based distance education, or off-campus programs, directly address how the proposed program meets unmet need.

Since there is only one somewhat similar program in the UNC System (the Computational Data Science and Engineering program at NC A&T, CIP 14.9999), there is no unnecessary duplication. In our consultation with NC A&T, it was clear our programs focus on different areas. Specifically, the NC A&T program is focused on Engineering and computational science areas such as high performance computing (HPC) and graphical processing units (GPUs) while our

proposed PhD is focused on the data, prediction algorithms, and a broad set of areas of application. While we may have a small portion of students that research similar topics, our program is designed as a very broad based and transdisciplinary program that stretches across many topics, including business, health, social sciences, as well as engineering. In addition, the core foci of our universities (an Urban Research University and an HBCU, respectively) will attract a distinct set of students. Hence, the two programs meet complementary needs for doctoral education in North Carolina.

Separately, North Carolina State University recently started to offer a Ph.D. in Geospatial Analytics. In contrast to our proposed program, this program is narrowly focused on geospatial data and methods of analysis, and Data Science is a very small part of this program. This program currently enrolls 45 students advised by mentors who mainly have affinities with natural and environmental sciences. We have been in contact with Dr. Ross Meentemeyer, Program Director. This program does not overlap with our Data Science program.

e. Admission. List the following:
   i. Admissions requirements for proposed programs (indicate minimum requirements and general requirements).

The DTSC Ph.D. program seeks the following from successful applicants to the program:

- Bachelor's degree of its U.S. equivalent from a college or university accredited by an accepted* accrediting body, with an undergraduate GPA of 3.0 or above.
- Applicants with the equivalent to a U.S. master's degree from a college or university accredited by an accepted* accrediting body, in data science or in a related field, with a minimum undergraduate GPA of 3.0 and a minimum graduate GPA of 3.50 (on a 4.00 scale) in all graduate work are eligible to apply for *Advanced Standing* (see Degree Requirements for details).
- Any applicant whose native language is other than English must demonstrate English proficiency by submitting official and satisfactory score on the Test of English as a Foreign Language (TOEFL), International English Language Testing System (IELTS), or Duolingo English Test (DET) English language proficiency test. A minimum score of 83 on the Internet-based TOEFL, overall band score of 6.5 on the IELTS, or minimum score of 115 on the DET is required. Additionally, minimum *subscores* of 18 on the TOEFL, 6.5 on the IELTS, or 115 on the DET are required. Applicants who meet one of the criteria identified on the website may be exempted from the language requirement.
- Any other appropriate credentials as required by the Graduate School.
- OPTIONAL: A satisfactory score (>50th percentile) from the aptitude portion of the GRE.

(* Accepted accrediting bodies: Accrediting Commission for Community and Junior Colleges (ACCJC) Western Association of Schools and Colleges, Higher Learning Commission (HLC), Middle States Commission on Higher Education (MSCHE), New England Commission of Higher Education (NECHE), Northwest Commission on Colleges and Universities (NWCCU), Southern Association of Colleges and Schools Commission on Colleges (SACSCOC), and WASC Senior College and University Commission (WSCUC).)

Required prerequisite courses and programming experience: Applicants may apply without having all prerequisites listed below, but they must be completed *prior to matriculation*. Proof of completion will be required for any outstanding prerequisites if an applicant is

admitted and accepts their offer of admission. These prerequisites are often found in Data Science or related degrees (e.g., Computer Science, Statistics, Math, Quantitative Economics, Mathematical Finance, and Engineering). Strong candidates may be allowed to make up deficiencies in some areas, and may test out, at the discretion of the Data Science Ph.D. admissions committee.

- Calculus: A course or courses from an accredited college or university that covers concepts through multivariable calculus and functions in more than one dimension.
- Matrix Algebra or Linear Algebra: Evidence of proficiency in matrix algebra via a linear algebra or similar mathematics course from an accredited college or university.
- Statistics: At least two courses from an accredited college or university that cover concepts in probability and statistical inference.
- Programming Experience: This experience can be demonstrated by completion of a course in computer science from an accredited college or university or substantial experience working with a programming language (such as Python, R, Matlab, C++, or Java).

For candidates seeking admission in the Advanced Standing option, experience or courses in the following areas are suggested:

- Statistics: Multivariate statistics or one additional course above the statistics requirement above
- Machine learning: One or more courses or equivalent experience in machine learning, artificial intelligence, or other areas of algorithmic development
- Visualization and communication with data: One or more courses or equivalent experience in the visualization communication of data
- Databases: One or more courses or equivalent experience with the management of data that includes knowledge of SQL and data structures.

Students can be admitted to the program on a part-time basis, including under the Advanced Standing option.

ii. Documents to be submitted for admission (listing)

Application to the proposed DTSC program will follow existing UNC Charlotte Graduate School admissions processes. The UNC Charlotte application process is completely online. To apply for graduate studies, all applicants must submit the following application materials to the UNC Charlotte Office of Graduate Admissions:

- Graduate School Application for Admission (online)
- Application Fee (payable online)
- Unofficial transcripts of all academic work attempted beyond high (secondary) school. An official (officially certified) final transcript must be submitted if an applicant is offered admission. International transcripts provided in a language other than English should be uploaded via the online application system, but an officially translated version should be uploaded as well.
- Official and satisfactory score on the Test of English as a Foreign Language (TOEFL), International English Language Testing System (IELTS), or Duolingo English Test (DET)

English language proficiency test for applicants whose native language is other than English. A minimum score of 83 on the Internet-based TOEFL, overall band score of 6.5 on the IELTS, or minimum score of 115 on the DET is required. Additionally, minimum *subscores* of 18 on the TOEFL, 6.5 on the IELTS, or 115 on the DET are required. Applicants who meet one of the criteria identified on the website may be exempted from the language requirement.

- A personal and original statement of purpose (essay indicating research interests and motivation and one or more potential faculty advisor) in the range of 500 words, submitted online as part of the application submission process.
- Three letters of recommendation, two of which must be from faculty members (submitted online by recommenders).
- Official GRE/GMAT test scores. A waiver is available upon request and subject to the approval of the Program Director under specific circumstances (professional experience, for instance).
- A resume (submitted online).

As an option, applicants can submit a writing sample from their most recent degree and a sample of their recent research activities and output.

f. Degree requirements. List the following:

i. Total hours required. State requirements for Major, Minor, General Education, etc.

The DTSC Ph.D. will require a minimum of 74 credit hours of study inclusive of 18 credit hours of dissertation research. Some applicants may be eligible to pursue the Ph.D. degree with advanced standing. Eligibility for this accelerated option must be made at the time of admission to the program, and is subject to review and approval by the Graduate School, the DTSC Admissions Committee, and the DTSC Program Director. Under the advanced standing option, students must complete 44 credit hours, including 18 credit hours of dissertation research. Included in the 74 or 44 credit requirement mentioned above, students must complete the Responsible Conduct of Research course (GRAD 8302) and the Academic Integrity course (GRAD 8990).

ii. Other requirements (e.g., residence, comprehensive exams, thesis, dissertation, clinical or field experience, "second major," etc.).

The DTSC Program will follow the UNC Charlotte Graduate School requirements on residence (https://provost.charlotte.edu/policies-procedures/academic-policies-and-procedures/phd-degree-requirements). A student may satisfy the residency requirement for the program by completing 18 hours, either coursework or research credits, by study-in-residence during the academic year and during the summer terms, as long as the study is continuous. Study-in-residence is deemed to be continuous if the student is enrolled in one or more courses (including research/dissertation credit) in successive semesters until eighteen hours of credit are earned.

Following the UNC Charlotte Graduate School policies (https://provost.charlotte.edu/policies-procedures/academic-policies-and-procedures/phd-degree-requirements), in addition to demonstrating a high level of competence in

coursework, the student must pass the Ph.D. qualifying examination. The qualifying examination should be taken no later than one semester after completion of required core courses of the program. The qualifying exams will consist of three parts: a written research prospectus (draft proposal), oral defense of the draft proposal, and a written response to a data science problem presented by an ad hoc committee. Failure to pass the qualifying examination in two tries will result in the termination of the student's enrollment in the Ph.D. program.

After passing the qualifying examination, a student must propose a dissertation topic, prepare a written proposal, and submit it to the doctoral committee for review at least two weeks before the oral exam date. The oral exam, administered by the student's doctoral research advisor and doctoral committee, will include a presentation and defense by the student of his or her proposed research topic in accordance with rules and policies of the UNC Charlotte Graduate School. The doctoral student advances to candidacy after the dissertation topic and proposal has been approved by the student's doctoral committee and the Graduate School. The candidacy must be achieved at least 6 months before the doctoral degree is conferred.

The DTSC Program will allow the student's dissertation to take either of two forms: a traditional monograph or a collection of three or more articles structured coherently around a common theme. For the latter option, the student will be expected to follow the protocols laid out by the UNC Charlotte Graduate School.

g. Enrollment. Estimate the total number of students that would be enrolled in the program during the first year of operation and in each delivery mode (campus, online, site, etc.)

	Campus	Online	Site	Full-Time	Part-Time
Year 1	8	0	0	7	1
Year 3	24	0	0	21	3
Year 5	32	0	0	28	4

h. For graduate programs only, please also answer the following:

Grades required	Grades of A or B are acceptable, while grades of C or U are marginal and unacceptable, respectively. Per policies of the UNC Charlotte Graduate School, an accumulation of three "C" grades or one "U" grade will result in suspension of enrollment from the DTSC Ph.D. program. Termination may result from an additional "C" or "U" grade. DTSC Ph.D. students suspended or terminated from the doctoral program may appeal once to the Program Director to be reinstated by

	submitting an acceptable plan to improve their grades and successfully complete the program.
Amount of transfer credit accepted	Students applying for admission in the Advanced Standing option of the DTSC Program, and admitted to it, cannot transfer course credit hours. Students not in the Advanced Standing option of the DTSC Program may be allowed to transfer up to 9 semester hours of graduate credit (coursework only) earned at UNC Charlotte or other recognized graduate programs, if they are deemed relevant to their study in the DTSC Ph.D. Program. While enrolled in the DTSC Ph.D. Program, students may take courses from the DSBA Master's (6000/7000-level) at UNC Charlotte and have them transferred as credit towards the DTSC Ph.D. Program. These credits cannot be counted towards the requirements of another degree program. Transfers are subject to the approval of the Graduate School, Program Director and student's academic advisor.
Language and/or research requirements	English language proficiency is required. The DTSC Ph.D. will conform to the established UNC Charlotte Graduate Admissions English Language Proficiency Requirements and Policies: https://gradadmissions.uncc.edu/admissions-info/doctoral/ and https://gradadmissions.charlotte.edu/admissions/international-applicants/english-language-proficiency. These include official and satisfactory English language proficiency scores on the Test of English as a Foreign Language (TOEFL), the International English Language Testing System (IELTS), or the Duolingo English Test. A minimum score of 83 on the Internet-based TOEFL ,or a minimum overall band score of 6.5 on the IELTS, or a minimum Duolingo English Test score of 115 is required for admission to the doctoral program. As per UNC Charlotte Graduate Admissions policy, "Applicants who do not meet the minimum English language proficiency requirement will not be admitted to UNC Charlotte. They may, however, choose to enroll at UNC Charlotte's English Language Training Institute (ELTI) and then re-apply to the Graduate School. See ELTI's website: www.ielts.org for details. The DTSC Ph.D. program has no further language requirement. The Ph.D. in Data Science is a research degree requiring the completion of an original research dissertation. Therefore, all students must complete a minimum of 18 credit hours of DTSC 8900 Dissertation Research.
Any time limits for completion	According to UNC Charlotte Graduate School policy, students are allowed a maximum of eight (8) calendar years from formal admission to the doctoral program to complete the program successfully. The Data Science Ph.D. Program will follow the same policy.

i. For all programs, provide a degree plan showing the sequence of courses to be taken each year. List courses by title and number and indicate those that are required. Include an explanation of

numbering system. Indicate new courses proposed. A possible format is offered below as an example. If your institution uses a different format that provides the required information, it may be submitted instead.

The DTSC Ph.D. requires a total of 44 credit hours for students with advanced standing, and 74 credit hours for students without advanced standing. Students without advanced standing must complete 54 hours of coursework to include 18 hours of required core courses and 36 hours of electives. Students with advanced standing must complete 24 credit hours of coursework that must include 18 hours of required core courses and 6 hours of electives. Students must also complete the Responsible Conduct of Research course (GRAD 8302) (2 credit hours) and the Academic Integrity course (GRAD 8990) (0 credit hour).

All required core courses will be new courses, open only to doctoral students (8000-level courses). All students must take 18 credits of Doctoral Dissertation Research (DTSC 8900).

To satisfy the 36 credit-hours (or 6 credit-hours for the advanced standing option) of electives, the student will take a combination of DTSC 8000 (Special Topics in Data Science), other doctoral 8000-level classes, and other graduate courses at the 5000 to 7000 level when 8000-level equivalents are not available, provided that they would be relevant to their program of study and research. The student is allowed to take these electives from any graduate program or department at UNC Charlotte, subject to approval by the student's advisor and the DTSC Program Director. Students can also take individual studies classes (usually DTSC 8800). Each doctoral student is limited to a maximum of 6 credits of individual studies classes (DTSC 8800); students with advanced standing are limited to 3 credits of DTSC 8800. Transfer credit can be counted towards electives.

Courses numbered 8xxx or 9xxx are open to doctoral students only. Courses numbered 5xxx, 6xxx, or 7xxx are other graduate level courses.

Sample degree plan for a student in the Advanced Standing Option

Year 1	Course No.	Course Title	Required (Y/N)	New (Y/N)	Brief Description (If New Course)
	DTSC 8600 (2 credits)	Research Design for Data Science	Y	Y	This course is designed to teach you about conducting data science research – the systematic application of scientific knowledge and procedures to the identification of relevant research questions and the design, organization, conduct, analysis, ethical considerations, and communication of research applied to rigorous, structured

					and purposeful problem solving. To do this, you will need to develop a number of useful skills including those associated with critical reading, writing, conception of an effective research design, argument and critique. All of these skills are required to help us (a) engage in evidence-based research; (b) investigate interesting, novel, forward-looking and compelling questions, (c) test existing theories and/or develop new theories, and (d) disseminate our research results.
	DTSC 8601 (2 x 1 credit)	Data Science Research Seminar	Y	Y	This course is a seminar exposing students to the frontier of data science research in various domains of applications. It is structured with 3 to 4 modules through the semester, each one dedicated to a different body of literature. Students will gain research proficient in the domains of application in focus during the semester. Topics will rotate with each offering.
	DTSC 8110 (3 credits)	Statistics for Data Science	Y	Y	The course provides students with fundamental statistical knowledge and examples solved with well-known statistical software in the context of data science. Topics include probability distributions, data and statistical models, estimation approaches, confidence region and hypothesis testing, variance analysis and linear regression, logistic regression.
	DTSC 8130 (3 credits)	Ethics, Security, Privacy, & Governance of Data for	Y	Y	This course consists of three parts. First, it pursues some of

		Social Good			the most substantial ethical concerns that arise in data science, with attention to the ways that governance policies and technological developments can either ameliorate or increase them. Second, it provides a grounding of knowledge on data governance and data privacy, including the associated practices to assess data security and/or approaches to improve data security. Third, the course offers insights on the social impacts and potential benefits that data science and data scientists can provide to society, particularly from the individual and social engagement of principles of justice, diversity, equity, and inclusion.
	GRAD 8302 (2 credits)	Responsible Conduct of Research	Y	N	
	GRAD 8990 (0 credits)	Academic Integrity	Y	N	
	DTSC 8120 (3 credits)	Fundamentals of Machine Learning	Y	Y	This course is designed to give students a thorough grounding in the methods, mathematics, and algorithms needed to do research and applications in machine learning. Practical perspectives and applications of machine learning methods will be covered, including the development of new skills through instruction and practice; combined with an overview of the business to identify, model, retrieve, and evaluate enterprise data and knowledge assets. Focuses on the understanding of data and knowledge management and

					data mining using techniques such as Markov Decision Processes, Decision Trees, Supervised and Unsupervised Learning, Reinforcement Learning, Logistic Regression, and other business intelligence concepts. The course will discuss machine learning from organizational, technological, and management perspectives.
	DTSC 8140 (3 credits)	Fundamentals of AI	Y	Y	The course covers the following topics: state space search algorithms, adversarial search, puzzles, zero-order and first-order logics, proof systems including Gentzen formal systems, soundness and completeness, Godel's completeness theorem, Horn clauses, resolution theorem proving (set of support, linear input, unit-preference, ancestry-filtered form strategy), knowledge discovery including actionability (action rules mining), explainable AI, recommender systems (collaborative filtering, content-based, group, knowledge-based, hybrid), AI applications in healthcare, business, music, and art.

Year 2	Course No.	Course Title	Required (Y/N)	New (Y/N)	Brief Description (If New Course)
	DTSC 8601 (2 x 1 credit)	Data Science Research Seminar	Y	Y	This course is a seminar exposing students to the frontier of data science research in various domains of applications. It is structured with 3 to 4 modules through the semester, each one dedicated to a different body of literature. Students will gain

					research proficient in the domains of application in focus during the semester. Topics will rotate with each offering.
	DTSC 8000 (3 credits	Special Topics in Data Science	N	Y	Examination of major theories, methods, and issues in the area of Data Science. Instructional method(s) vary according to topic, course objectives, and instructor.
	DTSC 8800 (3 credits)	Independent Studies	N	Y	Individual research in specific topics of Data Science under the direction of a faculty member.
	DTSC 8900 (10 credits)	Dissertation Research	Y	Y	Under the direction of a dissertation advisor and committee, students design and execute an original research study. This study should address a significant issue or problem within the field of Data Science.

Year 3	Course No.	Course Title	Required (Y/N)	New (Y/N)	Brief Description (If New Course)
	DTSC 8900 (8 credits)	Dissertation Research	Y	Y	Under the direction of a dissertation advisor and committee, students design and execute an original research study. This study should address a significant issue or problem within the field of Data Science.

Sample degree plan for a student not in the Advanced Standing option

Year 1	Course No.	Course Title	Required (Y/N)	New (Y/N)	Brief Description (If New Course)
	DTSC 8600 (2 credits)	Research Design for Data Science	Y	Y	This course is designed to teach you about conducting data science research – the systematic application of

					scientific knowledge and procedures to the identification of relevant research questions and the design, organization, conduct, analysis, ethical considerations, and communication of research applied to rigorous, structured and purposeful problem solving. To do this, you will need to develop a number of useful skills including those associated with critical reading, writing, conception of an effective research design, argument and critique. All of these skills are required to help us (a) engage in evidence-based research; (b) investigate interesting, novel, forward-looking and compelling questions, (c) test existing theories and/or develop new theories, and (d) disseminate our research results.
	DTSC 8601 (3 x 1 credit)	Data Science Research Seminar	Y	Y	This course is a seminar exposing students to the frontier of data science research in various domains of applications. It is structured with 3 to 4 modules through the semester, each one dedicated to a different body of literature. Students will gain research proficient in the domains of application in focus during the semester. Topics will rotate with each offering.
	DTSC 8110 (3 credits)	Statistics for Data Science	Y	Y	The course provides students with fundamental statistical knowledge and examples solved with well-known statistical software in the context of data science. Topics include probability distributions, data and

					statistical models, estimation approaches, confidence region and hypothesis testing, variance analysis and linear regression, logistic regression.
	DTSC 8130 (3 credits)	Ethics, Security, Privacy, & Governance of Data for Social Good	Y	Y	This course consists of three parts. First, it pursues some of the most substantial ethical concerns that arise in data science, with attention to the ways that governance policies and technological developments can either ameliorate or increase them. Second, it provides a grounding of knowledge on data governance and data privacy, including the associated practices to assess data security and/or approaches to improve data security. Third, the course offers insights on the social impacts and potential benefits that data science and data scientists can provide to society, particularly from the individual and social engagement of principles of justice, diversity, equity, and inclusion.
	GRAD 8302 (2 credits)	Responsible Conduct of Research	Y	N	
	GRAD 8990 (0 credits)	Academic Integrity	Y	N	
	DTSC 8120 (3 credits)	Fundamentals of Machine Learning	Y	Y	This course is designed to give students a thorough grounding in the methods, mathematics, and algorithms needed to do research and applications in machine learning. Practical perspectives and applications of machine learning methods will be covered, including the development of new skills through instruction and practice; combined with an

					overview of the business to identify, model, retrieve, and evaluate enterprise data and knowledge assets. Focuses on the understanding of data and knowledge management and data mining using techniques such as Markov Decision Processes, Decision Trees, Supervised and Unsupervised Learning, Reinforcement Learning, Logistic Regression, and other business intelligence concepts. The course will discuss machine learning from organizational, technological, and management perspectives.
	DTSC 8140 (3 credits)	Fundamentals of AI	Y	Y	The course covers the following topics: state space search algorithms, adversarial search, puzzles, zero-order and first-order logics, proof systems including Gentzen formal systems, soundness and completeness, Godel's completeness theorem, Horn clauses, resolution theorem proving (set of support, linear input, unit-preference, ancestry-filtered form strategy), knowledge discovery including actionability (action rules mining), explainable AI, recommender systems (collaborative filtering, content-based, group, knowledge-based, hybrid), AI applications in healthcare, business, music, and art.

Year 2	Course No.	Course Title	Required (Y/N)	New (Y/N)	Brief Description (If New Course)
	DTSC 8601 (1 credit)	Data Science Research Seminar	Y	Y	This course is a seminar exposing students to the frontier of data science research in various domains of applications. It is structured

					with 3 to 4 modules through the semester, each one dedicated to a different body of literature. Students will gain research proficient in the domains of application in focus during the semester. Topics will rotate with each offering.
	DTSC 8000 (3 credits	Special Topics in Data Science	N	Y	Examination of major theories, methods, and issues in the area of Data Science. Instructional method(s) vary according to topic, course objectives, and instructor.
	DTSC 8800 (3 credits)	Independent Studies	N	Y	Individual research in specific topics of Data Science under the direction of a faculty member.
	XXXX (3 credits)	Elective to be determined	N	N	
	XXXX (3 credits)	Elective to be determined	N	N	
	XXXX (3 credits)	Elective to be determined	N	N	
	XXXX (3 credits)	Elective to be determined	N	N	

Year 3	Course No.	Course Title	Required (Y/N)	New (Y/N)	Brief Description (If New Course)
	XXXX (3 credits)	Elective to be determined	N	N	
	XXXX (3 credits)	Elective to be determined	N	N	
	XXXX (3 credits)	Elective to be determined	N	N	
	XXXX (3 credits)	Elective to be determined	N	N	
	XXXX (3 credits)	Elective to be determined	N	N	
	XXXX (3 credits)	Elective to be determined	N	N	

Year 4	Course No.	Course Title	Required (Y/N)	New (Y/N)	Brief Description (If New Course)
	DTSC 8900 (18 credits)	Dissertation Research	Y	Y	Under the direction of a dissertation advisor and committee, students design and execute an original research study. This study should address a significant issue or problem within the field of Data Science.

III. Faculty

a. (For undergraduate and master's programs) List the names, ranks and home department of faculty members who will be directly involved in the proposed program. The official roster forms approved by SACSCOC may be submitted. For master's programs, state or attach the criteria that faculty must meet in order to be eligible to teach graduate level courses at your institution.

N/A

b. (For doctoral programs) List the names, ranks, and home department of each faculty member who will be directly involved in the proposed program. The official roster forms approved by SACSCOC may be submitted. Provide complete information on each faculty member's education, teaching and research experience, research funding, publications, and experience directing student research including the number of theses and dissertations directed.

See Attachment IV (Faculty Roster) for the list of faculty members who will be involved in the proposed program.

Each student enrolled in the DTSC Program will have an academic advisor. To foster trans-disciplinarity as a foundational principle of the program, two academic co-advisors from different disciplinary backgrounds are strongly encouraged. Advisors must be core or affiliate tenure-track faculty of the UNC Charlotte School of Data Science. One of the co-advisors must be tenured. If the student has a single advisor, the advisor must be tenured or a Research Full Professor. The student's dissertation committee is composed of the advisor (or co-advisors), two other appointed members, and a faculty member appointed by the UNC Charlotte Graduate School. Aside from the advisor/co-advisors, at least one member of the dissertation committee must be core or affiliate faculty of SDS. Advisor(s) and committee members (excluding the Graduate School appointed member) must be from at least two different colleges. Professors of Practice, Research Professors, and Teaching Professors (of any rank) who are members of the Graduate Faculty and hold a doctoral degree can serve on a DTSC doctoral committee.

c. Estimate the need for new faculty for the proposed program over the first four years. If the teaching responsibilities for the proposed program will be absorbed in part or in whole by the present faculty, explain how this will be done without weakening existing programs, and how the current teaching responsibilities of those faculty will be covered.

We have estimated that two new tenure track faculty positions will be required as we start the program, with one additional faculty added in year 4. The program will also be supported through existing faculty that are affiliated and joint within SDS. The new faculty will enable capacity to teach our core requirements within the program with the additional potential to blend DSBA 6115 into the DTSC 8110 Statistics for Data Science and cross-list this between our M.S. and Ph.D. programs. Since this is a course that is taught currently, it will not require additional capacity. For elective courses we expect the majority of the 8XXX course load to be taken through existing courses offered in faculty's home departments. This will likely result in courses increasing from 5-8 to 6-10 students per section. In discussion with department chairs across the university, they are uniformly supportive of this concept. There will be several new elective courses developed as documented in this program. These will be taught by the new faculty (or existing faculty where capacity trades are made with chairs by the Executive Director). Current practice when requesting capacity from a department is to either 1) utilize capacity committed to SDS by departments, 2) offer SDS homed faculty teach a course or cross-list a course for the department's students, 3) provide funding for departments to hire part time faculty to make up the capacity. In the three years of operations, this has worked well for SDS at both the B.S. and M.S. levels for course scheduling. Experience has shown that this does not weaken other offerings and in fact strengthens them as 1) more courses can be offered through the additional students due to the cross-listing and 2) diverse teams and skills are present in the classroom, which enhances student learning in team projects and learning to reach a goal with divergent skills sets on a team.

d. Explain how the program will affect faculty activity, including course load, public service activity, and scholarly research.

This program will change faculty activity and make it much more transdisciplinary. Faculty will be working with faculty of other departments on a regular basis through research seminars, co-teaching, required co-Chairing of Ph.D. committees, and serving on doctoral committees designed to be transdisciplinary. This environment will foster transdisciplinary research collaborations that will extend beyond the specific activities needed for the proper functioning of the doctoral program, including the engagement in external funding activities.

Course loads, public service activity, and scholarly research requirements shall be identical to the home department requirements with the exception that the faculty are required to attend SDS faculty meetings. This is defined in each faculty's MOU that they sign to be an affiliated or joint faculty member of SDS.

IV. Delivery Considerations. Provide assurances of the following (not to exceed 250 words per lettered item):

a. *Access* (online, site-based distance education, and off-campus programs). Students have access to academic support services comparable to services provided to on-campus students and appropriate to support the program, including admissions, financial aid, academic advising, delivery of course materials, and placement and counseling.

N/A. The proposed program in Data Science will be offered 100% in face-to-face format, and no online or off-campus course will be offered.

b. *Curriculum delivery* (online and site-based distance education only). The distance education technology to be used is appropriate to the nature and objectives of the program. The content, methods and technology for each online course provide for adequate interaction between instructor and students and among students. What is the impact of online delivery on student access to the program, and what strategies are in place to support students who have internet limitations?

N/A. The proposed program in Data Science will be offered 100% in face-to-face format, and no online or off-campus course will be offered.

c. *Faculty development* (online and site-based distance education only). Faculty engaged in program delivery receive training appropriate to the distance education technologies and techniques used.

N/A. The proposed program in Data Science will be offered 100% in face-to-face format, and no online or off-campus course will be offered.

d. *Security* (online and site-based distance education only). The institution authenticates and verifies the identity of students and their work to assure academic honesty/integrity. The institution assures the security of personal/private information of students enrolled in online courses.

N/A.

V. Library

a. Provide a statement as to the adequacy of present library holdings for the proposed program to support the instructional and research needs of this program (this should be developed in consultation with the University Librarian).

Since the offering of the DSBA (Masters of Data Science and Business Analyst) and HIA (Master's in Health Informatics and Analytics) degrees, the UNC Charlotte Atkins Library has continued to provide resources and materials to support these programs. With the recent addition of the Bachelor of Data Science, a materials budget has been provided to the School of Data Science as well as continued funding from the Colleges of Business, Health and Human Services, and Computing and Informatics budgets due to the multidisciplinary nature of the Data Science programs. Based on an analysis of the Data Science/Research Data Librarian, Reese Manceaux, the current holdings are satisfactory to support research and instruction for this program and its faculty and students.

Students have access to hundreds of thousands of physical books and e-books from Springer, Wiley, Elsevier, Cambridge, Business Expert Press Digital Library and other publishers. Also available are the latest scholarly articles from databases such as Web of Science, ScienceDirect, Business Source Complete, ACM, Compendex, INSPEC, and others.

b. If applicable, state how the library will be improved to meet new program requirements for the next four years. The explanation should discuss the need for books, periodicals, reference

material, primary source material, etc. What additional library support must be added to areas supporting the proposed program?

The library offers responsive support to research needs of the School of Data Science and to all existing programs in which the School participates. Faculty and graduate student researchers can contact the data science librarian directly for one-time purchase materials that are needed. For requests for ongoing subscriptions, the librarian will work with faculty affiliated with the School to prioritize and make requests of the library and university to support new research materials needed to propel the work forward.

In order to offer resources in line with other comparable programs, J. Murrey Atkins Library will need to acquire subscriptions to research databases and datasets that the library currently does not provide access to. This will require a permanent or recurring increase to the library budget, since the library cannot acquire and retain access to additional subscription resources with a flat or decreased library budget.

More detailed information about future needs is provided below in the systematic needs assessment for Ph.D. programs.

c. Discuss the use of other institutional libraries (outside of your institution) in delivery of the program.

The library has a well-received Interlibrary Loan (ILL) Department. It is the highest rated service that the library offers. Faculty, students, and staff can make requests through an easy-to-use web interface, with the capability of auto-filling from any of our databases. Book chapters, conference proceedings, and journal articles are scanned and delivered electronically from other institutions as PDF files within 24-48 hours. Print books are mailed and delivered within 5 business days. Any materials that the library is unable to borrow from other libraries will be purchased if available for sale. We, along with other universities in the state, are also a site for NC LIVE, a statewide electronic resources consortium that makes digital resources accessible to North Carolina residents.

d. For doctoral programs, provide a systematic needs assessment of the current holdings to meet the needs of the program.

For this assessment, selected US institutions with doctoral programs in Data Science were used to evaluate the resources of the library and compare them with the University of North Carolina at Charlotte. They include Worcester Polytechnic Institute, Carnegie Mellon University, University of Virginia, UT-Austin, and Kennesaw State.

Databases of journal articles that Atkins Library currently subscribes to and are very important to the collections are below. These are mostly held by the other institutions as well:

- For Engineering/Statistics/Mathematics: Web of Science, ScienceDirect, ACM Digital Library, Compendex, INSPEC, IEEE Xplore, MathSciNet
- For Business: ABI-INFORM, Business Source Complete, Mergent Online, Mintel Academic Reports
- For Health: PubMed, Cochrane Library, CINAHL Complete, Liebert Online

- For Social Science, Humanities, and General Data/Statistics/Demographics: SimplyAnalytics, Data Axle, Proquest Statistical Abstract, Statista, Data Citation Index, Policy Map

Databases that other universities with Ph.D. Data Science programs have that Atkins current does not subscribe to but would greatly benefit the Data Science program 4 years or more into the future would be :

- For Engineering, Mathematics, and Health: **Scopus** which is the largest abstract and citation database of peer-reviewed literature.
- For Social Science, Humanities, and General Data/Statistics/Demographics: **Data Planet/SAGEData** (Access data on economics, crime, health, population, energy, the environment, and more in a single interface), **Social Explorer** (contains access to U.S. Census data dating back to 1790. Users can create maps and embed them as objects or download static images), **Proquest Historical Statistical Abstract Add-on** (back to 1878) and **Abstracts of the World** (50 countries worth of data).

DATA SETS: Atkins Library currently does not have the budget to purchase data sets which would aid research. These are quite varied depending on the topic of the researcher. A library fund for the purchase of these datasets would be helpful to purchase these on an as-needed basis. Also of use would be Text and Data Mining Collections that include:

- Proquest TDM Studio (ability to mine large volumes of published content from millions of pages of news and scholarly publications), Proquest Historical Newspapers and Congressional Record Text-as-Data Collection, and English-Corpora Text as Data.
- **OR** Nexis Daas (Data as a Service) to mine Nexis content

For an expanded selection of e-books, a subscription to the **O'Reilly Safari Technical Books** (a computer science focus) would be a helpful addition to our collection because of the wide variety of programming language, computer science, business analytics type books that the publisher prints.

VI. Facilities and Equipment

a. Describe the effect of this new program on existing facilities and indicate whether they will be adequate, in year one, five, and ten of the program's operation.

   i. Will any new square footage be required at any point in the first ten years of the program's operation? If so, please provide an overview of requirements, timeline, projected costs, and projected funding sources.

   Space for new faculty and research labs is being accounted for in a current renovation and expansion of Burson building on UNC Charlotte campus and part of our expansion of the interdisciplinary collaboration between the School of Data Science, the College of Engineering, and the College of Computing. This expansion has two foci, one of which is the expansion of interdisciplinary research. The expansion portion of this plan will be focused on interdisciplinary and transdisciplinary research and will complete 10,800 net square feet of space with an additional 30,000 square feet of shell built for future expansion ($30M). The funding has already been allocated to UNC Charlotte for the Burson expansion through the North Carolina State Budgeting process. Tentative groundbreaking for the expansion is in 2024 with expected completion in 2027.

ii. Will any existing square footage require repair, renovation, or retrofit? If so, please provide an overview of requirements, timeline, projected costs, and projected funding sources.

In addition to the Burson research expansion, the existing Burson building is in the initial design stage for refurbishment. This space will house the expansion of the School of Data Science and our classroom facilities and undergraduate programs in collaboration with programs from the College of Computing and Informatics and the College of Engineering. Finally, Colvard Building, where SDS is currently located, has $4.5M in planning funds and a $45M budget for refurbishment within the next 10 years. Any further growth needs of the programs within the School of Data Science will be considered within this refurbishment. Funding for the Burson refurbishment has already been allocated through the State budget ($25.9M) with refurbishment timing expected to be aligned with the expansion. Planning funding for Colvard is expected in the second year of the current state budget (FY 25). Further allocations are expected in future budgets with completion in the 7-10 year window.

b. Describe the effect of this new program on existing technology, information technology, and services and indicate whether they will be adequate, in year one, five, and ten of the program's operation.

The Data Science Ph.D. Program will utilize the University Research Computing (URC) infrastructure. This provides high-performance computing and analytics capabilities to support the research and teaching missions at UNC Charlotte. HPC resources include clusters of powerful computers and storage tailored to diverse application requirements. Many applications are pre-installed and ready for use. These resources are provided "as a service" to registered users.

Our HPC team provides consulting and assistance with experimental software and hardware needs. Together, URC supports, configures and ports applications to University resources and liaises between those engaged in research. Additionally, URC offers training for parallel computing (as used at the facility) and administration of local high-performance systems. Our Research Computing clusters are primarily Intel Xeon-based Dell servers, but we do have some AMD EPYC based compute nodes. We have a mix of models and generations, but our primary compute nodes are Intel Xeon-based Poweredge R630s / R640s and AMD EPYC-based Poweredge R6525. We offer compute nodes with different compute capabilities, so if you need large memory nodes or GPU nodes, we've got you covered. Our GPU nodes provide a mix of NVIDIA cards: GTX-1080ti, Titan V, and Titan RTX, as well as Tesla V100S and A100 Tensor Core GPUs. Our large memory nodes range from 1.5TB to 4TB of RAM in a single system.

We have a high-speed Mellanox 100Gb/s EDR Infiniband fabric in one data center and a 200Gb/s HDR Infiniband fabric in our other data center. The fabrics are connected via dual redundant Mellanox Technologies MetroX-2 Long-Haul IB switches. Our Lustre Filesystem is served out over our IB fabric to provide incredible throughput performance for our high I/O compute jobs. For a more detailed overview of the types of systems that make up each cluster, please check out our Research Clusters and Educational Cluster pages. Research Computing provides an extensive set of applications and codes for use by our researchers on the cluster. More information can be found at https://oneit.charlotte.edu/urc.

SDS works closely with our OneIT group to project and manage capacity needs. In addition, we are developing methods and tools to utilize cloud based computing resources for cases where this may be more cost effective and timely for specific types of data science research needs. SDS currently has an AWS cloud environment that utilizes S3 for operational storage, Glacier for archival storage, and Athena for our primary processing capability. Additional AWS tools can be made available through the SDS Administrators in partnership with OneIT.

Existing facilities and services are adequate for the proposed Ph.D. in Data Science at the one and five year horizon. As for ten years, given the fast pace of evolution of the field of Data Science, it is difficult to gauge what the future needs may be within that time frame, but current collaborations and processes for infrastructure expansion are in place.

VII. Administration

a. Describe how the proposed program will be administered, giving the responsibilities of each department, division, school, or college. Explain any inter-departmental or inter-unit administrative plans. Include an organizational chart showing the "location" of the proposed new program.

The program will be housed within the UNC Charlotte School of Data Science. The School is a transdisciplinary academic unit governed by the College of Computing and Informatics, the Belk College of Business, The College of Health and Human Services, the College of Sciences, the College of Humanities, Earth, and Social Sciences, The William States Lee College of Engineering and the Provost. SDS was formed in January of 2020 and currently has more than 80 joint or affiliated faculty and 3 faculty fully housed within SDS. SDS is led by an Executive Director that reports to a Board of the governing deans and the Provost. The Provost reports to the Chancellor. SDS has its own By-Laws and faculty governance procedures.

The Data Science Ph.D. Planning Committee is expected to transition to a **Ph.D. Curriculum Committee** within SDS once the program is fully approved. This Planning Committee is currently composed of two Co-Chairs and several members who are faculty affiliated with SDS and hold Graduate Faculty standing with the UNC Charlotte Graduate School. The Planning Committee composition reflects the diversity of scholarly interests in the School (at least one faculty member from each College involved in SDS). The Program Director will serve as Chair of this Committee. Members other than the Program Director will each serve two-year renewable terms. Curricular changes will go through an approval process consistent with UNC Charlotte and SDS current practice, including being reviewed and approved by a School Review Committee prior to being funneled into the larger university review process. The Curriculum Committee will also handle student appeals.

SDS will appoint a **Ph.D. Program Director** to manage the formation of an admissions committee, the program of study approvals, the student learning outcomes as well as overall operations of the Ph.D. program (student recruitment, admission review and decision, funding decision, management of qualifying exams, etc.), and liaise with the Graduate School and the External Advisory Board. The Program Director will report to the Executive Director of SDS and will be a member of the Curriculum Committee.

The **Admissions Committee** will review student applications for admission, and make admission recommendations to the Program Director. The Admission Committee will be composed of the Program Director and one tenure-track faculty member with Graduate School Faculty appointment and affiliation with SDS from each College that is part of the governance structure of SDS. Members other than the Program Director will each serve two-year renewable terms. Membership in both the Admissions and Curriculum Committees is possible, but not preferred. The Program Director will serve as Chair of this Committee.

The Program Director will establish an **External Advisory Board** composed of professionals and scholars of Data Science who will advise the Program Director on broad strategic matters concerning the structure of the program, its operation, and the mission and standing of the program within the national and international field of Data Science.

See the SDS formation document in Attachment V and the SDS organizational chart in Attachment VI.

b. For joint programs only, include documentation that, at minimum, the fundamental elements of the following institutional processes have been agreed to by the partners:
   i. Admission process
   ii. Registration and enrollment process for students
   iii. Committee process for graduate students
   iv. Plan for charging and distributing tuition and fees
   v. Management of transcripts and permanent records
   vi. Participation in graduation
   vii. Design of diploma

   N/A

VIII. Additional Program Support

a. Will additional administrative staff, new master's program graduate student assistantships, etc. be required that were not previously identified in the Request for Preliminary Authorization? If so, please describe each item, state the estimated new dollars required at steady state after four years, and state the source of the new funding and resources required.

One new administrative staff member is expected to be hired early in the program. Fully loaded costs are $86k/yr. This staff member will be supporting the Ph.D. Program Director and ensuring Ph.D. students have space, computers, and a community supportive of their needs.

In addition, SDS and the Graduate School will support up to 10 Teaching Assistantships with an expected stipend of $22k/yr. At maturity, this requires nearly $370k/yr of funding. A portion of this funding will be allocated from current funding of M.S. level Teaching Assistantships (~$75k/yr) while the remainder (~$300k) will be allocated to the Graduate School for GASP funding through tuition, fees, and general fund appropriations from the student credit hours generated by the B.S. in Sports Analytics (currently in approval) and the B.S. in Data Science. The Teaching Assistants will support these undergraduate programs and courses. In addition, the

proposed SBTI for the Ph.D. program (which is the same rate as the M.S. in Data Science and Business Analytics) will support the funding needs of the program (~$224k/yr at maturity).

IX. Accreditation and Licensure

a. Where appropriate, describe how all licensure or professional accreditation standards will be met, including required practica, internships, and supervised clinical experiences.

The proposed Ph.D. program is not subject to licensure or professional accreditation standards.

b. Indicate the names of all accrediting agencies normally concerned with programs similar to the one proposed. Describe plans to request professional accreditation.

UNC Charlotte is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools (SACSCOC) to award baccalaureate, master's, and doctoral degrees. There are no plans to request additional professional accreditation for the proposed DTSC Ph.D. program.

c. If the new degree program meets the SACSCOC definition for a substantive change, what campus actions need to be completed by what date in order to ensure that the substantive change is reported to SACSCOC on time?

As required by the Policy Statement on Substantive Change for Accredited Institutions of the Commission on Colleges, the University of North Carolina at Charlotte (UNC Charlotte) is required to submit a letter of notification for new degree programs prior to implementation. Notification of this new degree program will be provided to SACS after approval by the University of North Carolina Board of Governors and prior to implementation.

d. If recipients of the proposed degree will require licensure to practice, explain how program curricula and title are aligned with requirements to "sit" for the licensure exam. List what state(s) the institution has determined the program meets professional licensure requirements for and how that information will be communicated to students and prospective students.

N/A

X. Evaluation Plans

a. What student learning outcomes will be met by the proposed program and how will student proficiency be measured? These items may be updated as necessary to meet student and program needs.

Program Student Learning Outcomes	Measurement Instrument	Criteria for Proficiency (score, percentage, level of performance, etc.)
Students will describe and discuss the **interdisciplinary and transdisciplinary**	Written answer of student to DTSC Foundations question on the Ph.D. qualifying exam, as	90% of students "Meet expectations" or "Exceed expectations" on the related

foundations of Data Science	graded by ad hoc faculty committee	qualifying exam question
Student will critically evaluate published scholarship in Data Science and allied knowledge fields	a. Written answer of student to related question on the Ph.D. qualifying exam, as graded by ad hoc faculty committee b. Written dissertation report, as assessed by members of student's dissertation examination committee	a. 90% of students "Meet expectations" or "Exceed expectations" b. 90% of students "Meet expectations" or "Exceed expectations"
Students will critically use concepts, theories and methodologies relevant to data science in fostering new or original knowledge in their primary area of scholarship	Written dissertation report, as assessed by members of student's dissertation examination committee	90% of students "Meet expectations" or "Exceed expectations"
Students will effectively write and present Data Science scholarship to peers, students, and members of the broader community outside of the field	Written dissertation report and dissertation presentation, as assessed by members of student's dissertation examination committee	90% of students "Meet expectations" or "Exceed expectations" on their dissertation report submitted by the examining committee
Students describe, discuss, and evaluate the responsibilities of Data Scientists regarding the ethics of data practices, security, privacy and governance of data, and action for social good	Written answer of student to question on data ethics and social good on the Ph.D. qualifying exam, as graded by ad hoc faculty committee	90% of students "Meet expectations" or "Exceed expectations" on the related qualifying exam question
Students will use appropriate data science tools and techniques, including applied statistical analysis, machine learning, artificial intelligence, to answer broader research questions in a data rich environment	Written answer of student to related questions on the Ph.D. qualifying exam, as graded by ad hoc faculty committee	90% of students "Meet expectations" or "Exceed expectations" on the related qualifying exam questions
Students will demonstrate the ability to identify, assess, select and/or develop appropriate data analytics methods and models for addressing a specific real-world issue from an evidence-based perspective	Written dissertation report and dissertation presentation, as assessed by members of student's dissertation examination committee	90% of students "Meet expectations" or "Exceed expectations" on their dissertation report submitted by the examining committee

b. The plan and schedule to evaluate the proposed new degree program prior to the completion of its fourth year of operation (to include types of measurement, frequency, and scope of program review).

The UNC Charlotte Ph.D. in Data Science will provide research intensive doctoral-level education for students seeking Data Science careers in practice, research and teaching/academia. Our evaluation plans for the proposed Ph.D. in Data Science encompass the criteria to evaluate the quality and effectiveness of the program, as well as the Student Learning Outcomes (SLO), Measures (Metrics), and Plan/Schedule. The program evaluation will be focused on the program objectives (restated below) and the SLOs. The program evaluation will be conducted through internal assessments and an external reviews process.

The objectives of the Data Science Ph.D. program include:

- Preparing research data scientists, professional data scientists, and scholars/academicians who will be leaders in developing, maintaining, and managing data ethically and effectually to sustain the economic and social vibrancy of North Carolina and the United States;
- Training research data scientists who have deep understanding of data, of knowledge production based on data and of subject matters that thrive on evidence-based research and practice;
- Providing a range of educational and research experiences for a diverse group of students to participate in research initiatives at UNC Charlotte, Private, Public, and International institutions; and,
- Preparing future data science educators, scholars, and professionals who are at the frontiers of understanding and leveraging the evolving data landscape.

The criteria that will be used to evaluate the planned Data Science Ph.D. program objectives including those that address operational efficiency as well as program impact are presented below.

- Criterion 1: Demonstrate mastery of the fundamental concepts, models, advanced research skills of Data Science.
- Criterion 2: Ability to recruit, retain, and graduate well qualified Ph.D. students.
- Criterion 3: Level of contribution of doctoral students and their advisors to advances in Data Science through impactful publications, presentations, and other scholarly activities.
- Criterion 4: Level of employment of graduates from the program and service of such graduates in leadership positions in academic, government, international agencies, and the private sector within and outside the State of North Carolina.

The following measures will be used to evaluate the performance and effectiveness of the proposed Data Science Ph.D. program with respect to the criteria described above.

Criterion 1: Over 90 % of students are assessed to "Meet expectations" or "Exceed expectations" on a series of sub-criteria on completion of their Ph.D. qualifying exam and and/or successful defense of their research dissertation (SLO assessment detailed in Section X.a above).

Criterion 2: Number of UNC Charlotte graduates recruited, retained, and graduated; number of non-UNC Charlotte graduates recruited, retained, and graduated; diversity of recruited Ph.D.

students and local versus international institutions where they gained their B.S. and M.S. degrees; time to graduation.

Criterion 3: Number of research articles published in peer-reviewed and indexed outlets by doctoral students and their advisers on average; number of projects that were affected in North Carolina and elsewhere through research conducted by program students and their advisers; number of presentations and short courses taught by doctoral degree candidates.

Criterion 4: Number of program graduates who are gainfully employed in their field of study; number of program graduates who serve in leadership positions and/or win professional awards.

Since the proposed Ph.D. program is expected to take about 6 – 7 years to mature and achieve steady state, several of the measures for evaluating program success, listed above, will not be realized in four years. Therefore, evaluation of the program will assess progress towards the steady-state goals. The program will be evaluated internally at the end of each academic year for the first four years. SLOs will be assessed and reports will be submitted to the SDS Executive Director and to the Graduate School every year. In addition, the External Advisory Board and the Director of the Ph.D. Program will be tasked to conduct an external review annually.

By the end of the fourth year, an evaluation report will be submitted to the SDS Executive Director and the UNC Charlotte Office of Academic Affairs. The report will include information on the extent to which UNC Charlotte has met projected enrollments and degrees conferred, and the readiness of the university to continue funding the program on the level provided at the end of the fourth year. This report will be submitted as a part of UNC Charlotte's long-range planning submission. Every 2 years of operation, an internal evaluation will be conducted by the Data Science Ph.D. Program Director. At the end of the second year, the evaluation report including all the components mentioned above will be submitted to the SDS Executive Director for their review. Based on the results of these reviews, deficiencies, structural and programmatic inconsistencies in the program will be addressed. The Graduate School and the Office of Academic Affairs at UNC Charlotte also have mechanisms and processes in place for providing oversight on all graduate programs. The proposed program will be assessed to determine if it is meeting the four-year milestones described below.

- Program enrollment in the fourth year should approach 30 students.
- During the fourth year of the proposed program, scholarly activities including presentations, journal publications, and grant activity by the CEE Faculty will be assessed. New external funding generated annually by the SDS affiliated faculty should exceed $2.0M. External funding should be supporting a minimum of 10 RAs.
- The program should have produced its first graduates by the fourth year of operation.
- Changes in the proposed program will be implemented as necessary to allow achievement of program goals.

XI. Supporting Fields

a. Discuss the number and quality of lower-level and cognate programs in operation at the institution for supporting the proposed degree program.

No additional subject-matter fields or cognate programs are required to support the proposed Data Science Ph.D. program. Faculty within SDS have over 25 different tenure homes.

Responsibilities, including teaching load, are outlined for each faculty member through specific and unique joint or affiliate faculty MOUs. The Ph.D. in Data Science will be supported by the portion of faculty workload allocated through these agreements.

b. Are other subject-matter fields at the proposing institution necessary or valuable in support of the proposed program? Is there needed improvement or expansion of these fields? To what extent will such improvement or expansion be necessary for the proposed program?

We will capitalize on existing doctoral programs in the Colleges that are part of the Administrative Structure of the School of Data Science and on graduate school support to implement the program. After four years, an evaluation will be conducted to examine the efficacy of the curriculum. Potential changes in the curriculum may be identified at that time, but no significant changes are anticipated.

XII. Costs, Funding, and Budget

Adding a new degree program will cost the institution some amount of money and will potentially generate new revenues. Calculating the costs and identifying the funding sources associated with implementation of a new program requires several institutional offices (e.g., academic affairs, finance, institutional research, enrollment management) to collaborate to present an accurate estimate.

a. Complete and attach the *UNC System Academic Program Planning Financial Worksheet* showing all costs required and revenues generated for each of the first five years of the program. Provide a budget narrative for each year addressing the following:

i. UNC Academic Program Costs

Faculty costs include all faculty assigned to the proposed program, including faculty serving as program directors, coordinators, department chairs, etc., funded in the 101 instructional budget code. If an existing faculty member is reassigned to the program, the salary is reflected as a reallocated cost. New faculty salaries need to be competitive for the discipline, and figures should include all applicable fringe (e.g., retirement, medical). If the proposed program will hire new faculty, it is a new cost.

Graduate Assistant costs are identified either as new or reallocated, as appropriate, and should include all stipends, tuition remission, and benefits, as applicable.

EHRA Non-Faculty positions include non-instructional academic support costs directly associated with running the program, including amounts associated with the Dean's office, research support, etc. This should include salaries and all applicable fringe.

SHRA Non-Faculty positions include all positions specific costs associated with the new program. This includes the additional staff needed to organize applications, prepare for the proposed program, and for general administration of the proposed program. New staff or purchases of new equipment should be adequate to support the stated goals and enrollments for the proposed program. Other program costs identified in the proposal should be realistic.

ii. UNC Academic Program Revenues

Funding sources may include enrollment growth formula funding, other state

appropriation, regular tuition, tuition differential, general fees, special fees, reallocation of existing resources, federal funding, and other funding (such as awarded grants or gifts). The total projected revenue from the above categories should allow the proposed program to become self-sufficient within five years.

When estimating funding for new programs, institutions should take into account that students switching programs do not generate additional enrollment growth formula funds. For example, if a program projects enrollment of 20 students, by 12 of them switched into the program from an existing program at the institution, then only 8 of the students would generate additional formula funding.

Reallocation of Existing Resources includes the salary of faculty reassigned who may be partially or wholly reallocated to the new program. Explain how the current teaching obligations of those faculty are reallocated and include any faculty replacement costs as program costs in the budget. If substantial funds are reallocated, explain how existing undergraduate and graduate programs will be affected.

Federal Funding (In-hand only) refers to federal monies from grants or other sources currently in hand. Do not include federal funding sought but not secured. If anticipated federal funding is obtained, at that time it can be substituted for funds designated in other funding categories. Make note within the text of the proposal of any anticipated federal funding. Provide evidence of sustainability after federal funds have been exhausted.

Narrative for financial costs and revenues (identical to Preliminary Authorization narrative.

Year 1: Total costs $889k. Roughly 54% of the total costs are reallocations from current programs where the program can add seats to currently taught courses including courses from our Sports Analytics Certificate. New costs come from 1 new tenure track faculty. New costs also support one new graduate TA, one EHRA staff for operations, and other misc support. New tuition revenues of $549k would offset new costs of $412k.

Year 2: Total costs $1.7M. 37% of the total costs continue to be reallocations from current programs. Incremental costs from Year 1 support 1 new tenure track and 2 new additional non-tenure track faculty to teach new courses in the program and add additional capacity to core coursework in statistics and computer programming as well as additional TA support. Total new revenues of $1.6M easily offset the total new costs of $1.0M.

Year 3: Total costs $2.3M. Reallocated costs drop to 33% of the costs in Year 3 as new courses and sections require new faculty to teach. Incremental new costs from Year 2 support one new tenure track faculty, one new non-tenure track, and four new additional graduate assistantships. Total new revenues of $2.6M easily offset the total new costs of $1.5M.

Year 4: Total costs $2.6M. 29% of the total costs in Year 4 are reallocation from current programs; the program costs and revenues are growing at similar rates. Incremental new

costs over year 3 support one new non-tenure track faculty and 2 new graduate assistantships and one new EHRA student services to increase capacity. Total new revenues of $2.5M offset the total new costs of $999k.

Year 5: Total costs $2.9M. 25% of the total costs in Year 5 are reallocation from current programs the program is reaching steady state. Incremental costs include one additional tenure track faculty, two new graduate assistantships, and one new students services person. Total new revenues of $4.0M exceed the total new costs of $2.2M.

i. UNC Academic Program Revenues

The program revenues are expected to be primarily supported by regular tuition and reallocation of one lecturer and current faculty that teach course courses in statistics, computer science, and kinesiology. We will expect some efficiency of faculty, staff, and support from SDS, but the majority of reallocated support is due to capacity in courses outside of this new program (Computer Science, Statistics, general education). Any F&A from external funding of research will be utilized back within the program, although this is expected to be a minor contributor. As the program grows, major fees will be utilized to support staff and student services. The tuition and appropriation revenues are determined at an institutional level The numbers reflected may or may not reflect an actual change in the university budget.

b. Based on the institutions' estimate of available existing resources or expected non-state financial resources that will support the proposed program (e.g., federal support, private sources, tuition revenue, etc.), please describe the following:

i. How does the institution budget and allocate enrollment growth revenues? Is this program expected to generate new enrollment growth for the institution? If so, how will funds be allocated to the proposed program or be used to further other institutional priorities?

The budget review process is conducted by the colleges and the Office of Academic Affairs annually. Deans submit funding requests to Academic Affairs based on the prioritized needs of each college. The proposed program is expected to generate new enrollment growth for UNC Charlotte. Increases in enrollment and the corresponding increase in Student Credit Hours (SCH) are reviewed by the Dean's office and examined within the context of the UNC System Office funding formula and University priorities when determining allocation of enrollment growth funds and general tuition and fees. If available, funds will be used to hire additional faculty and staff to support teaching and research.

The vast majority of the students in this program are expected to attend UNC Charlotte specifically for this program. This assumption is based upon our experience with the other Ph.D. programs and the uniqueness of Data Science Ph.D. programs across the country. We do expect to be able to recruit nationally and internationally for this program.

ii. Will the institution seek other additional state appropriations (both one-time and

recurring) to implement and sustain the proposed program? If so, please elaborate.

No, data science was a focus on the request in the State budget in 2023. This consists of $3M in recurring funding and $6M in one time funding (split over 2 years). Assuming this comes through, the Ph.D. program will receive the required implementation and recurring funding necessary to sustain the program.

iii. Will the institution require differential tuition supplements or program-specific fees? If so, please elaborate.

1. State the amount of tuition differential or program-specific fees that will be requested.

   The program will require an SBTI of $420/hr. This is equivalent to the M.S. in Data Science and Business Analytics currently offered by SDS. DSBA is currently all self funded students. Having an identical rate will reduce incentives for incoming B.S. students to declare a Ph.D. when they in fact intend to leave with an M.S.; without an equivalent SBTI fee, there would be a financial incentive to be in the Ph.D. program rather than the M.S.. The funding would be used to support the TAs and EHRA-staff required to manage the program. At this time a major fee is not expected to be charged.

2. Describe specifically how the campus will spend the revenues generated.

   The funding (~$224k/yr at maturity), would support 2 TAs, the EHRA Staff member hired for the program, and other needs of the students.

3. Describe the anticipated impact of the tuition differential or program-specific fee are expected to impact student access.

   The SBTI is not expected to impact student access. The majority of students will be supported through stipends, tuition, and fee support. SBTI payment will be part of their support package offered. For the small number of self supported students, they will be required to pay SBTI; however, it is expected that all of these students will be Advanced Standing students and will be working data science professionals (at the M.S. levels) with several years of experience. Recent salary data from August 2023 has data scientists with M.S. degrees and several years of experience earning median salaries of $130k/yr. Thus, the self supported students will be earning high salaries and will not likely make a decision to enroll or not based on the additional cost of SBTI.

c. Provide a description of how the program can be implemented and sustained If enrollment increase funding, differential tuition, or other state appropriations noted in the budget templates are not forthcoming.

   We would not offer this program if funding is not forthcoming.

XIII. Additional Information. Include any additional information deemed pertinent to the review of this new degree program proposal.

XIV. Attachments. Attach *the UNC System Academic Program Planning Worksheet* as the first

attachment following this document, the final approved Request for Preliminary Authorization as the second attachment, followed by any other relevant documents.

Attachment I. UNC System Academic Program Planning Worksheet.
Attachment II. Request for Preliminary Authorization and Response to Comments.
Attachment III. Letters of Support (External)
Attachment IV. Faculty Roster
Attachment V. Memo: Establishment of the School of Data Science
Attachment VI. School of Data Science Org Chart
Attachment VII. Letters of Support (Internal)

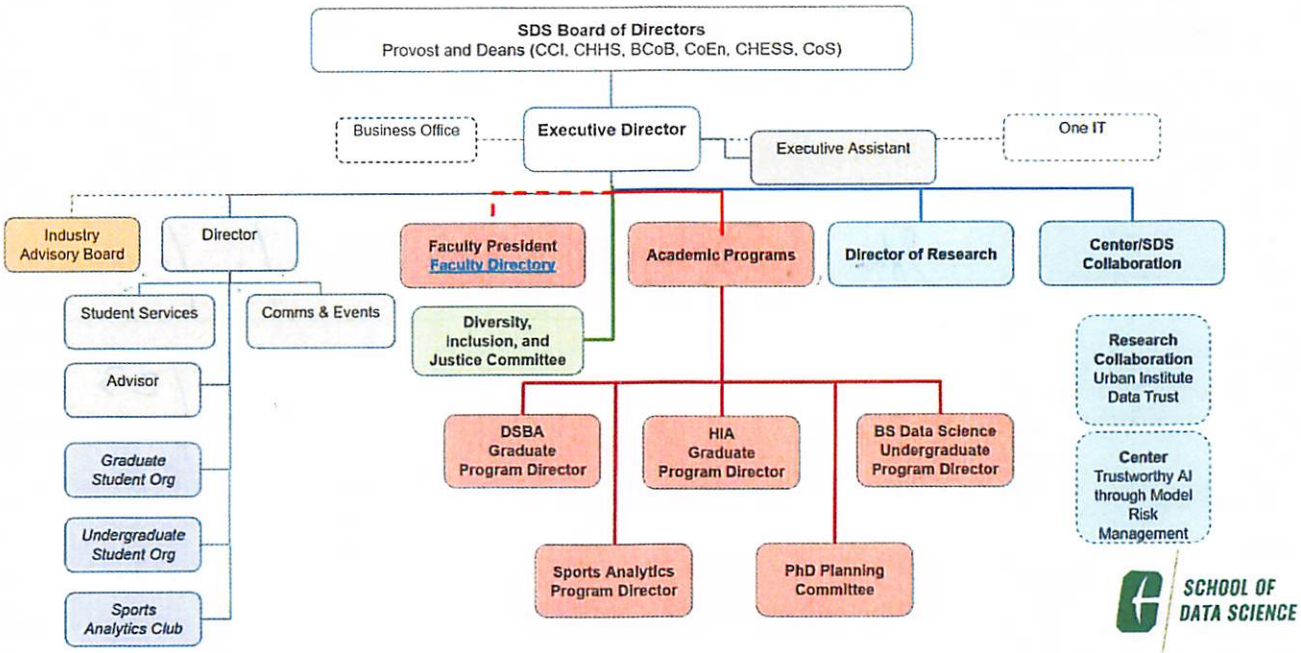
XV. Signatures. This proposal to establish a new program has been reviewed and approved by the appropriate campus committees and authorities and has my support.

Position Title	Signature	Date
Chancellor		12/1/23
Provost		11/30/23
Chief Financial Officer		11/29/23

(Only complete below for partner institution if this is a joint degree program proposal)

Position Title	Signature	Date
Chancellor		
Provost		
Chief Financial Officer		

Appendix VI. School of Data Science Org Chart



Instructions

Fill out the Sources and Uses tables using estimates that are as accurate as possible and reflect the information provided throughout the proposal.

Current program sources and uses include the revenues and expenses associated with any program that is being incorporated or reassigned to the new proposed program. It should include any existing financial commitments that would be taken on by the new program. The current sources should include all sources associated with existing students, including appropriation, tuition, fees, and other sources, and all expenses associated with those students, including existing faculty costs.

New program sources and uses include any incremental revenues or expenses associated with the proposed new program. Existing financial commitments should not be repeated in this section.

Regular Tuition and **Differential Tuition** are automatically calculated based on the projected student enrollment on an FTE basis and the corresponding tuition rates.

Enrollment funding appropriation is automatically calculated based on the projected resident student credit hours (SCH) and the enrollment funding rate. The worksheet assumes a fall start and an SCH funding basis. Manual adjustments may be necessary if this is not the case. Do not include nonresident credit hours in this calculation.

NC Promise Appropriation applies to undergraduate programs at ECSU, FSU, UNCP and WCU. The rates used can be found in the NC Promise rates tab.

Sources should include all associated revenues received by the university, regardless of whether they are allocated to the program.

Uses should include a best estimate of all expenses incurred by the university related to the program, even if it is not charged to the program. Personnel costs should include all salaries and benefit expenses. Start-up costs (year 0) should include all costs incurred prior to the first year of student enrollments

Total program sources and uses (calculated) should show the total cost of the proposed program and the total revenues that would be used to fund the program. Sources are not required to equal uses, but any significant gap should be explained.

Add any additional sources or uses as additional lines in the chart and confirm that they are correctly adding to the subtotals.

Updated August 2022

	Current Program Sources (if applicable)	Rate	Year 0 (Start Up)	1st Year	2nd year	3rd Year	4th Year	5th Year	TOTALS
1	General Fund Appropriation								$ -
2	NC Promise Appropriation								$ -
3	*Resident Enrollment (FTE)*								
4	Regular Resident Tuition (Annual Rate)	$ 4,337	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5	*Nonresident Enrollment (FTE)*								
6	Regular Nonresident Tuition (Annual Rate)	$ 18,482	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7	Tuition Differential (Annual Rate)	$ 7,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
8	Special Fees		$ -	$ -	$ -	$ -	$ -	$ -	$ -
9	External Funding (In-Hand Only)								$ -
10	Other Funding (Identify)			100,000	75,000	50,000	50,000	50,000	$ 325,000
11	**Total Current Sources**		$ -	$ 100,000	$ 75,000	$ 50,000	$ 50,000	$ 50,000	$ 325,000
	Proposed New Program Sources								
12	*Incremental Resident SCH*			36	72	108	126	144	
13	Enrollment Funding Appropriation	$ 965	$ -	$ -	$ 17,370	$ 52,110	$ 86,850	$ 112,905	$ 269,235
14	*Resident Enrollment (FTE)*			2	4	6	7	8	
15	Regular Resident Tuition (Annual Rate)	$ 4,337	$ -	$ 8,674	$ 17,348	$ 26,022	$ 30,359	$ 34,696	$ 117,099
16	NC Promise Appropriation (Resident)		$ -	$ -	$ -	$ -	$ -	$ -	$ -
17	*Nonresident Enrollment (FTE)*			6	12	18	21	24	
18	Regular Nonresident Tuition (Annual Rate)	$ 18,482	$ -	$ 110,892	$ 221,784	$ 332,676	$ 388,122	$ 443,568	$ 1,497,042
19	NC Promise Appropriation (Nonresident)		$ -	$ -	$ -	$ -	$ -	$ -	$ -
20	Tuition Differential (Annual Rate)	$ 7,000	$ -	$ 56,000	$ 112,000	$ 168,000	$ 196,001	$ 224,001	$ 756,002
21	Special Fees		$ -	$ -	$ -	$ -	$ -	$ -	$ -
22	External Funding (In-Hand Only)								$ -
23	Other Funding (Identify)			73,480	146,960	220,440	293,920	293,920	$ 1,028,721
24	**Total New Sources**		$ -	$ 249,046	$ 515,462	$ 799,249	$ 995,252	$ 1,109,090	$ 3,668,099
25	**Total Proposed Program Sources**		$ -	$ 349,046	$ 590,462	$ 849,249	$ 1,045,252	$ 1,159,090	$ 3,993,099

Comments

Program is set up to be a split of advanced standing students and direct entry to PhD (50/50).
We have a successful MS program where many have wanted to return for PhD. MS program is all self pay for all students
We estimated an entry of 8 students/year (75% non-resident)
SBTI for PhD program is consistent with MS program.
We expect 75% non resident and 25% in state residents.
The in state students will be a mix of full time and part time. Full time will be supported through TA or grants. Part time will be self pay.
Blend of part time and full time in state gets us to the FTE estimate
Other current funding source: efficiencies gained by housing the program with the MS program (DSBA).

		Year 0 (Start Up)	1st Year	2nd year	3rd Year	4th Year	5th Year	TOTALS
	Current Program Uses (if applicable)							
1	Tenure/Tenure-Track Faculty		$ 373,524	$ 373,524	$ 560,286	$ 560,286	$ 560,286	**$2,427,905**
2	Non Tenure-Track Faculty							**$ -**
3	Graduate Student Support		73,480	73,480	73,480	73,480	73,480	**$ 367,400**
4	EHRA Non-Faculty Positions		86,198	86,198	86,198	86,198	86,198	**$ 430,989**
5	Student Support (Scholarships)							**$ -**
6	Libraries							**$ -**
7	Supplies and Materials							**$ -**
8	Travel, Communications, and Fixed Charges							**$ -**
9	Equipment and Technology							**$ -**
10	Facility Repair and Renovation							**$ -**
11	Other (Identify)							**$ -**
12	**Total Current Uses**	**$ -**	**$ 533,202**	**$ 533,202**	**$ 719,964**	**$ 719,964**	**$ 719,964**	**$3,226,294**
	Proposed New Program Uses							
13	Tenure/Tenure-Track Faculty*		330,425	330,425	330,425	495,637	495,637	**$1,982,549**
14	Non Tenure-Track Faculty*							**$ -**
15	Graduate Student Support*		73,480	146,960	220,440	293,920	293,920	**$1,028,721**
16	EHRA Non-Faculty Positions*	86,198	86,198	86,198	86,198	86,198	86,198	**$ 517,187**
17	Student Support (Scholarships)							**$ -**
18	Libraries		10,000	10,000	10,000	10,000	10,000	**$ 50,000**
19	Supplies and Materials		5,000	5,000	5,000	5,000	5,000	**$ 25,000**
20	Travel, Communications, and Fixed Charges		5,000	5,000	5,000	5,000	5,000	**$ 25,000**
21	Equipment and Technology		40,000	40,000	40,000	40,000	40,000	**$ 200,000**
22	Facility Repair and Renovation							**$ -**
23	Facility New Construction or Expansion							**$ -**
24	Other (Identify)		15,000	15,000	15,000	15,000	15,000	**$ 75,000**
25	**Total New Uses**	**$ 86,198**	**$ 565,103**	**$ 638,583**	**$ 712,063**	**$ 950,755**	**$ 950,755**	**$3,903,457**
26	**Total Proposed Program Uses**	**$ 86,198**	**$1,098,304**	**$1,171,784**	**$1,432,026**	**$1,670,719**	**$1,670,719**	**$7,129,751**

Comments

Reallocation of 2 Tenure track in beginning with additional one later in program

Note majority of positions that support this PhD will be joint faculty as is the practice in our School of Data Science

TT and NTT faculty positions are in FTE not headcount due to joint nature

11/29/23

New capacity is 6 courses of core curriculum eventually taught twice per year + 2 seminar courses + 4 new topics courses/yr (16 sections + seminars = 50 credit hours /yr new)

Graduate student support is for Teaching Assistants (tuition, fees, SBTI, + $22k stipend)

E&T is computing equipment for new students and ongoing compute capacity

"Other" is Graduate Program Director Stipend

Non Faculty is for student support (advising, labs, recruiting, etc)

Reallocation of SDS staff include portions of many postions (marketing, EA, analytics, etc).

Benefits multiplier		1.44	
Estimated portion of current SDS staff members that will support PhD program			
PhD student tuition, fees, SBTI, $22k stipend	$	36,740	escalating number of students at Tuition, fees, SBTI, $22k stipend (starts at 2, max of 10)
cost/TT of current TT	$	130,000	
cost/TT new hires	$	115,000	1 TT and then a second TT: Need capacity to teach 6 core courses twice a year + 2 seminars + 2 new courses = 44 credit hours
cost/NTT	$	90,000	
cost of EHRA non faculty	$	60,000	
Program Director Stipend	$	15,000	
Cost of new student laptop, misc	$	5,000	

Institution	Residency	Appropriation Rate
ECSU	Resident	$ 1,856
	Nonresident	$ 11,400
FSU	Resident	$ 1,982
	Nonresident	$ 9,590
UNCP	Resident	$ 2,602
	Nonresident	$ 10,573
WCU	Resident	$ 2,971
	Nonresident	$ 9,723

THE UNIVERSITY OF NORTH CAROLINA SYSTEM

New Academic Degree Program Request for Preliminary Authorization

Institution University of North Carolina at Charlotte

Degree Program Title (e.g. M.A. in Biology) PhD in Data Science

CIP Code 11.0701 Computer Science

Reviewed and Approved By (Provide Name and title only. No signature required in this section.)

Review	Name	Title
Provost	Alicia Bertone	Provost and Vice Chancellor for Academic Affairs
Chief Financial Officer	Richard Amon	Vice Chancellor for Business Affairs
Faculty Senate Chair (Or representative)	Susan Harden	Faculty President
Graduate Council (If applicable)	David Dalton	Graduate Council Chair
Graduate/Undergraduate Dean (If applicable)	Pinku Mukherjee	Interim Associate Provost & Graduate School Dean
Academic College/School Dean	Bojan Cukic, Robert Keynton, Catrine Tudor-Locke, John Smail, Jennifer Troyer	Interim Dean College of Computing and Informatics, Dean William State Lee College of Engineering, Dean College of Health and Human Services, Interim Dean College of Liberal Arts & Sciences, Dean College of Business
Department Head/Chair	Douglas Hague	Executive Director
Program Director/Coordinator	Jean-Claude Thill; Monica Johar	Knight Distinguished Professor of Public Policy; Professor of Management Information Systems

New Academic Proposal Process

New academic programs are initiated and developed by faculty members. The Request for Preliminary Authorization must be reviewed and approved by the appropriate individuals listed above before submission to the UNC System Office for review.

Please provide a succinct, yet thorough response to each section. Obtain signatures from the Chancellor and Provost, and submit the proposal via the PREP system to the UNC System Vice President for Academic Programs, Faculty, and Research, for review and approval by the UNC System Office. If the Request for Preliminary Authorization is approved, the institution may begin work on the formal Request to Establish a New Academic Degree Program.

NOTE: If an institution is requesting preliminary authorization for a degree program at a higher level than their current Carnegie Classification (e.g. a Master's institution proposing a doctoral degree), then a request for a mission review must first be submitted to the UNC Board of Governors Committee on Educational Planning, Programs, and Policies, through the Senior Vice President for Academic Affairs. If approved by the Board, then the institution may proceed with the Request for Preliminary Authorization.

UNC Institution Name	University of North Carolina Charlotte
Joint Degree Program (Yes or No)? If so, list partner institution.	No
Degree Program Title (e.g. M.A. in Biology)	PhD in Data Science
CIP Code and CIP Title (May be found at National Center for Education Statistics)	11.0701 Computer Science
Require UNC Teacher Licensure Specialty Area Code (Yes or No). If yes, list suggested UNC Specialty Area Code(s).	No
Proposed Delivery Mode (campus, online, or site-based distance education). Add maximum % online, if applicable.	Campus
Will this program be offered through an Online Program Manager (OPM; Yes or No)? If so, list the online OPM.	No
Proposed Term to Enroll First Students (e.g. Fall 2023)	Fall 2024

I. SACSCOC Liaison Statement: *(Provide a brief statement from the University SACSCOC liaison regarding whether the new program is or is not a substantive change.)*

The new program is a significant departure. As a result, a prospectus is required to be submitted and approved six months prior to the intended start date, either in January for a fall start date or July for a spring start date.

II. Program Summary: (*Briefly describe the proposed program and summarize the overall rationale.*) Maximum of 1,000 words.

Include the following in your narrative:

a. How this program supports specific university and UNC System missions.
b. Collaborative opportunities with other UNC institutions as appropriate.
c. Ways in which the proposed program is distinct from others already offered in the UNC System. Information on other programs may be found on the UNC System website, and all similar programs should be listed here (use the 4-digit CIP as a guide).

The proposed doctoral program in Data Science fulfills a need created by the increasing demand in the marketplace for data scientists at all levels of university education, including undergraduate, master's, and doctoral degrees. Currently, market needs are met mainly through existing BS and MS degrees in Data Science, Business Analytics (DSBA), Statistics, and Computer Science at UNC Charlotte. These programs offer rapid specialization for different profiles of data science professionals. The proposed PhD program in Data Science will provide doctoral-level education to students seeking data science careers both in academia and in industry. The program is a terminal research degree that is trans-disciplinary by design and lays emphasis on the mastery of the data science tools and methodologies and on responsible stewardship of data to cover the broad value of data science in various domains across society. Strong emphasis will be placed on providing students the opportunity to demonstrate mastery of knowledge in multiple data science application domains including, but not limited to, economics, financial services, political science, sociology, marketing, management information systems, operations management, criminal justice, public policy, geography, public health, earth and environmental sciences, engineering, urban management, and education.

As North Carolina's urban research university, UNC Charlotte is in an unparalleled position to deliver on career-building expertise. UNC Charlotte leverages its location in the state's largest city to offer internationally competitive programs of research and creative activity, exemplary undergraduate, graduate, and professional programs, and a focused set of community engagement initiatives. UNC Charlotte maintains a particular commitment to addressing the cultural, economic, educational, environmental, health, and social needs of the greater Charlotte region and beyond. UNC Charlotte recently established the School of Data Science (SDS) as the home for trans-disciplinary data science and analytics programs. SDS and its predecessor, the Data Science Initiative (DSI), are key strategic priorities of the University. Five colleges participate in program implementation within the School of Data Science: College of Computing and Informatics, College of Liberal Arts & Sciences, Belk College of Business, College of Health and Human Services, and William States Lee College of Engineering, while the remaining colleges of Education and Arts + Architecture will be contributing as well.

By exposing students to real-world data and problems in the civil society and in business organizations, the data science PhD program will emphasize educational and research opportunities that clearly align with UNC Charlotte's mission, including social mobility, public

policy, and urban analytics. The early acquisition of a $2.1 million research grant has positioned UNC Charlotte to be a national leader in fundamental and applied research in data science. More recently, the North Carolina General Assembly has invested $41.2M for "Engineering North Carolina's Future." This funding specifically calls for investments in data science along with engineering and cybersecurity. As a complement, SDS has a broad cadre of industrial and community partners including Bank of America, Lowe's, Microsoft, Premier, Genpact, Atrium Health, Novant Health, Duke Energy, SAS, IQVIA as well as others. The surrounding hub of top financial services, energy, retail sales and distribution, advanced manufacturing, and technology companies provide an ideal ecosystem to utilize a suite of skills only an urban research university can accommodate—data analytics, innovation insights, business acumen, and critical problem solving. UNC Charlotte is also responding to this sector's large workforce demand through collaborations with other universities and business partners in the Research Triangle Park (RTP). Through collaborations with NC State, UNC Chapel Hill, Wake Tech, and other UNC System universities (including HBCU institutions), UNC Charlotte SDS is working to weave a network and strategic workforce development pipelines to expand data science capability across North Carolina. While there are no existing doctoral programs in Data Science in the UNC system, we will seek out and reinforce collaboration across UNC system institutions.

The UNC System mission is "to discover, create, transmit, and apply knowledge to address the needs of individuals and society." A critical component of data science education is to guide students to develop data acumen. This requires exposure to key concepts in data science, real-world data and problems that can reinforce the limitations of existing tools and stimulate the development of new ones, and ethical considerations that permeate many applications. Key foundational concepts related to data acumen are at the core of competitive capabilities of every business, government, or non-profit organization today. The ability of UNC institutions to incorporate data science best practices is a key component in their long-term viability, resilience, and sustainability.

Currently, there are no PhD programs in Data Science at any campus of the University of North Carolina. As detailed in the Student Demand section, the national and global popularity of master's programs in data science[1] and our own surveys strongly suggest that there will be large student demand for a PhD program in data science (details in Student Demand section). Not only is industry poised to support demand for data scientists with doctoral level of training, but the growth of undergraduate and masters programs nationally will also require the hiring of faculty members ready to train the next generations of students in data science. In the UNC system, there are five master's programs in data science: UNC Charlotte, NC State, UNC Wilmington, Appalachian State University, and Winston-Salem State University. Duke University has a master's program in data science as well. In particular, three representative data science programs – the MS in DSBA at UNC Charlotte,[2] the MSA program at NC State,[3] and the Master's

[1] NC State Institute for Advanced Analytics MS Program Tracking https://analytics.ncsu.edu/?page_id=4184

[2] https://datascience.charlotte.edu/

[3] https://analytics.ncsu.edu/

in Interdisciplinary Data Science (MIDS) at Duke University[4] are experiencing healthy enrollment. UNC Chapel Hill is preparing an online version of their MS in Data Science and the new Foundations of Data Science MS at NC State[5] is expected to grow quickly. Finally, UNC Chapel Hill announced their intent to form a School of Data Science and Society, signaling increasing demand in this growing field.

With over 600 alumni, the DSBA program at UNC Charlotte will provide a natural pipeline of prospective students for this proposed PhD program. In a recent survey of DSBA alumni, 15% indicated they would be interested in a PhD program in Data Science at UNC Charlotte. To be prepared for challenging coursework and rigorous research at the highest level, student applicants are expected to have demonstrable knowledge in calculus, linear algebra, probability, and statistics along with proficiency in programming languages. They will be well qualified recruits for the planned PhD program.

III. Student Demand*: (Provide external estimates of student demand. Discuss the extent to which students will be drawn from a pool of students not previously served by the institution. Maximum length 1,000 words.)*

Several years ago, a university-wide Data Science PhD Committee partnered with the Data Science External Advisory Board (EAB) to conduct student demand research. The product of this effort is a report on the student demand for a PhD in Data Science (see Appendix B). Because there was no CIP (Classification of Instructional Programs) code devoted to data science programs at that time, EAB's report identified these closely related fields: computer science, statistics, and management information systems and services. In the previous five years of available data, nationwide institutions reported an 18% increase in doctoral-level degree completions related to data science with computer science showing the most completions. A current review of existing PhD programs in or related to data science included[6]:

Arizona State University: PhD in Biomedical Informatics
Bentley University: PhD in Business – Business Analytics Specialization
Brown University: PhD in Computer Science – Concentration in Data Science
University at Buffalo: PhD in Computational and Data-Enabled Science and Engineering
California Institute of Technology: PhD in Computing and Mathematical Science focusing on Data Sciences
Carnegie Mellon University: PhD in Machine Learning
University of Nevada – Reno: PhD in Statistics and Data Science
Clemson University: PhD in Biomedical Data Science & Informatics
Indiana University-Purdue University-Indianapolis: PhD in Data Science

[4] https://datascience.duke.edu/
[5] NC State Foundations of Data Science Request to Establish
[6] Master's in Data Science on www.mastersindatascience.org/schools/doctorate

Kennesaw State University: PhD in Analytics & Data Science
University of Massachusetts Boston: PhD in Business Administration - Information Systems for Data Science Track
New York University: PhD in Data Science
NCSU: PhD in Geospatial Analytics
University of Southern California: PhD in Data Sciences & Operations
University of Tennessee: PhD in Analytics
University of Maryland-College Park: PhD in Information Studies – Concentration in Big Data/Data Science
University of Nevada-Reno: PhD in Statistics & Data Science
UNC at Chapel Hill: PhD in Health Informatics
University of Southern California: PhD in Data Sciences & Operations
University of Washington-Seattle: PhD in Mechanical Engineering - Data Science
Worcester Polytechnic Institute: PhD in Data Science
Yale University: PhD in Statistics and Data Science

The demand for Data Science programs, including PhD, has continued to soared since our original study[7]. The above list, which is only a sample of PhD programs related to data science, demonstrates the increasing demand for data science programs. The Big Data emergence in academia and industries and the ubiquitous and real-time harvesting of data have been driving the growth of these new programs.

UNC Charlotte School of Data Science is fielding a consistent flow of inquiries from current students and alumni about when they can expect to enroll in a PhD in data science. Given these inquiries, our survey of alumni, and discussion with Kennesaw State's PhD administrators, we expect student demand for this program from three areas, 1) current Data Science MS holders from UNC Charlotte as well as other US based MS programs for which we expect to offer an advanced standing entry point for qualified applicants (Statistics, Computer Science, etc.); 2) direct entry from US based data science and other technically based undergraduate degree holders including the BS in Data Science offered by UNC Charlotte; and 3) international students. We expect a small, but material demand for part time participation from current Charlotte based MS holders, likely our own DSBA alumni, that want to return to complete a PhD, but are unwilling to give up the high salaries they are currently earning.

UNC Chapel Hill's preliminary assessment of student and labor market demand[8] for their proposed data science master's program shows high demand for master's programs in data science. According to that study, "nationally, master's completions in data science have doubled over the past eight years (101.9% growth), which is 10 times the rate of master's degree growth across all disciplines over the same time period (10.1% growth). Similar trends exist in North Carolina, where master's completions in data science have increased 580.5% over the last 8 years."

[7] NC State Institute for Advanced Analytics MS Program Tracking https://analytics.ncsu.edu/?page_id=4184
[8] Appendix A

In line with this Data Science phenomenon, we expect that the DSBA program at UNC Charlotte will be a major applicant pool for the proposed PhD program. Many DSBA students have shown their strong desire to continue their studies on data science at the doctoral level, but have often struggled to find appropriate PhD programs in terms of their personalized interests. Because of the anticipated connection of the DSBA master's program and our proposed program, a steady number of DSBA students are expected to apply to the proposed program. The table below demonstrates enrollment in the DSBA program since the establishment of the program in 2014.

In addition, a survey of the current cohort of DSBA students was recently conducted to gauge their interest in the PhD program in Data Science (over 25% of our 341 alumni responded). According to the survey that was conducted upon graduation, 84% would have been moderately (28%) or very (56%) interested in continuing to a PhD program in Data Science. Of these alumni, 61 (71% of respondents) are still interested in applying when we start a PhD in Data Science at UNC Charlotte.

The demand for doctoral education in data science within the state of North Carolina is particularly astute. Only three similar doctoral programs are located in the state of North Carolina: the PhD in Geospatial Analytics at NCSU, the PhD in Health Informatics at UNC at Chapel Hill, and the renamed PhD in Computational Data Science and Engineering at NC A&T.[9] Two of these programs are only concentrated on particular specialty domains (geospatial analytics and health informatics) and the third evolved from a PhD in Computer Science and Engineering and retains its focus on engineering. While the proposed program is most similar to the NC A&T program, the proposed PhD in Data Science at UNC Charlotte is a broader, multidisciplinary program capturing diverse application domains based on data science techniques such as marketing, management information systems, operations management, education, public policy, urban and environmental sciences, and computational social sciences; it will be the first comprehensive doctoral program in data science in the state of North Carolina. Producing higher numbers of PhD graduates in this field is necessary to ensure sufficient supply of graduates to fill positions at academic institutions. As an example, several of our industry partners in Charlotte have over 100 PhD graduates in data science working inside their corporations. These teams are expected to continue to grow over time.

While there is no comprehensive data science program at the doctoral level in the UNC system, there are six master's programs in data science in the state of North Carolina: UNC Charlotte, NC State, UNC Wilmington, Appalachian State University, Winston-Salem State University and Duke University. In particular, two representative UNC system data science programs – the MS in DSBA at UNC Charlotte (https://dsba.charlotte.edu/) and the MSA program at NC State (analytics.ncsu.edu) are experiencing steadily increasing enrollment growth. The following table shows the consistently strong enrollment growth in both programs.

[9] https://www.ncat.edu/news/2020/12/coe-department-changes-name-expands-curriculum.php

Year	NC State MSA Graduates[10]	UNC Charlotte DSBA Graduates
2008	23	0
2009	35	0
2010	39	0
2011	39	0
2012	38	0
2013	81	0
2014	79	0
2015	86	1
2016	113	24
2017	118	42
2018	111	57
2019	111	54
2020	118	82
2021	116	81

IV. Access, Affordability, and Student Success: (*Provide an analysis of the impact of the program on student access and affordability. Maximum length 1,000 words. Reference sources such as College Scorecard, Census postsecondary outcomes data, etc. For graduate programs, focus on areas relevant to the institution's strategic plan.)*

a. Analysis of the impact of the proposed program on student access, including key metrics identified in the UNC System Strategic Plan and statewide initiatives (such as myFutureNC).
b. ***Analysis of student debt levels*** for similar programs and programs at the same academic level at the institution.
c. Provide an analysis of indebtedness, repayment, and relationship to potential earnings.

[10] https://analytics.ncsu.edu/reports/alumni/MSA2021.pdf

a. The North Carolina General Assembly has invested $41.2M for "Engineering North Carolina's Future,"[11] with UNC Charlotte committing to 2,000 additional data science, engineering and computer science graduations in the next 5 years. While undergraduate education will be the bulk of these graduates, our proposed PhD program completes a full set of educational opportunities for students at UNC Charlotte. This program also aligns with the UNC System goals[12] to provide critical workforce credentials to our graduates as well as increase productivity.

   In addition, the progression of students at UNC Charlotte will assist in increasing the diversity of students in the PhD program. A recent study by Harnham indicated that the current data science practitioners are not very diverse (9% are underrepresented minorities); UNC Charlotte's Data Science undergraduate and MS programs on the other hand have significantly more ethnic diversity (ranging from 24% in the DSBA to 33% in the BS). With the significant number of our MS alums expressing interest in the proposed PhD program, we expect the high underrepresented proportion of our students to carry through to our PhD program. In addition, our industry partners, such as Wells Fargo, Genpact, Bank of America, Microsoft, and Sia Partners have all supported our development of the current PhD proposal and currently sponsor our diversity and inclusion efforts in the form of the annual Women in Data Science conference. Our partners are also supporting us through the development of advanced special topics courses (e.g., model risk management) and have provided support letters for NSF-NRT programs that indicated that they would hire our data science related PhD graduates. They have also set up externships for PhD and MS students to better attract data science related PhDs to their teams. We have designed the proposed program to be a mix of part-time and full time students to provide opportunities for working data science professionals. Part-time students may want to continue working as the salaries data science professionals receive are over $116k for MS students, even with limited experience.[13]

b. The anticipated debt level for students enrolled in the proposed program is comparable to that of programs offered at UNC Charlotte ($56,761). Notably, fees at UNC Charlotte are significantly lower than the fees in other North Carolina institutions offering PhDs. To further reduce the debt burden and reduce time to graduation, the proposed data science PhD program at UNC Charlotte will have an Advanced Standing track. This structure allows students entering with a relevant Master's (e.g. our DSBA) degree to have a plan of study with a minimum of 42 credit hours instead of 72 (including 18 credit hours of dissertation research), shortening time to degree. We also expect our full time students to be fully supported through Teaching or Research Assistantships and receive a stipend. While total tuition and fees over the expected mix of students is expected to be $44k for residence students (primarily Advanced Standing students) and $112k for non-resident students (mix

[11] https://inside.charlotte.edu/news-features/2022-03-11/engineering-north-carolinas-future

[12] https://www.northcarolina.edu/impact/strategic-plan/

[13] https://www.burtchworks.com/big-data-analyst-salary/big-data-career-tips/the-burtch-works-study/ (Individual contributor data scientist with 3 years experience).

of Advanced Standing and direct entry), any need for assuming debt would be primarily due to fees that are not covered through their assistantships and living expenses.

c. Doctoral education has a strong correlation (r = .82) with gainful employment earnings compared with IRS Scorecard earnings by credential level in all categories evaluated for doctoral students. In fact, the proportion of median debt is less than the proportion of median earnings (median debt 7.7-59.9% and median earnings 11.6-72.8%). The indebtedness from the proposed program is in relation to the amount of time to complete the dissertation and the amount of support received. In 2021, the average annualized salary ranges for a PhD-prepared data scientist ranged from $110k to $150k ($144k according to NSF). Therefore, we anticipate the proposed program will be affordable and attractive to a large cohort of applicants. The high salaries within industry point to a secondary issue that universities are working through in this field. With starting salaries in academic fields related to data science (mathematics and computer science) averaging $79k,[14] the pay differential is expected to drive many though not all of the PhD graduates into industry.

V. Societal, Labor Market and Employability: *(Provide **external** evidence of societal demand and employability of graduates from each of the following source types. Must include external estimates. Maximum length 1,000 words)*

a. Labor market information (projections, job posting analyses, and wages)
   i. Specific to North Carolina (such as ncworks.gov, nctower.com, or outside vendors such as Lightcast.)
   ii. Available from national occupational and industry projections (such as the U.S. Bureau of Labor Statistics).
b. Projections from professional associations or industry reports (including analysis
c. Other (alumni surveys, insights from existing programs, etc.)

a. *Labor market information:* The Bureau of Labor Statistics predicts[15] that data scientists will experience one of the highest job growths between 2020 and 2030 (>30%). Currently the vast majority of data science practitioners have graduate degrees (93%). Of data science jobs today, 12% hold a PhD degree (40% of artificial intelligence positions, a type of data scientists). NC State Institute for Advanced Analytics regularly tracks the job supply and demand across North Carolina as well as the nation[16]. Given the large percentage of jobs that require a PhD, the limited number of PhD programs in data science, and the anticipated trajectory of job market growth, UNC Charlotte is proposing a new PhD program in Data Science. In concurrence, a UNC Chapel Hill preliminary study showed:[17]

[14] table 49 from https://ncses.nsf.gov/pubs/nsf22300/data-tables
[15] https://www.bls.gov/emp/images/growing_occupations.png and https://www.bls.gov/emp/tables/occupational-projections-and-characteristics.htm
[16] NC State Institute for Advanced Analytics Job Tracking https://analytics.ncsu.edu/?page_id=14518
[17] Appendix A

> "high labor market demand for individuals with a master's degree in data science. All five of the occupations identified as being most closely aligned with a master's degree in data science are projected for more than double the growth (14%) over the next decade than the projected growth across all occupations nationwide over the same time period (5.8% growth). Statewide occupational projections mirror national projections among likely occupations for an individual with a master's degree in data science, providing a promising outlook on occupations utilizing data science skills. Pairing long-range occupational projections with recent job posting data, employers nationwide were looking to hire Data Scientists nearly twice as often over the past year as the second most-common job title (Biostatisticians). A trend at both the state and national level is the emergence of biostatistics, as job titles including the term account for the second and third most-common titles (Biostatisticians and Biostatistics Managers) over the last year."

b. *Projections from professional associations or industry reports:* Companies seeking doctoral-level data scientists are broad, ranging from IT companies (e.g., Amazon) to finance companies (e.g., Capital One) to management consulting companies (e.g., Booz Allen Hamilton). The Bureau of Labor Statistics (BLS)[18] highlighted this growing demand as follows:

> "The Rapid growth in data collection by businesses will lead to an increased need for data-mining services. Computer scientists will be needed to write algorithms that help businesses make sense of very large amounts of data. With this information, businesses understand their consumers better, making the work of computer and information research scientists increasingly vital (Source: BLS Occupational Outlook Handbook: Computer and Information Research Scientists)."

The proposed program is aimed at focusing on theories and techniques pertaining to data collection, data organization, and analytics for applications to real-world problems in a variety of domains of use, while instilling good societal stewardship of data. Our real-world applications will be multidimensional in the sense that the program will cover multiple domains such as marketing, operations management, public policy, education, urban and environmental management, engineering, and others.

As a PhD program in an emerging field where increasing numbers of universities are creating data science programs at the undergraduate, master's, and doctoral levels. In consultation with Kennesaw State about their experience with Data Science PhD graduates[19], we do expect a portion of our graduates to seek academic positions even

[18] BLS Computer and Information Scientists Job Outlook

[19] Kennesaw State University was one of the early Data Science PhD programs. As of Spring 2022, they had graduated 14

though the industry job market and compensation is strong.

c. *UNC Charlotte sponsored survey:* An EAB report (see Appendix A) also described in-demand skills related to data science, specifically programming languages employers most often seek from doctoral-level data scientists such as Java, Python, SQL, R, C++, and others. This is confirmed by a more recent study from Burtch Works[20] where Python continues to gain popularity with data science practitioners. More generally, there is a strong demand from employers for knowledge in statistics, mathematics, computer science, and data mining. In addition to such technical proficiencies, employers are seeking doctoral-level data science professionals with management and leadership skills to supplement their technical and analytical skills (such as software programming, statistics, and data mining skills). Our proposed multi-disciplinary program would provide education and training for such professionals through a broad range of real-world applications related to data management and storage, analytics, information-based decision making in disciplines as diverse as marketing, operations management, political science, policy, education, public health, social and environmental management, financial services, defense, engineering, and computational sciences, to name but a few. The balance between technical skills and decision-making leadership will be even more important in the near future, with Artificial Intelligence (AI) growing rapidly to replace some of human data skills. Our program will strive to strike the balance to be a sustainable program even in the full-fledged AI era.

VI. Costs, Funding, and Budget (*Maximum length 1,000 words)*

Adding a new degree program will cost the institution some amount of money and will potentially generate new revenues. Calculating the costs and identifying the funding sources associated with implementation of a new program requires several institutional offices (e.g., academic affairs, finance, institutional research, enrollment management) to collaborate to present an accurate estimate.

a. Complete and attach the *UNC System Academic Program Planning Financial Worksheet* showing all costs required and revenues generated for each of the first five years of the program. Provide a budget narrative for each year addressing the following:

   i. UNC Academic Program Costs

   Year 1: Total costs $1.1M. Roughly 50% of the costs are reallocations from current programs where the Data Science PhD program can add seats to currently taught courses. We will also receive some efficiency from utilizing SDS funds that currently support 2 TA positions in the MS to TAs within the PhD program. We would reassign a portion of current SDS staff to the PhD program. New costs come from 2 new tenure track faculty. New costs to support 2

students. 4 went to tenure track assistant professor positions, 2 to post-docs (one has since found a tenure track position), and 8 to industry.

[20] https://www.burtchworks.com/2021/08/03/2021-survey-python-the-tool-of-choice-for-data-scientists-analytics-pros/

additional graduate assistantships, one EHRA staff for operations, and other miscellaneous support (library, travel, student computing). New revenues from tuition and SBTI of $249k would not totally offset new costs of $565k.

Year 2: Total costs $1.2M. Roughly 46% of the costs continue to be reallocations from current programs. Incremental costs from Year 1 support 2 new additional graduate assistantships. Total new revenues of $515k are closer to offsetting the total new costs of $638k.

Year 3: Total costs $1.4M. More than 50% of the costs in Year 3 are reallocation from current programs as more electives are now being taken in the 8000 courses already taught by other programs. Incremental new costs from Year 2 support 2 new additional graduate assistantships. Total new revenues of $799k now fully offset the total new costs of $712k.

Year 4: Total costs $1.7M. The proportion of reallocated costs drops to 43% of the total costs as the program stabilizes and new one additional faculty. Incremental new costs over year 3 support 2 new additional graduate assistantships and one additional tenure track faculty required to fully enable the curriculum. Total new revenues of $1.1M continue to offset the total new costs of $951k.

ii. UNC Academic Program Revenues

The program revenues are expected to be primarily supported by regular tuition and a tuition increment. We will reallocate some TA funding from current support of the DSBA program. As the MS program in Data Science and Business Analytics has grown to nearly 250 students, the efficiency of faculty, staff, support (e.g., full classrooms for faculty, no additional staff, etc.) will enable SDS to reallocate one faculty and limited funding additional funding as required. The Data Science PhD program is expecting the UNC Charlotte Division of Academic Affairs to provide up to 8 Graduate Assistantships. While the School of Data Science is still very new (2020), it is expected that the more than 80 affiliated faculty will routinely seek external grant funding that will provide financial support to a number of PhD students in the program (a potential upside with limited additional cost). SDS will also receive a portion of the F&A returned to the Colleges. These financial resources are expected to be utilized to support graduate students and faculty within the PhD. program. As a starting point, SDS faculty were awarded $5.6M in external funding in AY 21 and $8.4M in AY 22.

b. Based on the institution's estimate of available existing resources or expected non-state financial resources that will support the proposed program (e.g., federal support, private sources, tuition revenue, etc.), please describe the following:

i. How does the institution budget and allocate enrollment growth revenues? Is this program expected to generate new enrollment growth for the institution? If so, how will funds be allocated to the proposed program or be used to further other institutional priorities?

The budget review process is conducted by the colleges and the Office of Academic Affairs annually. Deans submit funding requests to Academic Affairs based on the prioritized needs of each college. The proposed PhD program is expected to generate new enrollment growth for UNC Charlotte. Increases in enrollment and the corresponding increase in Student Credit Hours (SCH) are reviewed by the Dean's office and examined within the context of the UNC System Office funding formula and University priorities when determining allocation enrollment growth funds and general tuition and fees. If available, funds will be used to hire additional faculty and staff to support teaching and research.

ii. Will the institution seek other additional state appropriations (both one-time and recurring) to implement and sustain the proposed program? If so, please elaborate.

UNC Charlotte is seeking $12M in legislative funding for data science. This request has been approved by the UNC System and is under consideration by the General Assembly for appropriation in the FY23-24 and FY24-25 budgets. As part of that request, $1.2M in recurring funds and $600K in one-time funds will be used to launch the proposed program. If this funding is approved, the budget will be adjusted accordingly. If the appropriation does not occur, the institution will reassess financial support needed for the program which may result in the inability to proceed.

iii. Will the institution require differential tuition supplements or program-specific fees? If so, please elaborate.

1. State the amount of tuition differential or program-specific fees that will be requested.

A requested tuition differential of $388.89/credit hour will be requested. This is consistent with that of the current DSBA MS program at UNC Charlotte. We expect to keep the tuition differential consistent between the programs as to eliminate any arbitration between programs.

2. Describe specifically how the campus will spend the revenues generated.
   We will invest the generated revenue to support fixed-term faculty, a part-time/full-time administrative coordinator, provide aid to students, support program advertising, research, and activities and experiences contributing to the richness of the doctoral learning engagement (speaker series, workshops, conference attendance) and dissemination of findings.

c. Provide a description of how the program can be implemented and sustained If enrollment increase funding, differential tuition, or other state appropriations noted in the budget templates are not forthcoming.

The current faculty at the University has the expertise needed to teach the courses in the proposed program. Many of the courses in the proposed program are or will be shared with the existing degree programs in the colleges participating in the School of Data Science. Such sharing will create synergy between the proposed program and existing programs, and also between the colleges involved. This synergy, we believe, will help to strengthen the existing programs and the vision of transdisciplinary learning.

Although there are nearly enough faculty to cover courses in the program, some of the core courses are approaching capacity. Therefore, we expect to hire new faculty to teach additional sections of these courses needed for the sake of manageability. In addition, for some of the existing DSBA courses we will have to develop an 8000-level counterpart. Consequently, we expect to hire three new faculty members in the first four years of the program to cover additional sections as well as to meet increased demand for these courses from existing degree programs.

The program will not be able to be implemented without approval of the tuition differential. With only SBTI approved, but no other funding, the program would depend very heavily on external grant funding for the PhD students, which may jeopardize the stability and sustainability of the program as it seeks to establish itself in a quickly changing technology-focused advanced learning landscape. This would severely limit the expected number of students, impact to the regional job market, and possibly temper the engagement of faculty in student advising responsibilities. Additionally, funding for this program is projected to come from a legislative budget request for data science approved by the UNC System and under consideration by the General Assembly for appropriation in the FY23-24 and FY24-25 budgets. If the appropriation does not occur, the institution will reassess financial support needed for the program which may result in the inability to proceed.

VII. For Research Doctoral Programs Only:

Describe the following (maximum length 1,000 words):

a. The research and scholarly infrastructure in place (including faculty) to support the proposed program.

UNC Charlotte offers 24 doctoral and 66 master's programs. Fall 2022 enrollment in these programs stands at 6,090, 978 of which are doctoral students. During the 2021-2022 academic year, 178 doctoral degrees were awarded. The Graduate School houses the Center for Graduate Life and Learning (CGLL), which supports a host of services and programs focused on strengthening competencies in communication, leadership, teaching, cultural engagement, and ethics. CGLL is essential to the success of graduate students and works collaboratively with the University Libraries, program directors and Colleges, and the office of Research and Economic Development (RED). RED houses a number of programs and resources to foster and sustain research, innovation, and talent development accessible to faculty and students.

The transdisciplinary School of Data Science (SDS) consists of over 90 full time, joint, and affiliated faculty representing 6 colleges and 23 departments. While primarily joint and affiliated faculty, each faculty member has assigned responsibilities, including teaching load, that are defined. In addition, SDS hosts an AWS environment with Twitter, local WiFi, and other data sets for our faculty and students. Each faculty member has access to the UNC Charlotte High Performance Computing infrastructure as well. SDS assists in defraying costs of publication, travel to conferences, and other similar support. In addition, we host two conferences each year (Women in Data Science and Analytics Frontiers) with 300-500 attendees each. Faculty have the opportunity to present their research and interact with many local corporations at these conferences. Research seminars with local and external guest speakers are regularly scheduled.

b. Any aspects of financing the proposed new program not included in the above section.

Primary funding for the proposed program will be through tuition and tuition differential as described. Additional funding is expected through extramural research as data science is one of the key focuses of most funding agencies. The National Science Foundation plays a leadership role in this respect (https://www.nsf.gov/cise/bigdata/), with SDS faculty receiving NSF 2022 grants in video analytics, AI understanding business performance, and natural language processing of leadership statements. SDS faculty also received 2022 awards from the National Institutes of Health (https://datascience.nih.gov/) where faculty are using data science to study childrens' activity, peptide interference, and suicide detection and intervention. SDS faculty are leading an Intelligence Community Center of Excellence for the Department of Defense as well as receiving 2022 grants from industry partners like Intel, Alair Engineering and Electrical Power Research Institute. Our faculty also

work within the larger academic community with 2022 funding from projects led within North Carolina by NC State, NC A&T, UNC Pembroke, UNC Chapel Hill, as well as outside of NC with Western Michigan, Northeastern, Northwestern, and University of Sheffield. SDS faculty have received 2022 grants from Mecklenburg County and the NC Department of Justice as well as additional funding and support from the NC General Assembly which has previously been allocated to support SDS through "Engineering North Carolina's Future."

c. State the number, amount, and source of proposed graduate student stipends and related tuition benefits that will be required to initiate the program.

SDS is expecting to initially provide 5 graduate student stipends of $22k each with related tuition, SBTI, fees and healthcare support. This is expected to grow to 10 stipends being supported by SDS and Academic Affairs at UNC Charlotte (2 SDS, 10 AA). AA is expected to provide their standard GASP package for 3 students growing to 8 in the first few years, with SDS covering any additional funding necessary to complete the support package. We do expect a portion of the students to matriculate with Advanced Standing (especially those transitioning from our DSBA program). We also expect a small, but material portion of these advanced standing students to not be supported by graduate student stipends since it is highly likely that they will be fully employed in Charlotte while they are studying part-time in the new program. We anticipate that, at maturity, in excess of 30% of our full-time students will be supported on external funding.

VIII. For Professional Practice Doctoral Programs Only:

Describe the following (maximum length 1,000 words):

N/A

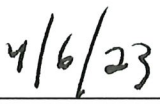
IX. Contact: (List the names, titles, e-mail addresses and telephone numbers of the person(s) responsible for planning the proposed program, including SACS COC liaison.)

Position Title	Name	E-mail Address	Telephone
Executive Director SDS	Doug Hague	dhague@uncc.edu	704-687-5666
Knight Distinguished Professor of Public Policy	Jean-Claude Thill*	jfthill@uncc.edu	704-687-5973
Professor	Monica Johar*	msjohar@uncc.edu	704-687-7658

Professor	Zbigniew Ras	ras@uncc.edu	704-687-8574
Professor	Jiangcheng Jiang	Jjiang1@uncc.edu	704-687-6415
Associate Professor	Monika Sawhney	msawhney@uncc.edu	704-687-0963
Assistant Professor	Ming Chen	mchen37@uncc.edu	704-687-7626
Professor	Srinivas Pulugurtha	sspulugu@uncc.edu	704-687-1233

* Denotes primary contacts

Signatures. This Request for Preliminary Authorization has been reviewed and approved by the appropriate institutional committees and authorities and has my support.

Position Title	Signature	Date
Chancellor		
Provost		4/5/2023

(Only complete below for partner institution if this is a joint degree program proposal)

Position Title	Signature	Date
Chancellor		
Provost		

Appendix A: Chapel Hill Report
Appendix B: EAB Report
Appendix C: Letters of Support

	Current Program Sources (if applicable)	Rate	Year 0 (Start Up)	1st Year	2nd year	3rd Year	4th Year	5th Year	TOTALS
1	General Fund Appropriation								$ -
2	NC Promise Appropriation								$ -
3	*Resident Enrollment (FTE)*								
4	Regular Resident Tuition (Annual Rate)	$ 4,337	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5	*Nonresident Enrollment (FTE)*								
6	Regular Nonresident Tuition (Annual Rate)	$ 18,482	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7	Tuition Differential (Annual Rate)	$ 7,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
8	Special Fees		$ -	$ -	$ -	$ -	$ -	$ -	$ -
9	External Funding (In-Hand Only)								$ -
10	Other Funding (Identify)			100,000	75,000	50,000	50,000	50,000	$ 325,000
11	**Total Current Sources**		$ -	$ 100,000	$ 75,000	$ 50,000	$ 50,000	$ 50,000	$ 325,000
	Proposed New Program Sources								
12	*Incremental Resident SCH*			36	72	108	126	144	
13	Enrollment Funding Appropriation	$ 965	$ -	$ -	$ 17,370	$ 52,110	$ 86,850	$ 112,905	$ 269,235
14	*Resident Enrollment (FTE)*			2	4	6	7	8	
15	Regular Resident Tuition (Annual Rate)	$ 4,337	$ -	$ 8,674	$ 17,348	$ 26,022	$ 30,359	$ 34,696	$ 117,099
16	NC Promise Appropriation (Resident)		$ -	$ -	$ -	$ -	$ -	$ -	$ -
17	*Nonresident Enrollment (FTE)*			6	12	18	21	24	
18	Regular Nonresident Tuition (Annual Rate)	$ 18,482	$ -	$ 110,892	$ 221,784	$ 332,676	$ 388,122	$ 443,568	$ 1,497,042
19	NC Promise Appropriation (Nonresident)		$ -	$ -	$ -	$ -	$ -	$ -	$ -
20	Tuition Differential (Annual Rate)	$ 7,000	$ -	$ 56,000	$ 112,000	$ 168,000	$ 196,001	$ 224,001	$ 756,002
21	Special Fees		$ -	$ -	$ -	$ -	$ -	$ -	$ -
22	External Funding (In-Hand Only)								$ -
23	Other Funding (Identify)			73,480	146,960	220,440	293,920	293,920	$ 1,028,721
24	**Total New Sources**		$ -	$ 249,046	$ 515,462	$ 799,249	$ 995,252	$ 1,109,090	$ 3,668,099
25	**Total Proposed Program Sources**		$ -	$ 349,046	$ 590,462	$ 849,249	$ 1,045,252	$ 1,159,090	$ 3,993,099

Comments

Program is set up to be a split of advanced standing students and direct entry to PhD (50/50).
We have a successful MS program where many have wanted to return for PhD. MS program is all self pay for all students
We estimated an entry of 8 students/year (75% non-resident)
SBTI for PhD program is consistent with MS program.
We expect 75% non resident and 25% in state residents.
The in state students will be a mix of full time and part time. Full time will be supported through TA or grants. Part time will be self pay.
Blend of part time and full time in state gets us to the FTE estimate
Other current funding source: efficiencies gained by housing the program with the MS program (DSBA).

		Year 0 (Start Up)	1st Year	2nd year	3rd Year	4th Year	5th Year	TOTALS
	Current Program Uses (if applicable)							
1	Tenure/Tenure-Track Faculty		$ 373,524	$ 373,524	$ 560,286	$ 560,286	$ 560,286	$ **2,427,905**
2	Non Tenure-Track Faculty							$ -
3	Graduate Student Support		73,480	73,480	73,480	73,480	73,480	$ **367,400**
4	EHRA Non-Faculty Positions		86,198	86,198	86,198	86,198	86,198	$ **430,989**
5	Student Support (Scholarships)							$ -
6	Libraries							$ -
7	Supplies and Materials							$ -
8	Travel, Communications, and Fixed Charges							$ -
9	Equipment and Technology							$ -
10	Facility Repair and Renovation							$ -
11	Other (Identify)							$ -
12	**Total Current Uses**	**$ -**	**$ 533,202**	**$ 533,202**	**$ 719,964**	**$ 719,964**	**$ 719,964**	$ **3,226,294**
	Proposed New Program Uses							
13	Tenure/Tenure-Track Faculty*		330,425	330,425	330,425	495,637	495,637	$ **1,982,549**
14	Non Tenure-Track Faculty*							$ -
15	Graduate Student Support*		73,480	146,960	220,440	293,920	293,920	$ **1,028,721**
16	EHRA Non-Faculty Positions*	86,198	86,198	86,198	86,198	86,198	86,198	$ **517,187**
17	Student Support (Scholarships)							$ -
18	Libraries		10,000	10,000	10,000	10,000	10,000	$ **50,000**
19	Supplies and Materials		5,000	5,000	5,000	5,000	5,000	$ **25,000**
20	Travel, Communications, and Fixed Charges		5,000	5,000	5,000	5,000	5,000	$ **25,000**
21	Equipment and Technology		40,000	40,000	40,000	40,000	40,000	$ **200,000**
22	Facility Repair and Renovation							$ -
23	Facility New Construction or Expansion							$ -
24	Other (Identify)		15,000	15,000	15,000	15,000	15,000	$ **75,000**
25	**Total New Uses**	**$ 86,198**	**$ 565,103**	**$ 638,583**	**$ 712,063**	**$ 950,755**	**$ 950,755**	$ **3,903,457**
26	**Total Proposed Program Uses**	**$ 86,198**	**$ 1,098,304**	**$ 1,171,784**	**$ 1,432,026**	**$ 1,670,719**	**$ 1,670,719**	$ **7,129,751**

Comments

Reallocation of 2 Tenure track in beginning with additional one later in program

Note majority of positions that support this PhD will be joint faculty as is the practice in our School of Data Science

TT and NTT faculty positions are in FTE not headcount due to joint nature

New capacity is 6 courses of core curriculum eventually taught twice per year + 2 seminar courses + 4 new topics courses/yr (16 sections + seminars = 50 credit hours /yr new)

Graduate student support is for Teaching Assistants (tuition, fees, SBTI, + $22k stipend)

E&T is computing equipment for new students and ongoing compute capacity

"Other" is Graduate Program Director Stipend

Non Faculty is for student support (advising, labs, recruiting, etc)

Reallocation of SDS staff include portions of many postions (marketing, EA, analytics, etc).

Benefits multiplier	1.44	
Estimated portion of current SDS staff members that will support PhD program		
PhD student tuition, fees, SBTI, $22k stipend	$ 36,740	escalating number of students at Tuition, fees, SBTI, $22k stipend (starts at 2, max of 10)
cost/TT of current TT	$ 130,000	
cost/TT new hires	$ 115,000	1 TT and then a second TT: Need capacity to teach 6 core courses twice a year + 2 seminars + 2 new courses = 44 credit hours
cost/NTT	$ 90,000	
cost of EHRA non faculty	$ 60,000	
Program Director Stipend	$ 15,000	
Cost of new student laptop, misc	$ 5,000	

UNC | OFFICE OF THE PROVOST
Digital and Lifelong Learning

PRELIMINARY MARKET ASSESSMENT: MASTER'S DEGREE IN DATA SCIENCE

An assessment of student and labor market demand for the proposed data science master's program

Prepared for the Data Science Planning Group
by Digital and Lifelong Learning

July 2021

Any questions about this report? Contact us at dll@unc.edu

TABLE OF CONTENTS

Executive Summary **3**

Introduction & Objective **4**

Student Demand Analysis **5**

Summary 5

National Outlook 6

North Carolina Outlook 9

Societal & Labor Market Demand Analysis **11**

Summary 11

Occupational Outlook 14

Salary Outlook 16

National Job Posting Data 17

North Carolina Job Posting Data 19

In-Demand Skills 21

Appendices **25**

EXECUTIVE SUMMARY

Student Demand: The data show high demand for master's programs in data science. Nationally, master's completions in data science have doubled over the past eight years (101.9% growth), which is 10 times the rate of master's degree growth across all disciplines over the same time period (10.1% growth). Similar trends exist in North Carolina, where master's completions in data science have increased 580.5% over the last 8 years. Meanwhile, the academic marketplace for master's degrees in data science is becoming increasingly saturated; eight peer institutions nationwide offer a master's degree in data science (p. 8), and many in-state institutions have existing programs (p. 10).

In North Carolina, opportunity is still available for UNC-Chapel Hill to join the marketplace with a unique differentiator: a 100% online master's degree. Currently, no such program exists in North Carolina.

Even though an online program typically recruits from a larger pool than a residential program, program stakeholders at UNC-Chapel Hill should expect significant competition from existing programs at peer institutions across the country. These existing programs operate relatively large data science programs, with five peer institutions graduating over 100 students from their respective program in 2019. For the proposed program at UNC-Chapel Hill to be successful, opportunities to demonstrate and communicate program differentiation will be necessary.

Societal and Labor Market Demand: Similarly, the data show high labor market demand for individuals with a master's degree in data science. All five of the occupations identified as being most closely aligned with a master's degree in data science are projected for more than double the growth (14%) over the next decade than the projected growth across all occupations nationwide over the same time period (5.8% growth). Statewide occupational projections mirror national projections among likely occupations for an individual with a master's degree in data science, providing a promising outlook on occupations utilizing data science skills.

Pairing long-range occupational projections with recent job posting data, employers nationwide were looking to hire Data Scientists nearly twice as often over the past year as the second most-common job title (Biostatisticians). A trend at both the state and national level is the emergence of biostatistics, as job titles including the term account for the second and third most-common titles (Biostatisticians and Biostatistics Managers) over the last year. Program stakeholders at UNC-Chapel Hill could strategically partner with academic units in the health sciences to provide interdisciplinary learning outcomes to support program graduates in this emerging field.

Other opportunities for program stakeholders to prepare graduates for careers in the workforce could include utilizing in-demand workforce skills in program outcomes (pp. 21-24) and partnering with companies in North Carolina frequently hiring for jobs associated with master's degrees in data science to create both enrollment and employment pipelines (p. 19).

INTRODUCTION & OBJECTIVE

The information in this study is intended for the group at UNC-Chapel Hill tasked with investigating a new potential academic program: a master's degree in data science.

This preliminary market assessment is split into two distinct sections:[1]

- **Student Demand** to understand student interest and enrollment trends in master's programs in data science from multiple perspectives
- **Societal and Labor Market Demand** to recognize the occupations and industries hiring students who have earned a master's degree in data science including salary data, occupational trends, real-time job posting data, and in-demand skills

While the information in this market analysis is intended to inform the data science planning group in their program planning, it is meant to be a resource used to augment prior institutional knowledge and expertise for the proposed program at UNC-Chapel Hill.

[1] See Appendices for background on data and methodological approach for each section.

STUDENT DEMAND ANALYSIS[2]

Summary

Main Idea: Master's degrees in data science have grown at a considerable rate, with completions nationwide doubling over the past eight years, and completions in North Carolina increasing more than six times over the same time period. Inevitably, the growth in popularity of this credential means that the academic market is becoming more saturated. Eight peer institutions of UNC-Chapel Hill currently offer a program, and 6 institutions across the state have an existing data science master's program. However, with the proposed program, UNC-Chapel Hill would be offering a first-of-its-kind program in North Carolina, as no existing program across the state is fully online. Additionally, many peer institutions with an existing data science master's degree do not offer their program online (see p. 8). UNC-Chapel Hill could differentiate from these peer programs by offering an online program.

- **National Outlook**
  - Master's completion growth over time
    - 101.9% growth in data science master's completions across all formats between 2012-2019
      - Nearly 10x the growth of master's completions across all disciplines (10.1%) over the same time period
    - 359.6% growth in online completions over the same 8-year time span
      - Online master's programs account for 40% of all completions in 2019
    - 8 peer institutions with similar programs
- **North Carolina Outlook**
  - No online data science master's programs exist statewide
  - 6 institutions offer comparable degrees statewide
    - Largest competition in-state comes from Duke, NC State, and UNC Charlotte
  - 580.5% growth in master's completions in data science between 2012-2019
    - Over the same time span, master's degrees across all disciplines grew 17.5%

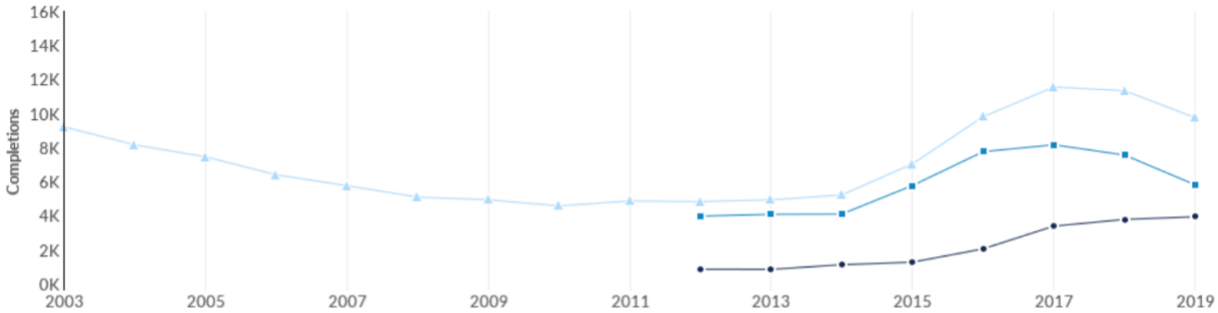
[2] See Appendix B for methodology

National Outlook

Data Science Master's Completions Nationwide[3]

	Completions (2019)	% Completions	Institutions (2019)	% Institutions
All Programs	9,751	100%	180	100%
Distance Offered Programs	3,939	40%	43	24%
Non-Distance Offered Programs	5,812	60%	137	76%

Growth in Master's Completions in Data Science Nationwide



	2012 Completions	2019 Completions	% Change
Distance Offered Programs	857	3,939	+359.6%
Non-Distance Offered Programs	3,972	5,812	+46.3%
All Programs	4,829	9,751	+101.9%

[3] The Classification of Instructional Programs (CIP) is developed by the U.S. Department of Education's National Center for Education Statistics (NCES). CIP codes are seen as industry standards to compare program enrollments and completions. CIP codes are typically updated every 10 years in response to changing curriculum, emerging programs, and market demand. For comparison and analysis, the specific CIP code "11.0101: Computer and Information Sciences, General" will be used to encompass master's degrees in Data Science, as this specific CIP code is used by the data science planning group in their program planning documents.

Institutions with the Most Master's Completions in Data Science Nationwide

Institution	Modality	Master's Completions (2019)	% Change Year-Over-Year (2019 vs. 2018)	3 Year % Change (2017-2019)	5 Year % Change (2015-2019)	Market Share	Tuition & Fees (2019)[4]
Georgia Tech	Online	1,114	18%	91%	791%	11.4%	$16,088
New York University	Online	487	20%	26%	-2%	5%	$35,562
University of Texas at Dallas	Classroom	400	-6%	-13%	10%	4.1%	$13,874
Southern New Hampshire University	Online	354	-12%	-17%	35%	3.6%	$18,810
Northeastern University	Classroom	310	51%	31%	30%	3.2%	$25,085
Stony Brook University	Classroom	299	85%	65%	85%	3.1%	$13,558
Columbia University	Classroom	277	-15%	N/A[5]	N/A	2.8%	$49,968
The University of Texas at Arlington	Classroom	260	-10%	-27%	94%	2.7%	$10,248
Johns Hopkins University	Online	257	14%	27%	45%	2.6%	$57,556
University of Buffalo	Classroom	216	-5%	-7%	-33%	2.2%	$14,130

[4] Tuition and fees are specific to graduate students at the institution, but do not vary based on academic program. Where applicable, tuition and fees figures come from in-state tuition. Source: National Center for Education Statistics' Integrated Postsecondary Education Data System (IPEDS).

[5] Columbia University didn't report completions for this program in 2017 or 2015.

Peer Institutions[6] with Master's Completions in Data Science

Institution	Modality	Master's Completions (2019)	% Change Year-Over-Year (2019 vs. 2018)	3 Year % Change (2017-2019)	5 Year % Change (2015-2019)	Tuition & Fees (2019)[7]
Duke University[8]	Classroom	379	N/A[9]	N/A	N/A	$56,888
Johns Hopkins University	Online	257	14%	27%	45%	$57,556
University of Florida	Classroom	160	-60%	-38%	63%	$12,737
University of Wisconsin	Classroom	133	5%	-5%	138%	$12,180
University of Washington	Classroom	128	28%	20%	23%	$19,293
University of Virginia	Classroom or Online	59	28%	119%	269%	$19,528
University of Texas at Austin	Online	36	16%	-22%	-27%	$11,998
University of California, Berkeley[10]	Online	23	35%	15%	64%	$14,187

[6] Institutions selected in 2021 by the General Administration of the University of North Carolina System as official peers for UNC-Chapel Hill. More info: https://oira.unc.edu/strategic-planning/unc-system-defined-peer-group/

[7] Tuition and fees are specific to graduate students at the institution, but do not vary based on academic program. Where applicable, tuition and fees figures come from in-state tuition. Source: National Center for Education Statistics' Integrated Postsecondary Education Data System (IPEDS).

[8] Although Duke University doesn't have a program with the same CIP code as the proposed program at UNC-Chapel Hill, the "Master of Quantitative Management, Business Analytics" program is included due to feedback from program stakeholders identifying the Duke program as direct competition.

[9] Duke University didn't have any program graduates prior to 2019.

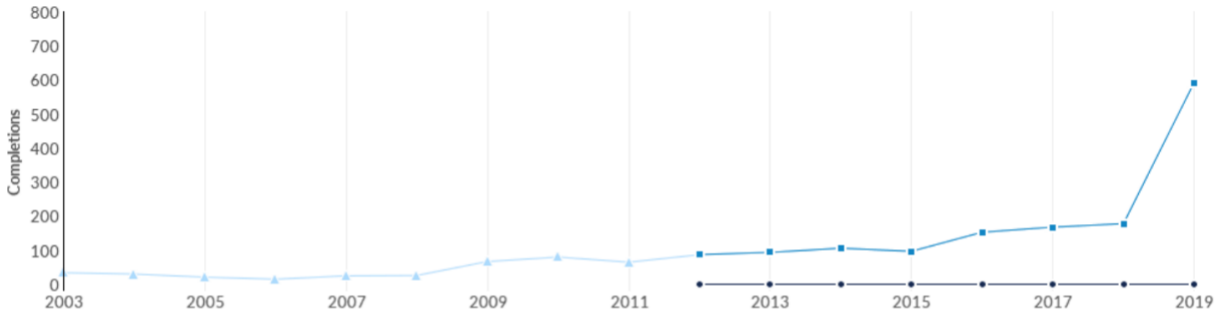
[10] Although UC-Berkeley doesn't have a program with the same CIP code as the proposed program at UNC-Chapel Hill, the online "Master of Information and Data Science" program is included after due to feedback from program stakeholders identifying the UC-Berkeley program as direct competition.

North Carolina Outlook[11]

Master's in Data Science Completions in North Carolina

	Completions (2019)	% Completions	Institutions (2019)	% Institutions
All Programs	592	100%	6	100%
Distance Offered Programs	0	0%	0	0%
Non-Distance Offered Programs	592	100%	6	100%

Growth in Master's Completions in Data Science in North Carolina



	2012 Completions	2019 Completions	% Change
Distance Offered Programs	0	0	0.0%
Non-Distance Offered Programs	87	592	+580.5%
All Programs	87	592	+580.5%

Note: There is a significant increase in completions in 2019 in North Carolina. This is largely due to Duke University's "Master of Quantitative Management, Business Analytics" degree which graduated its first cohort in 2019.

[11] There are only 12 completions in North Carolina under the CIP code "11.0101: Computer and Information Sciences, General." However, there are similar programs in North Carolina classified under the following adjacent CIP codes: "11.0802: Data Modeling/Warehousing and Database Administration" and "52.1399: Management Sciences and Quantitative Methods, Other." These additional CIP codes are utilized in this section for a more comprehensive view of state-level competition and student demand. Additionally, these CIP codes are referenced in official program planning documentation as similar programs across the UNC System.

North Carolina Institutions with Master's Completions in Data Science

Institution	Program Name	Master's Degree Completions (2019)	% Change Year-Over-Year (2019 vs. 2018)	3 Year % Change (2017-2019)	5 Year % Change (2015-2019)	Market Share	Tuition & Fees (2019)
Duke University	Master of Quantitative Management, Business Analytics	379	N/A[12]	N/A	N/A	64%	$56,888
NC State University	M.S., Analytics	111	0%	-6%	29%	18.8%	$11,673
UNC Charlotte	PSM, Data Science and Business Analytics	54	-5%	29%	5,300%	9.1%	$7,430
UNC Wilmington	M.S., Data Science	25	317%	525%	257%	4.2%	$7,457
Appalachian State University	M.S., Applied Data Analytics	19	533%	N/A[13]	N/A	3.2%	$7,976
Winston-Salem State University	Master of Computer Science & Information Technology	4	300%	0%	33%	0.7%	$6,412

[12] Duke University didn't have any program graduates prior to 2019.
[13] Appalachian State didn't have any program graduates prior to 2018.

SOCIETAL & LABOR MARKET DEMAND ANALYSIS[14]

Summary

Main Idea: Jobs most commonly occupied by data science program graduates are poised for notable growth over the next decade. All five representative occupations project for at least 2x the projected growth across all occupations both nationally and at the state level. Additionally, the median annual earnings for these occupations are all above $90k. Pairing strong occupational projections with healthy compensation provides a strong outlook for the future of these occupations. Among the studied occupations in the past year, employers were looking for "Data Scientists" at the state and national level more than any other job title, demonstrating the relative demand for that position in the workforce. An emerging trend statewide and nationally was the emergence of "biostatistics," as the term is included in the second and third most-common job titles, as employers are looking for employees to apply statistical methods and data projections to further research in medicine, public health, environmental sciences, and related fields. The proposed program at UNC-Chapel Hill could pair industry projections with real-time job posting data to create a program that is responsive and attractive to fill labor market needs.

- **Occupational Outlook**
  - Nationwide
    - Higher-than-average growth projected (14%) in representative occupations for data science graduates over the next decade
      - All five sample occupations for data science program graduates projected for at least 2x more growth over the next decade than the projected growth across all occupations[15]
    - "Statisticians" projected as the sample occupation with the largest growth (30.3%) over the next decade
  - North Carolina
    - Higher-than-average growth projected (13%) in representative occupations for data science graduates over the next decade
      - However, North Carolina projected as the state with the second-lowest growth rate among representative occupations throughout the Southeast, and slightly less growth projected than nationwide (14%).[16]
    - Raleigh-Cary and Charlotte-Concord-Gastonia MSAs poised for the largest growth among representative occupations over the next decade

[14] See Appendix C for methodology

[15] National projected growth across all occupations over the next decade is 5.8%

[16] The reason for a lower projected growth rate in North Carolina may be due to the large amount of data science jobs already existing in the state in 2021 (see p. 15).

        - All five sample occupations for data science program graduates projected for between 10-30% growth over the next decade, which is higher-than-average growth among all occupations statewide over the same time period[17]
- **Salary Outlook**
    - Among the occupations studied, the highest median annual earnings were for "Computer and Information Systems Managers" with an average median earning of $150k nationally
    - All five representative occupations had median annual earnings above $90k, with four of the five representative occupations for data science graduates earning more than 2x the average median earnings of all occupations nationwide[18]
- **National Job Posting Data**
    - Industry
        - The three industries hiring the most employees in data science careers are:
            - Professional, Scientific, and Technical Services
            - Information
            - Manufacturing
    - Occupations
        - The "Computer Systems and Information Managers" occupation was hiring more than twice as often as jobs within the second most-frequent occupation over the past year (Computer and Information Research Scientists)
    - Job Titles
        - "Data Scientist" was the most frequent job title over the past year
            - Employers were looking to hire Data Scientists nearly 2x as often as the next most frequent job title (Biostatisticians)
        - "Biostatistics" emerges as a common job title, as the term represents 2 of the top 3 most-common titles in job postings over the past year
- **North Carolina Job Posting Data**
    - Companies
        - 5 of the 10 employers with the most job postings were software companies
    - Industry
        - The three industries hiring the most employees in data science careers over the past year are "Professional, Scientific, and Technical Services," "Information," and "Manufacturing," matching national trends
    - Occupations
        - The "Computer Systems and Information Managers" occupation hired than three times as often as jobs within the second most-frequent

[17] North Carolina projected growth across all occupations over the next decade is 5.1%
[18] The average median annual earning for all 773 occupations in the United States is $47,423.

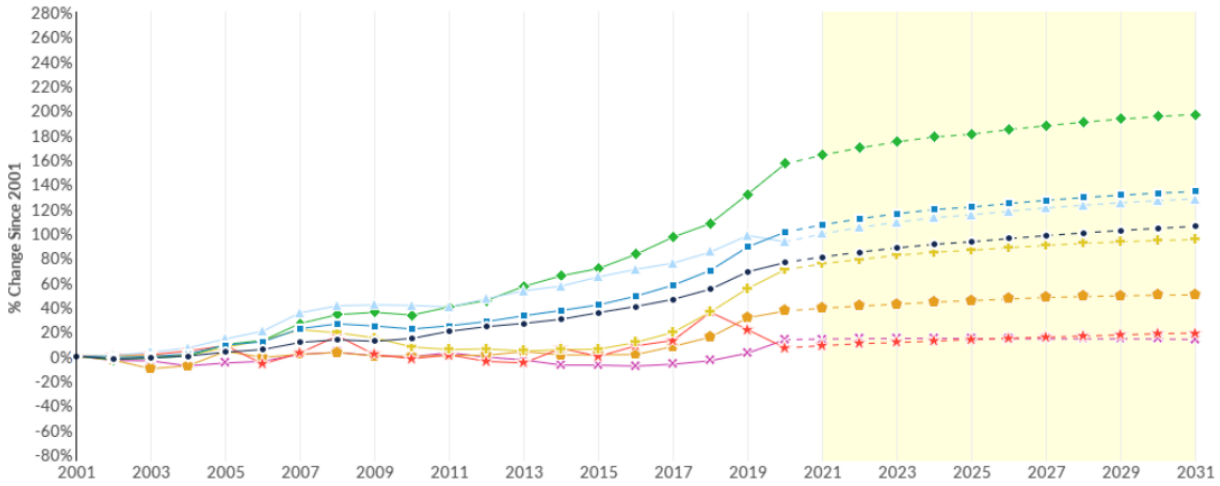
occupation over the past year (Computer and Information Research Scientists), matching national job posting data
        - The "Database Administrators and Architects" occupation only hired 5.5% of all jobs within the occupations studied, showing lack of demand for jobs within this occupation
    - Job Title
        - "Data Scientist" was the most frequent job title over the past year, matching national job posting data
        - Similar to national job posting data, "biostatistics" is represented in the second and third-most common job titles in North Carolina over the past year
- **In-Demand Skills**
    - Nationwide
        - "Computer science" was the most-desired hard skill[19] in job postings
        - "Communications" and "leadership" were the two most-desired soft skills[20] in job postings, with both skills represented in more than 50% of job postings
    - North Carolina
        - "Computer science" was the most-desired hard skill statewide in job postings, mirroring national skills data
        - "Leadership" was the most-desired soft-skill in job postings (56% of all postings)

[19] Well-defined and specific skills that are often highly technical, subject-matter specific, or acquired through on-the-job training.

[20] Typically broad competencies that include character traits, general cognitive or physical abilities, and interpersonal skills.

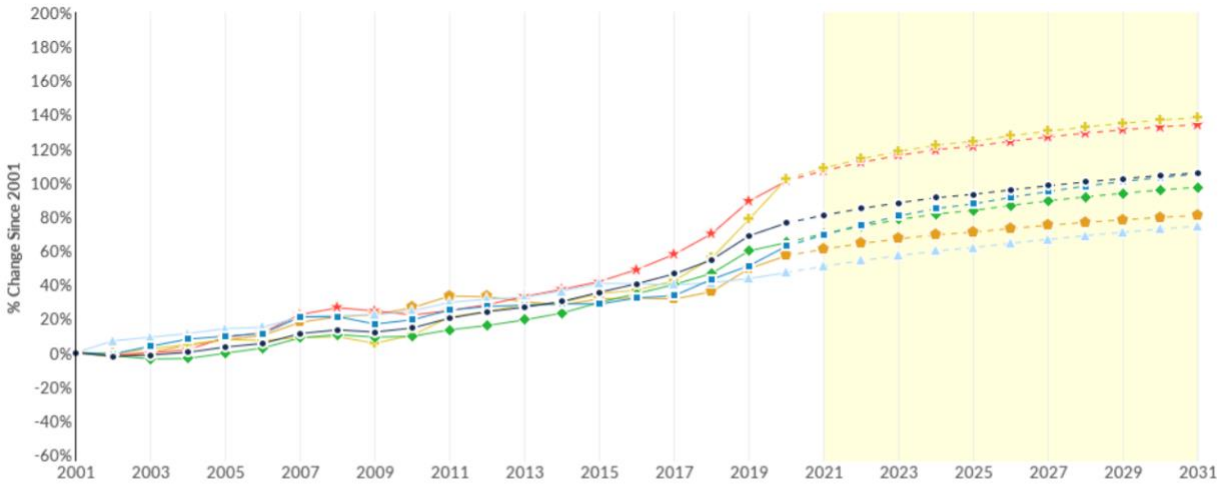
Occupational Outlook

North Carolina Outlook for Master's in Data Science Graduate Occupations



Region	2021 Jobs	2031 Jobs	Change	% Change	Median Hourly Earnings
United States	777,783	884,857	107,074	14%	$63.16
North Carolina	25,610	28,970	3,360	13%	$60.14
Raleigh-Cary, NC	5,079	5,804	725	14%	$60.47
Charlotte-Concord-Gastonia, NC-SC	9,113	10,259	1,146	13%	$62.88
Durham-Chapel Hill, NC	4,025	4,480	455	11%	$59.26
Fayetteville, NC	369	404	35	9%	$51.09
Winston-Salem, NC	953	1,027	74	8%	$56.73
Greensboro-High Point, NC	1,087	1,084	-3	0%	$60.94

Southeast Regional Outlook for Master's in Data Science Graduate Occupations



Region	2021 Jobs	2031 Jobs	Change	% Change	Median Hourly Earnings
United States	777,783	884,857	107,074	14%	$63.16
South Carolina	6,452	7,821	1,369	21%	$51.49
District of Columbia	8,011	9,268	1,257	16%	$72.61
Georgia	25,849	30,012	4,163	16%	$59.73
Tennessee	13,618	15,554	1,936	14%	$49.69
North Carolina	25,610	28,970	3,360	13%	$60.14
Virginia	31,787	35,705	3,918	12%	$67.51

Salary Outlook

Master's in Data Science Graduate Occupations by Average Salary Nationwide

Occupation	2021 Jobs	2031 Jobs	Percent Change[21]	Median Annual Earnings[22] [23]
Computer and Information Systems Managers	493,607	549,484	11.3%	$150,613
Computer and Information Research Scientists	33,938	38,840	14.4%	$126,818
Database Administrators and Architects	141,582	156,869	10.8%	$98,740
Statisticians	43,954	57,274	30.3%	$91,983
Data Scientists and Mathematical Science Occupations, All Other	64,702	82,391	27.3%	$97,899

Master's in Data Science Graduate Occupations by Average Salary in North Carolina

Occupation	2021 Jobs	2031 Jobs	Percent Change[24]	Median Annual Earnings[25] [26]
Computer and Information Systems Managers	16,063	17,723	10.3%	$138,632
Computer and Information Research Scientists	480	600	25%	$94,307
Database Administrators and Architects	4,621	5,088	10.1%	$104,007
Statisticians	1,985	2,507	26.3%	$100,242
Data Scientists and Mathematical Science Occupations, All Other	2,462	3,051	23.9%	$109,661

[21] The average projected change for all 773 occupations over the next 10 years in the United States is 5.8% growth.
[22] Nationally, the median advertised salary for these five sampling occupations over the past year is $118,700, based on 8,440 advertised salary observations nationwide (5% of the 154,703 matching postings) that required a master's degree for applicants.
[23] The average median annual earning for all 773 occupations in the United States is $47,423.
[24] The average projected change for all 773 occupations over the next 10 years in the United States is 5.8% growth.
[25] In North Carolina, the median advertised salary for these three sampling occupations over the past year is $111,400, based on 253 advertised salary observations in NC (5% of the 4,672 matching postings) that require a master's degree for applicants.
[26] The average median annual earning for all 773 occupations in the United States is $47,423.

National Job Posting Data[27] [28] [29]

Top Job Postings by Industry Nationwide

Industry	Total/Unique (July 2020-June 2021)[30]	Posting Intensity[31]	Median Posting Duration[32]
Professional, Scientific, and Technical Services	239,216/42,765	6:1	27 days
Information	173,816/30,100	6:1	42 days
Manufacturing	121,166/17,517	7:1	38 days
Finance and Insurance	116,413/17,448	7:1	32 days
Administrative and Support and Waste Management and Remediation Services	48,794/8,851	6:1	38 days

Top Job Postings by Occupation Nationwide

Occupation	Total/Unique (July 2020-June 2021)	Posting Intensity	Median Posting Duration
Computer and Information Systems Managers	515,123/87,809	6:1	35 days
Computer and Information Research Scientists	249,282/39,084	6:1	41 days
Statisticians	98,976/20,525	5:1	16 days
Database Administrators and Architects	45,040/7,285	6:1	41 days

[27] The period of time measured using real-time national job posting data is July 2020-June 2021. COVID-19 had a significant effect on job posting data during this time, especially in terms of the number of job postings.
[28] See Appendix D for methodology.
[29] All job postings are full-time and require a master's degree for the applicant, providing the most likely fit for graduates of the data science program in these specific jobs while notably decreasing the number of total and unique job postings analyzed.
[30] Total job postings denote the total and unduplicated number of online job advertisements listed by different companies on career sites and job boards. Unique job postings denote the number of de-duplicated job advertisements listed by different companies on career sites and job boards
[31] The ratio for total job postings to unique, de-duplicated job postings. For example, the "Information" industry has six postings online for each position. A higher than average (5:1) posting intensity can mean that industry is putting more effort than normal into hiring that position.
[32] Median posting duration for these five occupations nationwide is 34 days.

Top Posted Job Titles Nationwide

Job Title	Total/Unique (July 2020-June 2021)	Posting Intensity	Median Posting Duration
Data Scientists	68,305/10,609	6:1	38 days
Biostatisticians	26,553/6,120	4:1	16 days
Biostatistics Managers	17,869/4,657	4:1	10 days
Managers/Data Scientists	31,658/4,618	7:1	42 days
Principals	13,405/2,422	6:1	15 days
Directors of Software Development	16,190/2,289	7:1	49 days
Clinical Data Scientists	9,349/1,553	6:1	48 days
Research Scientists	10,107/1,481	7:1	46 days
Program Managers	7,944/1,391	6:1	41 days
Database Administrators	7,392/1,215	6:1	38 days

North Carolina Job Posting Data[33] [34]

Top Companies Hiring Data Science Graduate Occupations in North Carolina

Company	Total/Unique (July 2020-June 2021)[35]	Posting Intensity[36]	Median Posting Duration[37]
Oracle Corporation	3,364/627	5:1	45 days
Wells Fargo & Company	2,442/157	16:1	28 days
Parexel International Corporation	478/147	3:1	9 days
IQVIA	856/129	7:1	23 days
IBM	743/82	9:1	35 days
Microsoft Corporation	453/73	6:1	35 days
Ernst & Young, LLP	363/72	5:1	40 days
Cytel Inc.	251/69	4:1	7 days
Anthem, Inc.	175/67	3:1	32 days
Cisco Systems, Inc.	354/58	6:1	42 days

Top Job Postings by Industry in North Carolina

Industry	Total/Unique (July 2020-June 2021)	Posting Intensity	Median Posting Duration
Professional, Scientific, and Technical Services	8,245/1,374	6:1	31 days
Information	5,036/935	5:1	40 days
Manufacturing	3,141/544	6:1	41 days
Finance and Insurance	4,842/522	9:1	35 days
Administrative, Support, Waste Management and Remediation Services	1,519/261	6:1	41 days

[33] The period of time measured using real-time national job posting data is July 2020-June 2021. COVID-19 had a significant effect on job posting data during this time, especially in terms of the number of job postings.
[34] All job postings are full-time and require a master's degree for the applicant, providing the most likely fit for graduates of the data science program in these specific jobs while notably decreasing the number of total and unique job postings analyzed.
[35] Total job postings denote the total and unduplicated number of online job advertisements listed by different companies on career sites and job boards. Unique job postings denote the number of de-duplicated job advertisements listed by different companies on career sites and job boards
[36] The ratio for total job postings to unique, de-duplicated job postings. For example, Wells Fargo has 16 postings online for each position. A higher than average (6:1) posting intensity can mean employers are putting more effort than normal into hiring that position.
[37] Median posting duration for these five occupations in North Carolina is 36 days.

Top Job Postings by Occupation in North Carolina

Occupation	Total/Unique (July 2020-June 2021)	Posting Intensity	Median Posting Duration
Computer and Information Systems Managers	16,627/2,721	6:1	36 days
Computer and Information Research Scientists	5,605/879	6:1	40 days
Statisticians	4,491/815	6:1	28 days
Database Administrators and Architects	1,925/257	7:1	47 days

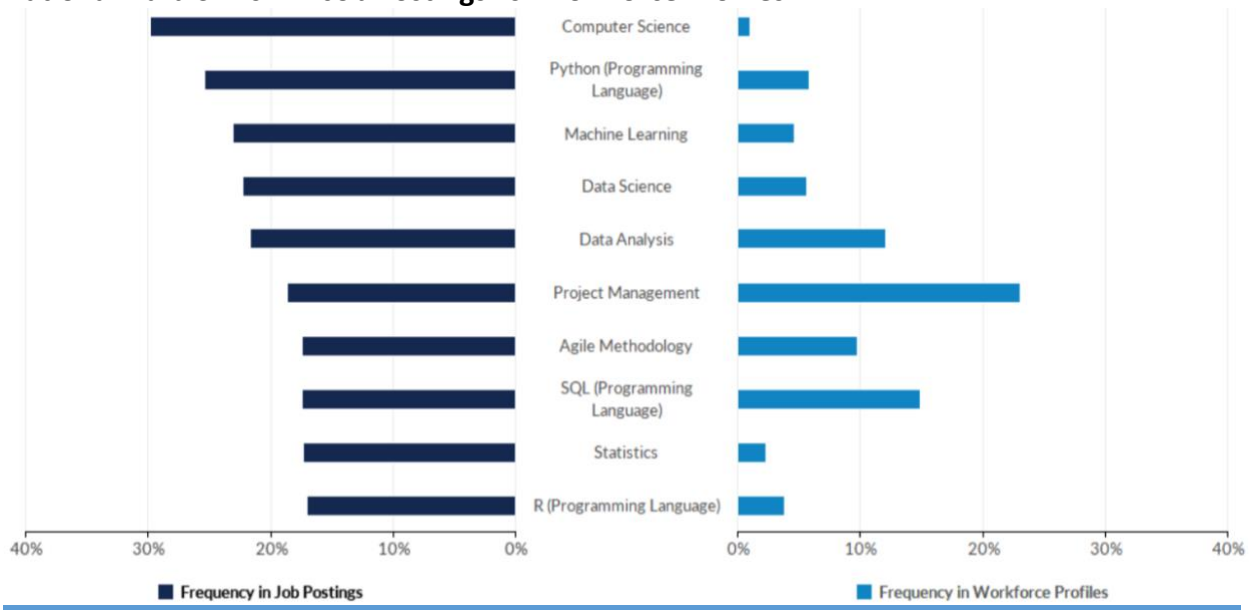
Top Posted Job Titles in North Carolina

Job Title	Total/Unique (July 2020-June 2021)	Posting Intensity	Median Posting Duration
Data Scientists	2,256/307	7:1	44 days
Biostatisticians	1,598/251	6:1	29 days
Biostatistics Managers	1,172/210	6:1	22 days
Managers/Data Scientists	818/121	7:1	40 days
Directors of Software Development	576/90	6:1	45 days
Principals	455/85	5:1	22 days
Database Administrators	302/44	7:1	52 days
Oracle Database Administrators	350/43	8:1	33 days
Clinical Data Management Managers	144/39	4:1	11 days
Program Managers	204/39	5:1	50 days

In-Demand Skills

The following data provide insight into the supply and demand of relevant skills by comparing the frequency of skills present in job postings against skills present[38] in today's workforce. The juxtaposition between skills present in job postings and those present in the workforce may reveal gaps in learning that could be filled through education.

National Hard Skills[39] in Job Postings vs. Workforce Profiles



Skill	Frequency in Postings[40]	Frequency in Profiles[41]
Computer Science	30%	1%
Python (Programming Language)	25%	6%
Machine Learning	23%	5%
Data Science	22%	6%
Data Analysis	22%	12%
Project Management	19%	23%
Agile Methodology	17%	10%
SQL (Programming Language)	17%	15%
Statistics	17%	2%
R (Programming Language)	17%	4%

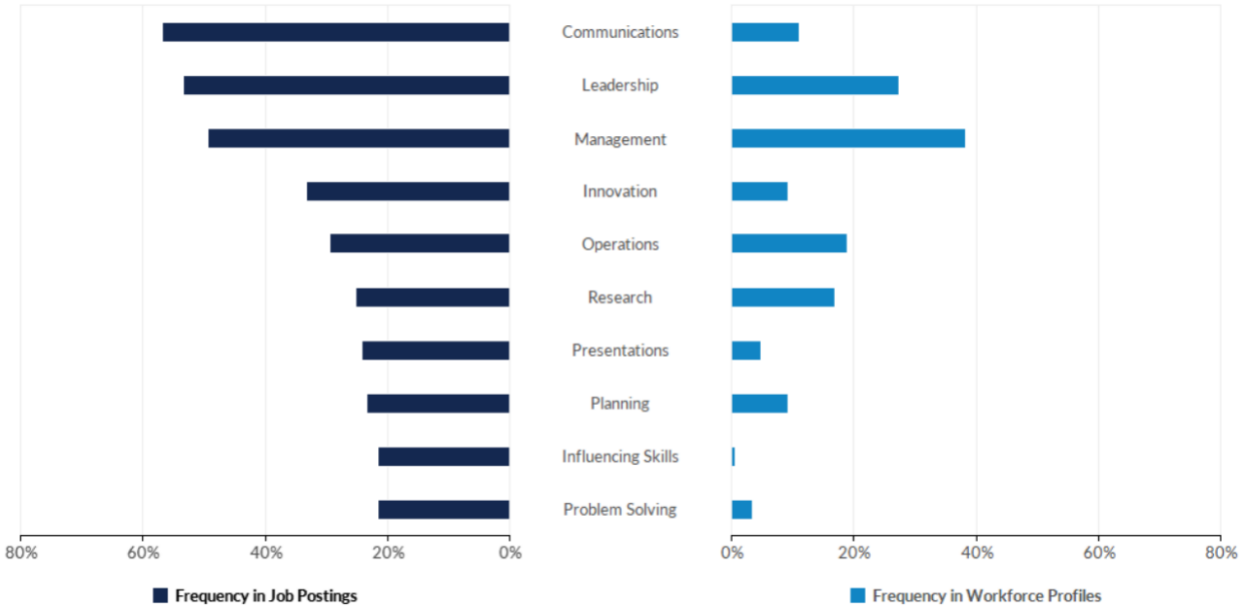
[38] The skills associated with workforce profiles represent workers of all education and experience levels, not just bachelor's-level employees

[39] Well-defined and specific skills that are often highly technical, subject-matter specific, or acquired through on-the-job training.

[40] Based on 154,703 unique job postings for the sampling of five data science-related occupations between July 2020 and June 2021. All job postings require a master's degree for applicants.

[41] Based on aggregated public résumés of United States employees with occupations in the sampling of five data science graduate occupations with updates résumés since 2019. Workforce profiles represent workers of all education and experience levels, not just master's-level employees.

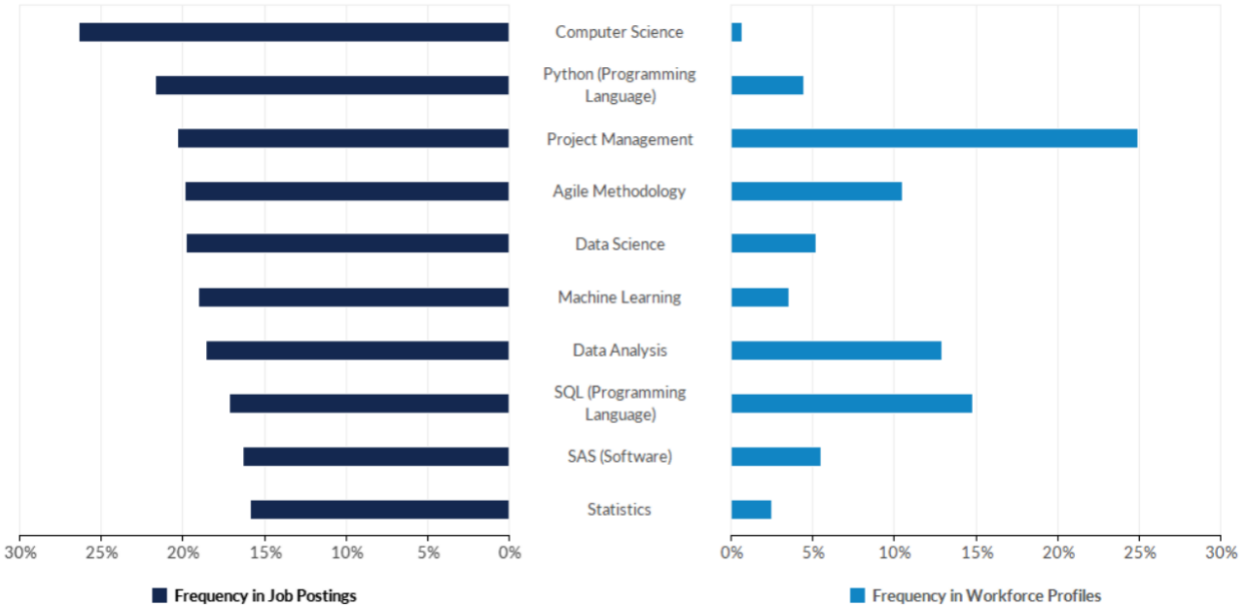
National Soft Skills[42] in Job Postings vs. Workforce Profiles



Skill	Frequency in Postings[43]	Frequency in Profiles[44]
Communications	57%	11%
Leadership	53%	27%
Management	49%	38%
Innovation	33%	9%
Operations	30%	19%
Research	25%	17%
Presentations	24%	5%
Planning	23%	9%
Influencing Skills	22%	1%
Problem Solving	21%	4%

[42] Typically broad competencies that include character traits, general cognitive or physical abilities, and interpersonal skills.
[43] Based on 154,703 unique job postings for the sampling of five data science-related occupations between July 2020 and June 2021. All job postings require a master's degree for applicants.
[44] Based on aggregated public résumés of United States employees with occupations in the sampling of five data science graduate occupations with updates résumés since 2019. Workforce profiles represent workers of all education and experience levels, not just master's-level employees.

North Carolina Hard Skills in Job Postings vs. Workforce Profiles

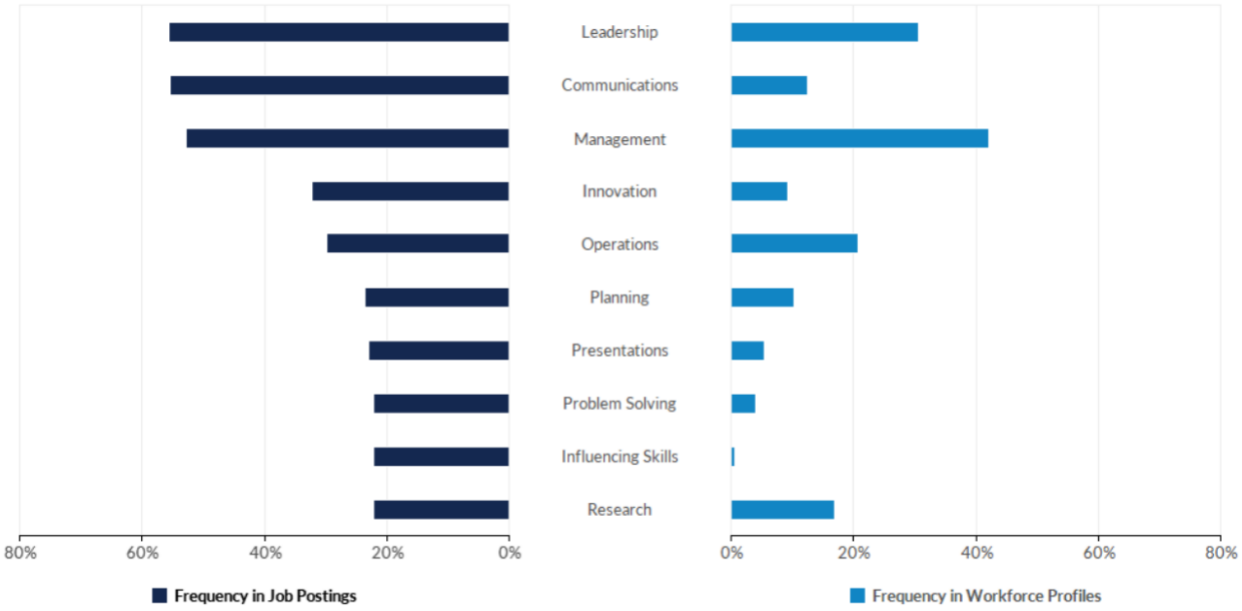


Skill	Frequency in Postings[45]	Frequency in Profiles[46]
Computer Science	26%	1%
Python (Programming Language)	22%	4%
Project Management	20%	25%
Agile Methodology	20%	10%
Data Science	20%	5%
Machine Learning	19%	4%
Data Analysis	19%	13%
SQL (Programming Language)	17%	15%
SAS (Software)	16%	6%
Statistics	16%	2%

[45] Based on 4,672 unique job postings for the sampling of five data science-related occupations between July 2020 and June 2021. All job postings require a master's degree for applicants.

[46] Based on aggregated public résumés of United States employees with occupations in the sampling of five data science graduate occupations with updates résumés since 2019. Workforce profiles represent workers of all education and experience levels, not just master's-level employees.

North Carolina Soft Skills in Job Postings vs. Workforce Profiles



Skill	Frequency in Postings[47]	Frequency in Profiles[48]
Leadership	56%	31%
Communications	55%	12%
Management	53%	42%
Innovation	32%	9%
Operations	30%	21%
Planning	24%	10%
Presentations	23%	6%
Problem Solving	22%	4%
Influencing Skills	22%	1%
Research	22%	17%

[47] Based on 4,672 unique job postings for the sampling of five data science-related occupations between July 2020 and June 2021. All job postings require a master's degree for applicants.

[48] Based on aggregated public résumés of United States employees with occupations in the sampling of five data science graduate occupations with updates résumés since 2019. Workforce profiles represent workers of all education and experience levels, not just master's-level employees.

APPENDICES

Appendix A: Background on Data

After conducting initial conversations with faculty and program administrators, the data in this preliminary market assessment comes from the following sources:

- National Center for Education Statistics Integrated Postsecondary Education Data System (IPEDS)
    - Enrollment data
    - Conferral data
- North Carolina Department of Commerce Labor and Economic Analysis (LEAD)
    - Economic data
    - Labor market data
    - Employment projections
    - Geographical data
- Bureau of Labor Statistics
    - Employment data
    - Wage data
    - Employment projections
    - Population projections
- Economic Modeling Specialists, Inc. (Emsi)
    - Occupational projections
    - Job postings data
    - Geographical data
- O*Net National Occupational Information
    - Occupation data
    - Skill attainment data
- North American Industry Classification System (NAICS)
    - Industry data

Appendix B: Student Demand Analysis Methodology

To compare data science programs, data is aggregated in two distinct ways:

- National level: Data is aggregated using the specific CIP code "11.0101: Computer and Information Sciences, General." [49] This is the specific CIP code used by the data science planning group in their program planning documents.[50]
- State level: Data is aggregated using three specific CIP codes:
    - 11.0101: Computer and Information Sciences, General
    - 11.0802: Data Modeling/Warehousing and Database Administration
    - 52.1399: Management Sciences and Quantitative Methods, Other

Three CIP codes are utilized at the state level due to the low number of completions (12) in North Carolina under CIP code 11.0101: Computer and Information Sciences, General. The two additional CIP codes provide a more comprehensive view of state-level competition and student demand. Additionally, these three CIP codes are all referenced in official program planning documentation as similar programs across the UNC System.

[49] The Classification of Instructional Programs (CIP) is developed by the U.S. Department of Education's National Center for Education Statistics (NCES). CIP codes are seen as industry standards to compare program enrollments and completions and are updated every 10 years in response to changing curriculum, emerging programmatic areas, and market demand.

[50] Note: Data science programs may be classified under a different CIP code, as institutions self-assign CIP codes. To best compare programs at the national level, CIP code 11.0101 is utilized. A new CIP code, "30.7001: Data Science, General" was added in 2020 to reflect the growth of data science programs. Completion data utilizing this new CIP code won't be available until late 2021. More info: https://nces.ed.gov/ipeds/cipcode/cipdetail.aspx?y=56&cipid=92953

Appendix C: Societal and Labor Market Demand Analysis Methodology

This section details the demand for employees who have earned a master's degree in data science in the workforce. Relevant information such as job postings, required skills, salaries, as well as emerging trends in the industry are studied. For comparison, data is aggregated using SOC codes.[51] Resources such as the CIP to SOC Crosswalk, conversations with program stakeholders, and industry-leading economic modeling data informed selection of the following SOC codes. These codes are most closely related to master's degree in data science labor market outcomes and provide a representative sample of the varied occupations for which someone with this academic credential may work:

- Computer and Information Systems Managers
    - Sample job titles: Data Processing Manager, IT Director, Information Systems Director
- Computer and Information Research Scientists
    - Sample job titles: Computer Scientist, Research Scientist, Scientific Programmer Analysts
- Database Administrators and Architects[52]
    - Sample job titles: Database Administration Manager, Data Officer, Database Analyst
- Statisticians
    - Sample job titles: Research Scientist, Statistical Analyst, Biostatistician
- Data Scientists and Mathematical Science Occupations, All Other[53]

These five occupations will be used throughout this analysis to provide a sampling outlook for master's degree recipients in data science in the workforce.

[51] Standard Occupational Classification (SOC) codes are a federal statistical standard developed by the Bureau of Labor Statistics for collecting, calculating, and disseminating data. All workers are classified into one of 773 occupations according to their occupational definition. The SOC codes were updated in 2018 to reflect the changing nature of the workforce. More info: https://www.bls.gov/soc/2018/major_groups.htm

[52] CIP codes "15-1141: Database Administrators" and "15-1243: Database Architects" are combined in the economic modeling software due to upcoming changes in the SOC code classifications. More info: https://kb.emsidata.com/faq/why-cant-i-find-the-soc-code-i-need/

[53] This is a combination of individual SOC codes which is utilized in the economic modeling software due to upcoming changes in the SOC code classifications. More info: https://kb.emsidata.com/faq/why-cant-i-find-the-soc-code-i-need/

Appendix D: Job Posting Data Methodology

Looking at real-time job posting data, there are three distinct ways in which the data can be organized. The hierarchy of job posting data fits the following format:

- Industry[54]
    - Occupation[55]
        - Job Title

In this hierarchy, occupations fit within industries and specific job titles fit within occupations. For this market analysis, Data science jobs are organized from most general (industry) to most specific (job title) for a better understanding of both the scope and granularity of available jobs in the workforce for a potential employee with a master's degree in data science.[56]

Note: The combined occupational classification used by economic modeling software, "Data Scientists and Mathematical Science Occupations, All Other," is not represented as a stand-alone occupation in the job posting data due to its role as a classification representative of multiple SOC codes.

[54] A group of businesses that produce similar goods and services and share similar production processes for creating the goods and services they sell. Classified using the North American Industry Classification System (NAICS) by the U.S. Census Bureau.

[55] Standard Occupational Classification (SOC) codes are a federal statistical standard developed by the Bureau of Labor Statistics for collecting, calculating, and disseminating data. All workers are classified into one of 773 occupations according to their occupational definition. The SOC codes were updated in 2018 to reflect the changing nature of the workforce. More info: https://www.bls.gov/soc/2018/major_groups.htm

[56] All job postings are full-time and require a master's degree for the applicant, providing the most likely fit for graduates of the data science program in these specific occupations while notably decreasing the number of total and unique job postings analyzed.

Appendix E: Intake Notes from Kickoff Meeting

DLL staff met with program stakeholders in July 2021 to better understand the purpose of developing this program and to ask questions to help guide and focus the creation of this market assessment. The following notes capture the high-level takeaways from the discussion:

- Rethinking this program from scratch, as first iteration was not online
    - What changes in the market due to the online nature of the program?
- Industries where program graduates may work
    - Healthcare
    - Banking
    - Pharmacy
    - Purely technology roles
- Competition
    - UC-Berkeley, Master of Data Science (MDS)
        - Aggressive marketing, 2U-supported program
    - Georgia Tech
    - UVA
    - NC State, although focus is different
    - UNC-Charlotte, PSM program, different program outcomes
- Program differentiation
    - More holistic perspective
        - Social sciences
        - Arts and humanities leaders as part of the degree
    - Healthcare (utilizing UNC Health)
- Potential feeder academic programs
    - Social science, economics, political science
- Still weighing PSM nomenclature as part of program
    - External identification vs. internal classification
- Tuition pricing as off-model, unsure of price differentiation strategies in-state vs. out-of-state or blanket pricing
- Difference between degree types
    - Master's in Computer Science
        - Rigorous degree, heavy math
        - Not experts in a particular industry
    - Master's in data science
        - Not as many computer science courses
        - Inherently works with the skills in data analysis coupled with the data for some specific industry
- Interested in skill attainment in program, skill gaps and in-demand skills in the workforce

EAB

DATA SNAPSHOT

Market Demand for a PhD in Data Science

Analysis of National Employer Demand

COE Forum

Grace Anderson
Market Research Manager

Table of Contents

1) Research Methodology 4
Project Challenge 4
Methodology and Definitions 4
Emsi Analyst and Alumni Insight™ 4
Project Sources 5
2) Executive Overview 6
3) Trends in Employer Demand 7
In-Demand Skills 8
Common Job Titles 10
High-Demand Employers 11
4) Degree Completion Trends 12

1) Research Methodology

Project Challenge

Leadership at the University of North Carolina-Charlotte approached the Forum to assess demand for a PhD program in data science. Through a combination of quantitative data analytics and secondary research, the Forum sought to assess the market demand for a data science PhD program.

EAB's market research function provides insights which guide strategic programmatic decisions at member institutions. The Forum combines qualitative and quantitative data to help administrators identify opportunities for new program development, assess job market trends, and align curriculum with employer and student demand.

EAB reports rely on labor market data from the Emsi Analyst and Alumni Insight tools (description below). Reports occasionally use data from the United States Census Bureau and United States Bureau of Labor Statistics data to explore occupation and job trends. Market research reports may also incorporate Integrated Postsecondary Education Data System (IPEDS) data to assess student enrollment, demographics, and completion rates across competitor programs.

Methodology and Definitions

Methodology: Unless stated otherwise, this report includes data from online job postings from March 2017 to February 2018. The Forum identified the top titles, skills, and employers for doctoral-level data science professionals.

To best estimate demand for graduates of a data science PhD program the Forum analyzed job postings in the "computer and information research scientist" occupation that require a doctoral degree and include the term "data science."

Definitions: Growth in job postings is measured in the total number of jobs posted each month over the last five years of data (i.e., this report includes historical data from March 2013 to February 2018).

Emsi Analyst™ and Emsi Alumni Insight™

EAB's Partner for Comprehensive Labor Market Data

This report includes data made available through EAB's partnership with Emsi (Economic Modeling Specialists International), a labor market analytics firm serving higher education, economic development, and industry leaders in the U.S., Canada and the United Kingdom.

Emsi curates and maintains the most comprehensive labor market data sets available for academic program planning, providing real-time job posting data, workforce and alumni outcomes data, and traditional government sources of data. Under this partnership, EAB may use Emsi's proprietary Analyst™ and Alumni Insight™ tools to answer member questions about employer demand, the competitive landscape, in-demand skills, postings versus actual hires, and skills gaps between job postings and professionals in the workforce. The Emsi tools also provide EAB with in-depth access to unsuppressed, zip-code-level government data for occupations, industries, programs, and demographics. For more complete descriptions of the Emsi tools, visit:

- http://www.economicmodeling.com/analyst/
- https://www.economicmodeling.com/alumni-insight/

To learn more about Emsi and its software and services, please contact Bob Hieronymus, Vice President of Business Development at bob.hieronymus@economicmodeling.com or (208) 883-3500.

Project Sources

The Forum consulted the following sources for this report:

- EAB's internal and online research libraries (eab.com)
- National Center for Education Statistics (NCES) (http://nces.ed.gov/)
- US Bureau of Labor Statistics (http://bls.gov)

2) Executive Overview

Increasing employer demand for doctoral-level data science professionals and projected employment growth in the "computer and information research scientist" occupation indicate opportunity for program development. Nationwide demand for doctoral-level data science professionals tripled in the last five years, from 550 job postings in March 2013 to 1,654 in February 2018. Demand reached a peak of 2,914 job postings in September 2017 then decreased across the rest of that year. Despite the recent decline, nationwide employment of "computer and information research scientists" is expected to grow 12.6 percent between 2017 and 2027. The Bureau of Labor Statistics (BLS) explains the faster-than-average projected growth in this occupation:

> "The Rapid growth in data collection by businesses will lead to an increased need for data-mining services. Computer scientists will be needed to write algorithms that help businesses make sense of very large amounts of data. With this information, businesses understand their consumers better, making the work of computer and information research scientists increasingly vital."[1]

The BLS also notes a growing national emphasis on cybersecurity will contribute to growing employment opportunities for computer and information research scientists.

Relevant completions rose 18 percent in the last five years, suggesting growing student interest in doctoral-level data science programs. Though the National Center for Education Statistics does not yet include a categorization to track completions in data science programs, doctoral-level completions in related fields increased over the last five years (e.g., computer science, statistics). Total completions in related fields rose from 1,193 in 2012 to 1,409 in 2016 (i.e., the most recent year of available data).

Employers seek doctoral-level data science professionals with management and leadership skills to supplement their technical and research skills. As expected, employers demonstrate significant demand for doctoral-level data science professionals with programming, software, mathematics, statistics, and data mining skills. In addition to these, employers frequently list 'leadership' and related skills as desirable in job postings (e.g., 'management,' 'decision making'). Ensure the PhD program offers graduates the chance to hone their leadership skills. The presence of director-level roles (e.g., 'director of research') among the most commonly posted job titles for doctoral-level data science professionals confirms the need for candidates with leadership and management skills.

1) Bureau of Labor Statistics Occupational Outlook Handbook: Computer and Information Research Scientists

3) Trends in Employer Demand

Increasing Employer Demand for Doctoral-Level Data Science Professionals and Projected Job Growth in Related Occupations Indicate Opportunity for Program Development

In the last five years, demand for doctoral-level data science professionals increased 200.7 percent, from 550 jobs posted in March 2013 to 1,654 posted in February 2018. Despite some fluctuation, the positive trend indicates growing demand for doctoral-level data science professionals. Demand reached a peak of 2,914 job postings in September 2017. Demand then decreased monthly with the exception of a rise in November 2017.

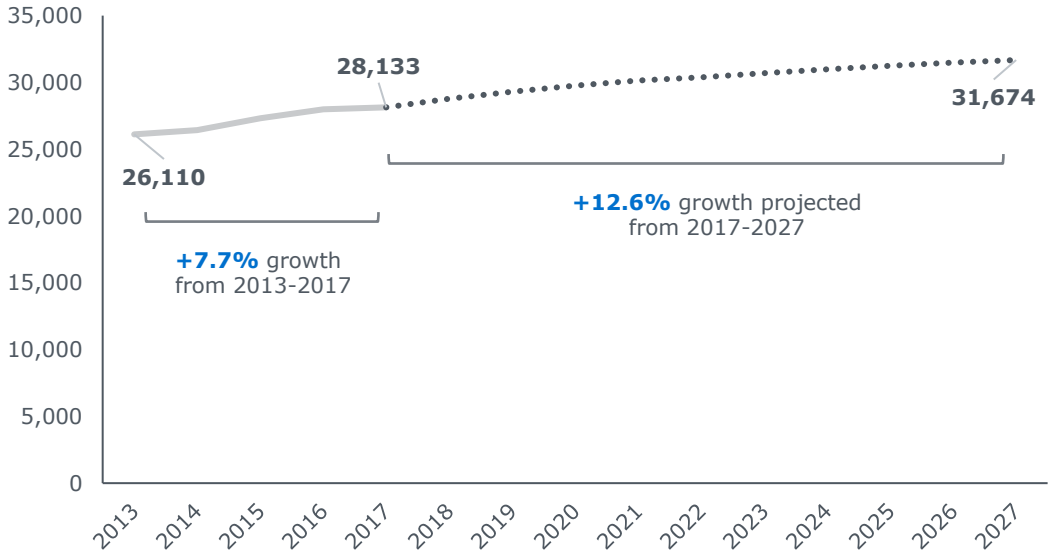
Historical Demand for Doctoral-Level Data Science Professionals

March 2013-February 2018, Nationwide Data[1]

Broader occupational data also indicates employment growth. Between 2013 and 2017 (i.e., the most recent year of available data), employment in the "computer and information research scientists" occupation, one of the occupations available to data science professionals, grew 7.7 percent, from 26,110 jobs in 2013 to 28,133 in 2017. Employment in this occupation is projected to grow a further 12.6 percent in the next 10 years (i.e., from 28,133 jobs in 2017 to 31,674 jobs in 2027).

Occupational Trends for Computer and Information Research Scientists

2013-2027, National Data[3]



Please note the data in this chart is jobs for computer and information research scientists at all education levels and is not limited to jobs related to data science. "Computer and information research scientists" is one of the occupations most commonly available to doctoral-level data science professionals.

2) Emsi Analyst™
3) Emsi Analyst™; Computer and Information Research Scientists is SOC occupation code 15-1111.

In Addition to Honing High-Demand Programming and Software Skills like Java and SAS, Help Data Science PhD Students Develop Leadership Skills to Meet Employer Demand

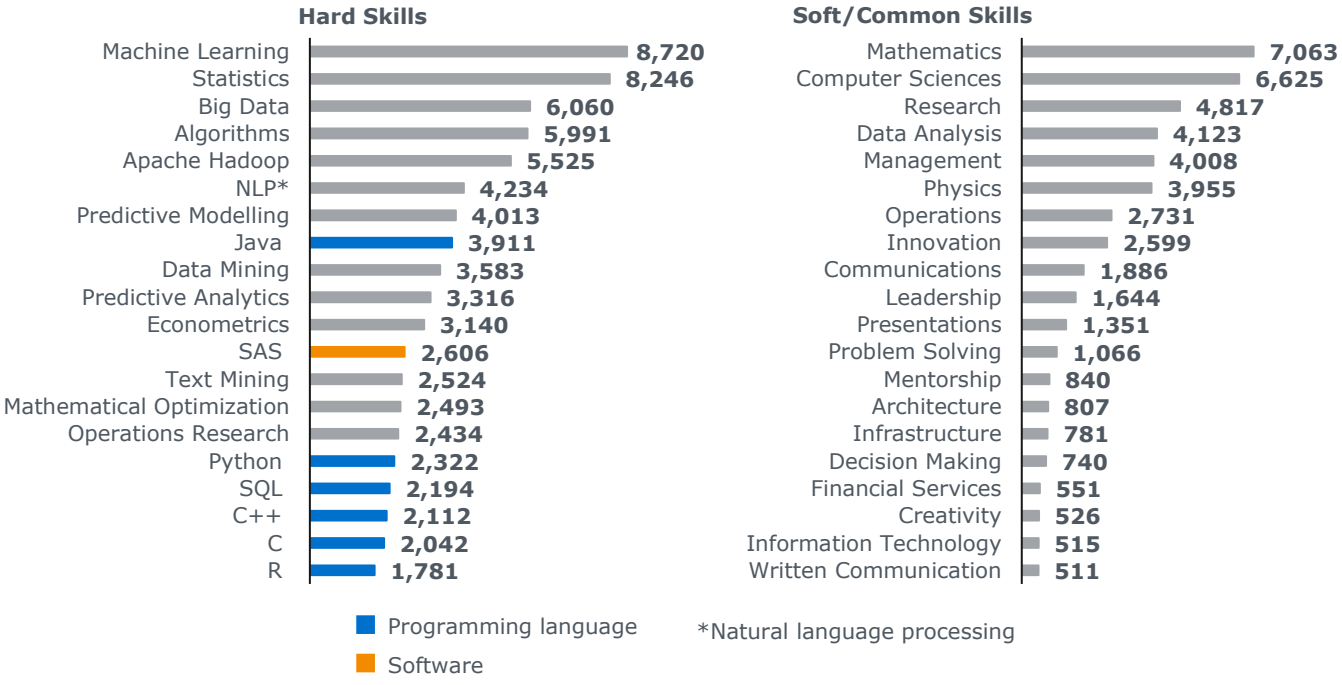
Of programming languages, employers seek doctoral-level data science professionals with 'Java' skills most often. 'Java' appears in 3,911 job postings for doctoral-level data science professionals in the last 12 months. Other in-demand programming languages include 'Python,' 'SQL,' and 'C++.' Employers also posted 2,606 jobs in the last 12 months seeking professionals proficient in 'SAS.' 'SAS' represents the only software skill to rank among the top 20 most commonly requested hard skills for doctoral-level data science professionals. As expected, employers also demonstrate significant demand for skills like 'statistics,' 'mathematics,' 'computer sciences,' and 'data mining.'

In addition to technical proficiency, employers frequently seek doctoral-level data science professionals with 'leadership' and related skills. Nationwide employers posted 4,008 jobs in the last 12 months for doctoral-level data science professionals with 'management' skills, making it the most commonly sought leadership skill. Other leadership-related skills in high demand include 'mentorship' and 'decision making.' In addition to research and technical training, ensure the PhD program at the **University of North Carolina-Charlotte** prepares students to take on leadership roles and responsibilities. Specifically, the program should help students hone their written and oral presentation skills: employers posted 1,351 relevant jobs seeking 'presentations' skills in the last year, and 511 seeking candidates with good 'written communication' skills.

Most Commonly Requested Skills Employers Seek in Doctoral-Level Data Science Professionals

March 2017-February 2018; Nationwide Data[4]

n=14,071 unique job postings



4) Emsi Analyst™

Doctoral-level data science professionals list 'Python' as a skill in their professional profiles most often. Programming languages 'SQL' and 'R' also rank among the top 10 skills listed in relevant professional profiles. However, professional profiles feature common skills 'data analysis' and 'research' more than any programming language or other skill except 'Python.'

A significant number of doctoral-level data science professionals list 'management' as a skill in their professional profiles: 'management' appears in 42 percent of analyzed profiles (i.e., 1,221 of 2,930 profiles). This frequency indicates doctoral-level data science professionals often choose to emphasize 'management' skills in their professional profiles. Administrators at the **University of North Carolina-Charlotte** should include leadership and management training in the PhD program to appeal to students hoping to gain or hone leadership and management skills.

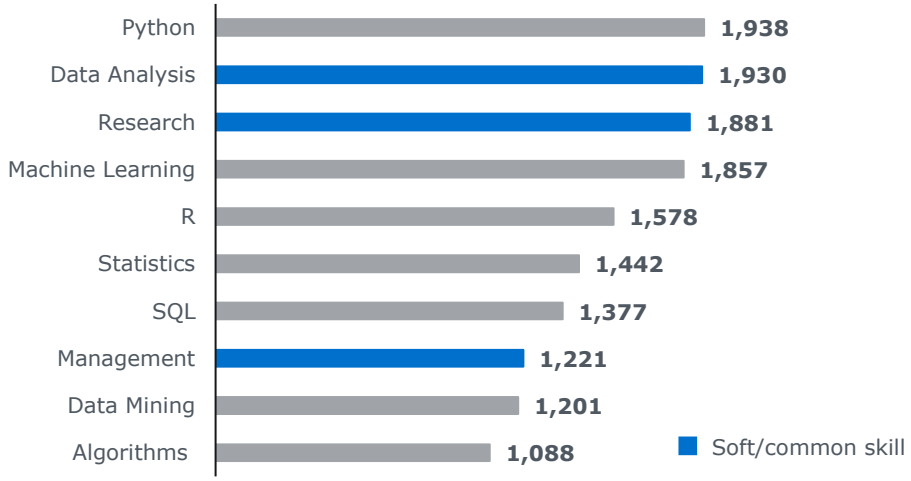
How Data Science Professionals Describe their Work

Data on this page comes from an analysis of professional profiles via Emsi's Alumni Insight™ tool. The tool consists of 110 million worker profiles representing a significant portion of the US working population. The profiles are derived from publicly-available professional and social media profiles, as well as CareerBuilder's proprietary resume database. The data is used to illuminate what's happening in today's workforce by showing the connections between people, education, and work.

Most Commonly Listed Skills in Professional Profiles of Doctoral-Level Data Science Professionals

2016-2018; Nationwide Data; Hard and Soft Skills[5]

n=2,930 professional profiles



5) Emsi Alumni Insight™

Common Job Titles

Employers Seek Data Science Professionals for Software Engineering and Research and Development Roles

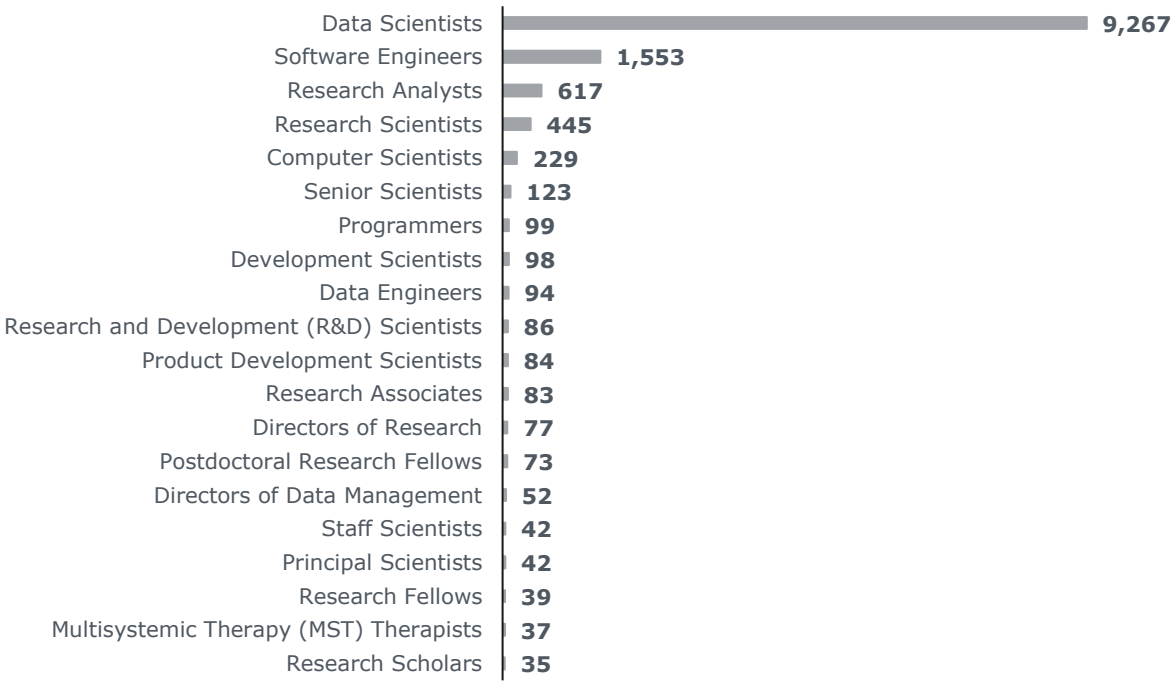
As expected, employers use the title 'data scientist' most often in job postings for doctoral-level data science professionals. Nationwide employers posted 9,267 'data scientist' jobs for doctoral-level data science professionals in the last 12 months, more than five times as many postings as appear with any other title. In addition to 'data scientist' roles, employers also often post jobs with research and engineering titles such as 'research analyst,' 'research scientist,' and 'data engineer.' In the last 12 months, employers posted 1,553 'software engineer' jobs seeking doctoral-level data science professionals, making it the second-most commonly posted job title.

The presence of director-level roles like 'director of research' and 'director of data management' among the most commonly posted job titles suggests administrators should include leadership training in the PhD program curriculum to prepare graduates for high-level management and leadership positions.

Most Commonly Posted Job Titles for Doctoral-Level Data Science Professionals

March 2017-February 2018; Nationwide Data[6]

n=14,071 unique job postings



6) Emsi Analyst™

High-Demand Employers

In the Past Year, Anthem Inc, Amazon, and Oracle Posted the Most Jobs for Doctoral-Level Data Science Professionals Nationwide

As expected, large technology companies like Amazon, Apple, Oracle, and Microsoft demonstrate significant demand for doctoral-level data science professionals. However, health insurance company Anthem Inc posted the most jobs for doctoral-level data science professionals in the last 12 months. Anthem Inc posted 2,610 relevant jobs, more than double the number of job postings from any other employer nationwide. Aetna Inc is the only other health care company to appear on the list of the top 20 employers with highest demand.

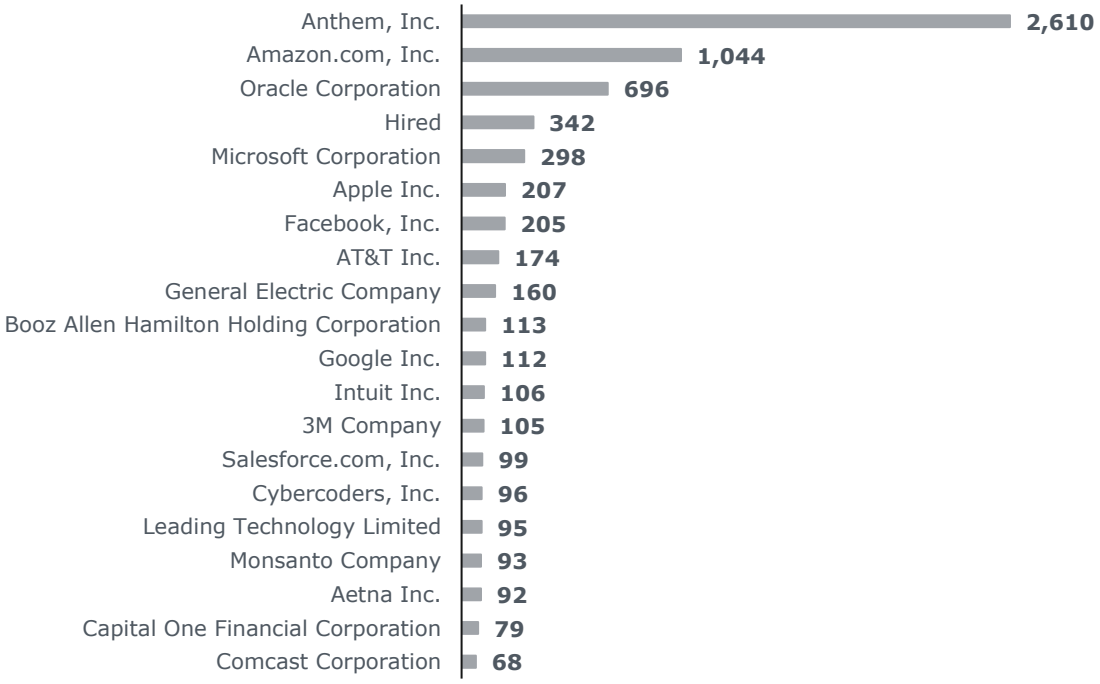
In addition to technology and health care companies, the following types of employers also demonstrate significant demand for doctoral-level data science professionals in the last year:

- Telecommunications companies AT&T Inc and the Comcast Corporation,
- Agriculture firm the Monsanto Company,
- Management consulting firm Booz Allen Hamilton, and
- Capital One Financial Corporation.

Employers with the Highest Demand for Doctoral-Level Data Science Professionals

March 2017-February 2018; Nationwide Data[7]

n=14,071 unique job postings



7) Emsi Analyst™

4) Degree Completion Trends

Rising Degree Completions in Programs Related to Data Science Indicate Growing Student Interest

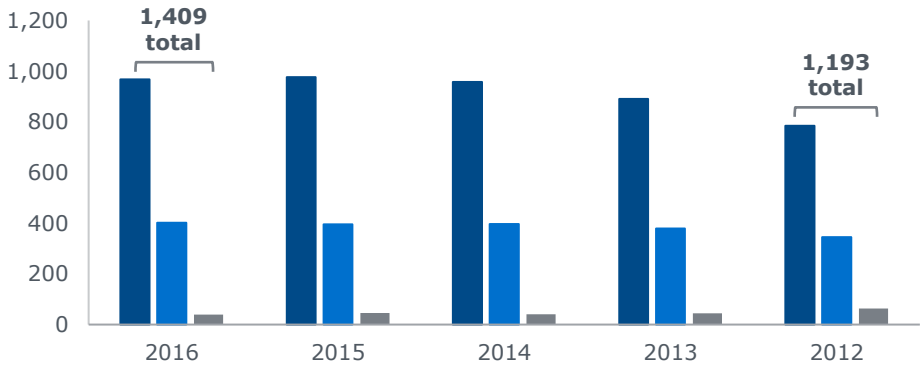
The National Center for Education Statistics' Classification of Instructional Programs (CIP) does not include a code for data science programs. To best estimate the total number of degrees completed nationally in data science-related programs, previous EAB research recommends analyzing degree completions for the following CIP codes: computer science, statistics, and management information systems and services.

In the last five years of available data, nationwide institutions report an 18 percent increase in doctoral-level degree completions related to data science (i.e., reported completions rose from 1,193 in 2012 to 1,409 in 2016). Of the programs related to data science, institutions report the highest completions in computer science.

Total completions rose steadily before peaking in 2015. From 2015 to 2016, total degree completions in doctoral-level programs related to data science decreased from 1,417 to 1,409.

Trends in Degree Completions for Data Science-Related Programs

National Data, Doctoral Level[8]



*This category includes the following CIP codes:

- 27.0501 – Statistics, General
- 27.0502 – Mathematical Statistics and Probability
- 27.0503 – Mathematics and Statistics
- 27.0599 – Statistics, Other

8) National Center for Education Statistics

Doug Hague <dhague@uncc.edu>

[EXTERNAL] Support for PhD in Data Science

1 message

Baker, Aditi (Data Science) <Aditi.Baker@thehartford.com> Mon, Nov 7, 2022 at 12:56 PM
To: Doug Hague <dhague@uncc.edu>

Dear Doug

As a supporter of the UNC Charlotte School of Data Science and its predecessor (the Data Science Initiative), we are very happy to see that the School is proposing to add a PhD to their degree options. We are supportive of this proposal as we see a large need for more doctoral level talent especially in fields like NLP, computer vision and graph learning.

Sincerely,

Aditi Baker

ADITI BAKER, FCAS
VP – Head of Data Science Enablement
Commercial Lines Data Science

The Hartford
Remote – New York

aditi.baker@thehartford.com

THE HARTFORD

Business Insurance
Employee Benefits
Auto
Home

Letter of Support for UNC Charlotte PhD

in Data Science

To: Dr. Douglas Hague, Executive Director of the UNC Charlotte School of Data Science
From: Madlen Ivanova
Subject: Support for PhD in Data Science
Date: November 7, 2022

As a longtime supporter of the UNC Charlotte School of Data Science and its predecessor (the Data Science Initiative, we are very happy to see that the School is proposing to add a PhD to their degree options. We are supportive of this proposal as we see a large need for more doctoral level talent in our organization as well as in the larger industry.

Sincerely,

Madlen Ivanova

Madlen Ivanova

Principal data scientist at Lowe's Companies Inc.

PREMIER TRANSFORMING HEALTHCARE TOGETHER®

October 28th, 2022

Dr. Douglas Hague
Executive Director and Professor of Practice
The University of North Carolina at Charlotte
School of Data Science
9201 University City Blvd.
Charlotte, NC 28223

Dear Dr. Douglas Hauge:

Please accept this letter of support for the proposed PhD degree program within the School of Data Science at The University of North Carolina at Charlotte. Premier, Inc. is a Charlotte based company representing over 4,400 U.S. hospitals and health systems and over 225,000 alternative provider organizations. To support the analytics needs of our member hospitals, Premier employs over 100 Data Scientists, Statisticians, Applied Researchers, and Data Analysts. Many of these positions require an advanced technical degree at the MS or PhD level. We are supportive of the PhD program being considered at UNC Charlotte and the educational and technical benefits that it would offer our employees in our pursuit of our mission to reduce cost and improve quality of the care in the U.S. Health System.

With best regards,

Michael Korvink, MA
Principal Data Scientist
ITS Data Science
Premier, Inc. (PINC)
13034 Ballantyne Corporate Place
Charlotte, NC, 28277
USA
michael_korvink@premierinc.com
Phone: (704) 771-4601

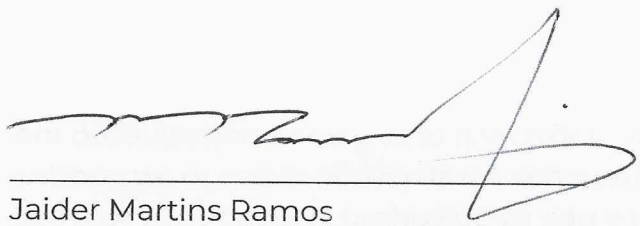
Qintess.

Innovation obsessed

To: Dr. Douglas Hague, Executive Director of the UNC Charlotte School of Data Science
From: Jaider Martins Ramos
Subject: Support for PhD in Data Science
Date: November 2, 2022

As a supporter of the UNC Charlotte School of Data Science, we are very happy to see that the School is proposing to add a PhD to their degree options. We are supportive of this proposal as we see a large need for more doctoral level talent in our organization as well as in the larger industry.

Sincerely,



Jaider Martins Ramos
Managing Director for Americas
QINTESS

9319 Robert D. Snyder Road, Suite 404
Charlotte, NC 28223

Request for Preliminary Authorization Review Comments Summary: University of North Carolina at Charlotte – Doctor of Philosophy in Data Science (11.0701)

Number of Programs Responding: 3

Please see below for specific statements and concerns.

Mission Alignment

Reviewer 1 *Acceptable.*

Reviewer 2 *Acceptable.*

Reviewer 3 *Acceptable.*

Student Demand

Reviewer 1 *Acceptable with some considerations.* Seems reasonable but more data regarding size and growth patterns from similar doctoral programs around the country would be helpful.

Reviewer 2 *Acceptable.*

Reviewer 3 *Acceptable.* There is no doubt of such a need from a student. The proposed enrollment projections seem reasonable.

Societal Demand

Reviewer 1 ***No response provided.***

Reviewer 2 *Acceptable.*

Reviewer 3 *Acceptable.* With AI technology and its open-source tools, industries have been employing data science a lot more than ever.

Relationship to Other Programs

Reviewer 1 ***No response provided.***

Reviewer 2 *Acceptable with some considerations.* The narrative completely missed that East Carolina University has a master's in data science and has had this program for at least 5 years. While no one has a PhD yet, there are ample master's level programs and that should be a good draw for students for a PhD program. However, completely missing a program is concerning.

Reviewer 3 *Acceptable.* Data science is an interdisciplinary subject of computer science, information management, and statistics. It is new and there are no duplicate programs in NC.

Collaborative Opportunities

Reviewer 1 ***No response provided.***

Reviewer 2 *Acceptable with some considerations.* This area is ripe for collaborations, and we hope that the program encourages collaboration with all the UNC institutions that could be feeding this PhD program with prospective students.

Reviewer 3 *Acceptable.* It has intensive collaboration opportunities with other universities and industries.

Program Requirements and Curriculum

Reviewer 1 ***No response provided.***

Reviewer 2 *Acceptable.*

Reviewer 3 *Acceptable.* The curriculum is well designed.

Faculty Sufficiency and Student Support

Reviewer 1 ***No response provided.***

Reviewer 2 *Acceptable.*

Reviewer 3 *Acceptable.* The School of Data Science will have plenty of faculty from the existing colleges and departments.

Admin & Instructional, Library, Research Facilities

Reviewer 1 ***No response provided.***

Reviewer 2 *Acceptable.*

Reviewer 3 *Acceptable.* UNCC has a strong base in supporting faculty research in the field of data science and its related areas; the university has been supporting such research with plenty of facilities.

Budget

Reviewer 1 ***No response provided.***

Reviewer 2 *Acceptable.*

Reviewer 3 *Acceptable.* The budget plan seems fair to establish the proposed program.

genpact

To: Dr. Douglas Hague, Executive Director of the UNC Charlotte School of Data Science

From: Amaresh Tripathy

Subject: Support for PhD in Data Science

Date: November 22, 2022

As a long-time supporter of the UNC Charlotte School of Data Science and its predecessor (the Data Science Initiative, we are very happy to see that the School is proposing to add a PhD to their degree options. We are supportive of this proposal as we see a large need for more doctoral level talent in our organization as well as in the larger industry.

Sincerely,

Amaresh Tripathy

Senior Vice President

Doug Hague <dhague@uncc.edu>

[EXTERNAL] Support for PhD in Data Science

1 message

Baker, Aditi (Data Science) <Aditi.Baker@thehartford.com> Mon, Nov 7, 2022 at 12:56 PM
To: Doug Hague <dhague@uncc.edu>

Dear Doug

As a supporter of the UNC Charlotte School of Data Science and its predecessor (the Data Science Initiative), we are very happy to see that the School is proposing to add a PhD to their degree options. We are supportive of this proposal as we see a large need for more doctoral level talent especially in fields like NLP, computer vision and graph learning.

Sincerely,

Aditi Baker

ADITI BAKER, FCAS
VP – Head of Data Science Enablement
Commercial Lines Data Science

The Hartford
Remote – New York

aditi.baker@thehartford.com

THE HARTFORD

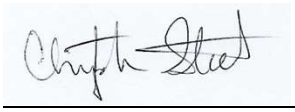
Business Insurance
Employee Benefits
Auto
Home

To: Dr. Douglas Hague, Executive Director of the UNC Charlotte School of Data Science
From: Christopher Steel
Subject: Support for PhD in Data Science
Date: November 22, 2022

As a longtime supporter of the UNC Charlotte School of Data Science and its predecessor (the Data Science Initiative, we are very happy to see that the School is proposing to add a PhD to their degree options. IQVIA is very supportive of this proposal as we see a large need for more doctoral level talent in our organization as well as in the larger industry.

We typically require doctoral level experience for our research positions and prefer to draw from local universities when possible. IQVIA recruits for many types of positions at UNC Charlotte currently, and we would interested in recruiting for more of our advanced data science roles if UNC Charlotte were to add a data science doctoral program.

Sincerely,



Christopher Steel

IQVIA Senior Director - AI

Letter of Support for UNC Charlotte PhD

in Data Science

To: Dr. Douglas Hague, Executive Director of the UNC Charlotte School of Data Science
From: Madlen Ivanova
Subject: Support for PhD in Data Science
Date: November 7, 2022

As a longtime supporter of the UNC Charlotte School of Data Science and its predecessor (the Data Science Initiative, we are very happy to see that the School is proposing to add a PhD to their degree options. We are supportive of this proposal as we see a large need for more doctoral level talent in our organization as well as in the larger industry.

Sincerely,

Madlen Ivanova

Madlen Ivanova

Principal data scientist at Lowe's Companies Inc.

PREMIER TRANSFORMING HEALTHCARE TOGETHER®

October 28th, 2022

Dr. Douglas Hague
Executive Director and Professor of Practice
The University of North Carolina at Charlotte
School of Data Science
9201 University City Blvd.
Charlotte, NC 28223

Dear Dr. Douglas Hauge:

Please accept this letter of support for the proposed PhD degree program within the School of Data Science at The University of North Carolina at Charlotte. Premier, Inc. is a Charlotte based company representing over 4,400 U.S. hospitals and health systems and over 225,000 alternative provider organizations. To support the analytics needs of our member hospitals, Premier employs over 100 Data Scientists, Statisticians, Applied Researchers, and Data Analysts. Many of these positions require an advanced technical degree at the MS or PhD level. We are supportive of the PhD program being considered at UNC Charlotte and the educational and technical benefits that it would offer our employees in our pursuit of our mission to reduce cost and improve quality of the care in the U.S. Health System.

With best regards,

Michael Korvink, MA
Principal Data Scientist
ITS Data Science
Premier, Inc. (PINC)
13034 Ballantyne Corporate Place
Charlotte, NC, 28277
USA
michael_korvink@premierinc.com
Phone: (704) 771-4601

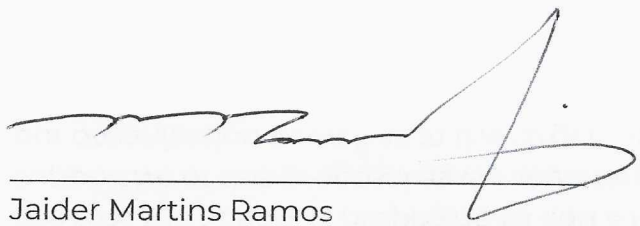
Qintess.

Innovation obsessed

To: Dr. Douglas Hague, Executive Director of the UNC Charlotte School of Data Science
From: Jaider Martins Ramos
Subject: Support for PhD in Data Science
Date: November 2, 2022

As a supporter of the UNC Charlotte School of Data Science, we are very happy to see that the School is proposing to add a PhD to their degree options. We are supportive of this proposal as we see a large need for more doctoral level talent in our organization as well as in the larger industry.

Sincerely,



Jaider Martins Ramos
Managing Director for Americas
QINTESS

9319 Robert D. Snyder Road, Suite 404
Charlotte, NC 28223

Agus Sudjianto
Head of Corporate Model Risk
401 South Tryon Street
Charlotte, NC 28202
Work: (704) 715-9052
Cell: (704) 617-0081
Agus.Sudjianto@wellsfargo.com

9/05/2023

Dear Dr. Hague:

As a longtime supporter of the UNC Charlotte School of Data Science and its predecessor (the Data Science Initiative), we are very happy to see that the school is proposing to add a PhD to their degree options. We are supportive of this proposal as we see a large need for more doctoral level talent in our organization as well as in the larger industry.

Sincerely,

Agus Sudjianto
Executive Vice President
Head of Corporate Model Risk, Wells Fargo NA

To: Dr. Douglas Hague, Executive Director of the UNC Charlotte School of Data Science
From: Tom Fisher, Managing Director of Four Doors Down Investment & Advisory Services
Subject: Support for PhD in Data Science
Date: November 11, 2022

I have been a longtime supporter of UNC Charlotte's School of Data Science, its predecessor and the incubation of Informatics. The school has come a long way and thanks to Doug's leadership we have a clear vision of what success will look like – the addition of a PhD to the degree options is an enormous step forward. The doctoral level degree talent will bring a new skill set to the Charlotte community as well as demonstrate UNC Charlotte's leadership in North Carolina and beyond.

In a world forever reliant on data and business analytic outcomes that are critical to the survival of corporate America. Programs, products, business verticals such as financial technology, healthcare, manufacturing and a whole host of other business verticals will enable UNC Charlotte's program to deliver a new dimension in higher education greatly needed in all of these industries.

Please accept my support for this PhD in Data Science by a graduate who has gone on to lead and manage these skills and my appreciation for UNC Charlotte to be at the forefront with programs like this.

Sincerely,

Tom Fisher

Managing Director, Four Doors Down Advisory Services

Faculty Roster
Qualifications of Full-Time and Part-Time Faculty

Name of Institution: __University of North Carolina at Charlotte_

Name of Primary Department, Academic Program, or Discipline: ____School of Data Science, PhD in Data Science_____

Academic Term(s) Included: __Fall 2022, Spring 2023_____ **Date Form Completed: Sept 13, 2023**

1	2	3	4
NAME (F, P)	**COURSES TAUGHT** **Including Term, Course Number & Title, Credit Hours (D, UN, UT, G) [Dual]** Note – for substantive change prospectuses/applications, list the courses *to be taught*, not historical teaching assignments	**ACADEMIC DEGREES & COURSEWORK** **Relevant to Courses Taught, Including Institution & Major** **List specific graduate coursework, if needed**	**OTHER QUALIFICATIONS & COMMENTS** **Related to Courses Taught**
Yaorong Ge, Professor of Software and Information Systems (F)	DSBA/HCIP 6160 Big Data Design [3]; Spring 2019 HCIP 6393 Hlth Data Integration [3]; Fall 2020, Fall 2021, Fall 2022 HCIP 6392 Enterprise Hlth Info Systems [3]; Spring 2021, Spring 2022 ITIS 8180 Foundations of Hlth Informatics [3]; Spring 2019	Ph.D., Vanderbilt University, Computer Science, 1995 M.S., Vanderbilt University, Computer Science, 1989 B.S., Zhejiang University, Computer Science, 1984	**Research Focus:** Application of data science and artificial intelligence methods to health and healthcare. **External Research Funding [Career Total]:** $5 Million **Publications:** 64 peer reviewed journals 43 peer reviewed conference publications 2 book chapters **Mentorship:** 26 PhD dissertation committees [chaired 10] 4 Master's thesis committees chaired >10 Undergraduate Research Mentor
SungJune Park, Professor of Business Information Systems and Operations Management (F)	DSBA 6201 Busn Intelligence & Analytics [3]; Spring 2019, Spring 2020, Fall 2020, Fall 2021, Fall 2022 BDBA 8240 Focused Research Seminar [3]; Spring 2019, Spring 2020, Spring 2021, Spring 2022 BDBA 8120 Professional Issues I [3]; Fall 2020, Fall 2021, Fall 2022 DSBA 6100 Big Data Analytics for Comp Adv [3]; Spring 2021 BDBA 8100 Intro to Experiment Design & Meas [3]; Fall 2022	Ph.D., State University of New York-Buffalo, Business Management, 2002 M.S., Korea Advanced Institute of Science and Technology, Management Science, 1994 B.S., Korea Advanced Institute of Science and Technology, Management Science, 1992	**Research Focus:** Applying data science techniques to business analytics, cybersecurity and supply chain risk management. **External Research Funding [Career Total]:** $0 **Publications:** 16 peer reviewed journals 19 peer reviewed conference publications 3 book chapters **Mentorship:** 16 PhD dissertation committees [chaired 2] 1 Undergraduate Research Mentor

Abbreviations: F, P: Full-time or Part-time; D, UN, UT, G: Developmental, Undergraduate Nontransferable, Undergraduate Transferable, Graduate; Dual: High School Dual Enrollment Course

1	2	3	4
NAME (F, P)	**COURSES TAUGHT** **Including Term, Course Number & Title, Credit Hours (D, UN, UT, G) [Dual]** Note – for substantive change prospectuses/applications, list the courses *to be taught*, not historical teaching assignments	**ACADEMIC DEGREES & COURSEWORK** **Relevant to Courses Taught, Including Institution & Major** **List specific graduate coursework, if needed**	**OTHER QUALIFICATIONS & COMMENTS** **Related to Courses Taught**
Dongsong Zhang Distinguished Professor of Business Information Systems and Operations Management (F)	DSBA 6100 Big Data Analytics for Comp Adv [3]; Fall 2019, Fall 2020, Fall 2021 BDBA 8130 Intro to Business Theory [3]; Spring 2020, Spring 2021, Spring 2022 BDBA 8230 Research Methods 2 [3]; Spring 2020, Spring 2021, Spring 2022	Ph.D., University of Arizona, Management Systems, 2002 M.S., Chinese Academy of Sciences, Artificial Intelligence, 1995 B.S., Peking University, Electrical and Computer Engineering, 1990	**Research Focus:** Text mining, social media analytics, misinformation/deception detection, mobile computing, health IT. **External Research Funding [Career Total]:** $4 Million **Publications:** 84 peer reviewed journals 86 peer reviewed conference publications 5 book chapters **Mentorship:** 25 PhD dissertation committees [chaired 10] 6 Master's thesis committees chaired 3 Undergraduate Research Mentor
Wenwen Dou, Associate Professor of Computer Science (F)	DSBA/HCIP 5122 Visual Analytics [3]; Spring 2019, Fall 2019, Spring 2020, Fall 2020, Spring 2021, Fall 2021, Spring 2022, Fall 2022, Spring 2023	Ph.D., University of North Carolina at Charlotte, Computer and Information Systems, 2012 B.S.E., Beijing University of Posts and Telecommunications, Engineering, 2006	**Research Focus:** Data visualization, visual analytics, text analytics, cognitive bias, misinformation, explainable AI. **External Research Funding [Career Total]:** $2.5 Million **Publications:** 10 peer reviewed journals 30 peer reviewed conference publications 1 book chapters **Mentorship:** 16 PhD dissertation committees [chaired 4] 2 Master's thesis committees chaired

1	2	3	4
NAME (F, P)	**COURSES TAUGHT** **Including Term, Course Number & Title, Credit Hours (D, UN, UT, G) [Dual]** Note – for substantive change prospectuses/applications, list the courses *to be taught*, not historical teaching assignments	**ACADEMIC DEGREES & COURSEWORK** **Relevant to Courses Taught, Including Institution & Major** **List specific graduate coursework, if needed**	**OTHER QUALIFICATIONS & COMMENTS** **Related to Courses Taught**
Liyue Fan, Assistant Professor of Computer Science (F)	DSBA/HCIP 6160 Big Data Design [3]; Fall 2019, Spring 2020, Fall 2020, Spring 2021, Fall 2021 DSBA/ITSC 6010/8010 Special Topics: Data Privacy [3]; Fall 2021 ITIS 6220/8220 Data Privacy [3]; Fall 2021 DSBA/HCIP 6160 Database Systems [3]; Fall 2022 ITCS 6160/8160 Database Systems [3]; Fall 2022	Ph.D., Emory University, Computer Science and Informatics, 2014 B.S., Zhejiang University, Mathematics & Applied Mathematics, 2008	**Research Focus:** Data privacy, geospatial and health informatics **External Research Funding [Career Total]:** $1.6 Million **Publications:** 8 peer reviewed journals 36 peer reviewed conference publications 2 book chapters published 1 editor/co-editor **Mentorship:** 2 PhD dissertation committees [chaired 1] 14 Undergraduate Research Mentor
Michael Grabchak, Associate Professor of Statistics (F)	MATH 7120/8120 Probability Theory 1 [3]; Spring 2019, Spring 2020, Spring 2021, Spring 2022, Spring 2023	Ph.D., Cornell University, Statistics, 2011 M.S., Cornell University, Statistics, 2008 B.A., Rutgers University, Computer Science and Mathematics, 2004	**Research Focus:** Probability and statistics which form the theoretical foundation for data science. **External Research Funding [Career Total]:** $0 **Publications:** 40 peer reviewed journals 4 peer reviewed conference publications 1 published book **Mentorship:** 14 PhD dissertation committees [chaired 4; including 2 in progress] 10 Undergraduate Research Mentor

Abbreviations: F, P: Full-time or Part-time; D, UN, UT, G: Developmental, Undergraduate Nontransferable, Undergraduate Transferable, Graduate; Dual: High School Dual Enrollment Course

1	2	3	4
NAME (F, P)	**COURSES TAUGHT** **Including Term, Course Number & Title, Credit Hours (D, UN, UT, G) [Dual]** Note – for substantive change prospectuses/applications, list the courses *to be taught*, not historical teaching assignments	**ACADEMIC DEGREES & COURSEWORK** **Relevant to Courses Taught, Including Institution & Major** **List specific graduate coursework, if needed**	**OTHER QUALIFICATIONS & COMMENTS** **Related to Courses Taught**
Justin Grandinetti, Assistant Professor of Communication Studies (F)	COMM 6100 Comm Research Methods [3]; Spring 2020, Spring 2021 COMM 6011 Topics in Comm Rsrch Methods [3]; Fall 2022	Ph.D., North Carolina State University, Communication, Rhetoric and Digital Media, 2019 M.A., James Madison University, Writing Rhetoric and Technical Communication, 2015 B.S., James Madison University, Writing Rhetoric and Technical Communication, 2013	**Research Focus:** Social and ethical implications of data-driven processes that are a part of everyday life, e.g. mobile media, streaming media and big data/AI. **External Research Funding [Career Total]:** $0 **Publications:** 11 peer reviewed journals 1 peer reviewed conference publications 3 book chapters **Mentorship:** 17 Master's thesis committees [chaired 1]
Laura Gunn, Associate Professor of Public Health Sciences (F)	HCIP 6102 Healthcare Data Analytics [3]; Spring 2019, Fall 2022 HCIP 6250 Problem Solving Health Analytics [3]; Spring 2019, Fall 2019, Spring 2020, Fall 2020, Spring 2021, Fall 2021, Spring 2023 HCIP 5376 Intro to Prgrmg for Hlth Info [3]; Spring 2022	Ph.D., Duke University, Statistical Science, 2004 M.S., Duke University, Statistical Science, 2001 B.A., Jacksonville University, Mathematics, 1999	**Research Focus:** Public health and healthcare centered on big data/analytics, particularly on prevention of chronic diseases and adverse outcomes. Applied biostatistical research focus. **External Research Funding [Career Total]:** >$14 Million **Publications:** 88 peer reviewed journals 102 peer reviewed conference publications 2 book chapters **Mentorship:** 8 PhD dissertation committees [chaired 5] 25 Master's thesis committees chaired 39 Undergraduate Research Mentor

1	2	3	4
NAME (F, P)	**COURSES TAUGHT** **Including Term, Course Number & Title, Credit Hours (D, UN, UT, G) [Dual]** Note – for substantive change prospectuses/applications, list the courses *to be taught*, not historical teaching assignments	**ACADEMIC DEGREES & COURSEWORK** **Relevant to Courses Taught, Including Institution & Major** **List specific graduate coursework, if needed**	**OTHER QUALIFICATIONS & COMMENTS** **Related to Courses Taught**
Yuqi Guo, Assistant Professor of Social Work (F)	SOWK 6141 Foundations of Social Work [3]; Fall 2021 MALS 6101 The Liberal Arts Tradition [3]; Spring 2022 SOWK 6232 Practice & Program Evaluation [3]; Spring 2022	Ph.D., University of Alabama, Social Work, 2019 M.S.W., University of Alabama, Social Work, 2014 B.A., East China University of Science and Technology, Law, 2012	**Research Focus:** Data science research of health disparities, cancer prevention, and community health particularly around health equity **External Research Funding [Career Total]:** $40,000 **Publications:** 42 peer reviewed journals 5 peer reviewed conference publications 1 book chapters 1 editor/co-editor **Mentorship:** 4 Undergraduate Research Mentor
Mirsad Hadzikadic, Professor of Software and Information Systems, Director of the Complex Systems Institute (F)	DSBA 6010 Special Topics: Analytical Storytelling [3]; Fall 2019 DSBA 6010/PPOL 8000 Topics: Complex Systems in Public Policy [3]; Spring 2021, Spring 2022 DSBA 6156 Applied Machine Learning [3]; Spring 2020, Fall 2021 ITIS 6500/8500 Complex Adaptive Systems [3];Spring 2019 DSBA/ITIS 6500/ITIS 8500 Complex Adaptive Systems [3]; Spring 2020, Spring 2021, Spring 2022, Spring 2023 DSBA 6520/ITSC 8520 Network Science [3]; Fall 2019, Fall 2020	Ph.D., Southern Methodist University, Computer Science, 1987 M.P.A., Harvard University, Political Science and Government, 2009 M.A., University of Banja Luka, Computer Science, 1981 B.S., University of Banja Luka, Computer Science, 1977	**Research Focus:** Machine learning, complex adaptive systems, network science, artificial intelligence. **External Research Funding [Career Total]:** $7.5 Million **Publications:** 23 peer reviewed journals 53 peer reviewed conference publications 12 book chapters 4 editor/co-editor volumes **Mentorship:** 32 PhD dissertation committees [chaired 22] 3 Master's thesis committees chaired

1	2	3	4
NAME (F, P)	**COURSES TAUGHT** **Including Term, Course Number & Title, Credit Hours (D, UN, UT, G) [Dual]** Note – for substantive change prospectuses/applications, list the courses *to be taught*, not historical teaching assignments	**ACADEMIC DEGREES & COURSEWORK** **Relevant to Courses Taught, Including Institution & Major** **List specific graduate coursework, if needed**	**OTHER QUALIFICATIONS & COMMENTS** **Related to Courses Taught**
Gordon Hull, Professor of Philosophy (F) Director, Center for Professional and Applied Ethics	PPOL 8635 Ethics of Public Policy [3]; Fall 2020, Fall 2022	Ph.D., Vanderbilt University, Philosophy, 2000 M.A., Vanderbilt University, Philosophy 1999 B.A. Wake Forest University, Philosophy, 1994	**Research Focus:** Ethics and technology, especially privacy, intellectual property, data ethics, AI ethics, and contemporary political theory **External Research Funding [Career Total]:** $1.1 Million **Publications:** 27 peer reviewed journals 47 peer reviewed conference publications 2 published books 7 book chapters **Mentorship:** 4 PhD dissertation committees 1 Master's thesis committee chair
Donald Jacobs, Professor of Physics (F)	OPTI 6611/8611 Graduate Colloquium [1]; Spring 2020 OPTI 8000 Selected Topics in Optics: Quantum Computing [3]; Fall 2022 NANO 8060 Special Topics in Nano Science: Physics [3]; Spring 2019	Ph.D., Purdue University-West Lafayette, Physics, 1992 M.S., Purdue University, Physics, 1991 B.S., Union College, Physics, 1985 A.S., Fulton-Montgomery Community College, Engineering Science, 1983	**Research Focus:** Computational/ statistical physics as applied to complex systems to predict and control their emergent properties. **External Research Funding [Career Total]:** >$6 Million **Publications:** 88 peer reviewed journals 1 peer reviewed conference publications 7 book chapters **Mentorship:** 34 PhD dissertation committees [chaired 13] 32 Master's thesis committee chair 26 Undergraduate Research Mentor

1	2	3	4
NAME (F, P)	**COURSES TAUGHT** **Including Term, Course Number & Title, Credit Hours (D, UN, UT, G) [Dual]** Note – for substantive change prospectuses/applications, list the courses *to be taught*, not historical teaching assignments	**ACADEMIC DEGREES & COURSEWORK** **Relevant to Courses Taught, Including Institution & Major** **List specific graduate coursework, if needed**	**OTHER QUALIFICATIONS & COMMENTS** **Related to Courses Taught**
Jiancheng Jiang, Professor of Statistics (F)	DSBA 6115 Stat Learning with Big Data [3]; Fall 2021, Fall 2022 STAT 8133 Multivariate Analysis [3]; Spring 2020, Spring 2023 STAT 8135 Statistical Computation [3]; Spring 2020, Spring 2021 STAT 8139 Time Series Analysis [3]; Spring 2022	Ph.D., Nankai University, Statistics, 1994 M.A., Nankai University, Mathematical Statistics, 1991 B.S., Nankai University, Mathematics, 1988	**Research Focus:** Statistics, biostatistics and financial econometrics. **External Research Funding [Career Total]:** >$2 Million **Publications:** >65 peer reviewed journals >30 peer reviewed conference publications 1 published book 3 book chapters **Mentorship:** PhD dissertation committees-served >20 years Master's thesis committees-served >20 years Undergraduate Research Mentor-served >15 years
Monica Johar, Professor of Management Information Systems (F)	DSBA 6201 Busn Intelligence & Analytics [3]; Spring 2019, Fall 2019, Spring 2020, Fall 2020, Spring 2021, Fall 2021, Spring 2022, Fall 2022, Spring 2023 BDBA 8200 Research Methods 1 [3]; Fall 2022 BDBA 8240 Focused Research Seminar [3]; Spring 2021, Spring 2022	Ph.D., University of Texas at Dallas, Management Science, 2006 M.S., University of Texas at Dallas, Management Information Systems, 2005 B.E., University of Pune, Electrical and Electronics Engineering, 2000	**Research Focus:** Development and use of a variety of quantitative models for problem-solving as applied to areas of software engineering, content delivery systems, web personalization and service analytics, among others. **External Research Funding [Career Total]:** $0 **Publications:** 11 peer reviewed journals 19 peer reviewed conference publications **Mentorship:** 6 PhD dissertation committees [chaired 2] 2 Master's thesis committees chaired

1	2	3	4
NAME (F, P)	**COURSES TAUGHT** **Including Term, Course Number & Title, Credit Hours (D, UN, UT, G) [Dual]** Note – for substantive change prospectuses/applications, list the courses *to be taught*, not historical teaching assignments	**ACADEMIC DEGREES & COURSEWORK** **Relevant to Courses Taught, Including Institution & Major** **List specific graduate coursework, if needed**	**OTHER QUALIFICATIONS & COMMENTS** **Related to Courses Taught**
Jake Minwoo Lee, Assistant Professor of Computer Science (F)	ITCS 8010 Topics in CS: [3]; Fall 2019 ITCS 8156 Machine Learning [3]; Spring 2019, Fall 2019, Fall 2020, Spring 2023	Ph.D., Colorado State University, Computer Science, 2017 M.ENGR., Korea Aerospace University, Computer Engineering, 2002 B.S., Korea Aerospace University, Computer Engineering, 2000	**Research Focus:** Development of foundational machine learning / reinforcement learning models; diverse data science application including computer-aided decision making, trustworthy Human+AI, data analytics and sports analytics. **External Research Funding [Career Total]:** $4.35 Million **Publications:** 6 peer reviewed journals 34 peer reviewed conference publications **Mentorship:** 11 PhD dissertation committees [chaired 2] 3 Master's thesis committees chaired 8 Undergraduate Research Mentor
Shaoyu Li, Associate Professor of Statistics (F)	ITCS 6040 Topics in Data Science: Model Risk Management [3]; Fall 2022	Ph.D., Michigan State University, Statistics and Quantitative Biology, 2011 M.A., Huazhong University of Science and Technology, Applied Statistics, 2006 B.A., Huazhong University of Science and Technology, Applied Mathematics, 2003	**Research Focus:** Biostatistics of healthcare and cancer research; statistical genetics and genomics; development of statistical and computational methods for biomedical data analysis especially omics data. **External Research Funding [Career Total]:** $884,747 **Publications:** 26 peer reviewed journals 1 book chapters **Mentorship:** 5 PhD dissertation committees [chaired 3] 10 Master's thesis committees chaired 7 Undergraduate Research Mentor

1	2	3	4
NAME (F, P)	**COURSES TAUGHT** **Including Term, Course Number & Title, Credit Hours (D, UN, UT, G) [Dual]** Note – for substantive change prospectuses/applications, list the courses *to be taught*, not historical teaching assignments	**ACADEMIC DEGREES & COURSEWORK** **Relevant to Courses Taught, Including Institution & Major** **List specific graduate coursework, if needed**	**OTHER QUALIFICATIONS & COMMENTS** **Related to Courses Taught**
Angela Xia Liu, Associate Professor of Marketing (F)	DSBA 6276 Consumer Analytics [3]; Spring 2020, Spring 2021, Spring 2022 DSBA 6276 Strategic Business Analytics [3]; Spring 2023 BDBA 8210 Current Topics Research Seminar [3]; Fall 2022 BDBA 8240 Focused Research Seminar [3]; Spring 2020, Spring 2021, Spring 2022	Ph.D., Syracuse University, Business Administration, 2010 M.S., Syracuse University, Applied Statistics, 2008 M.S., Syracuse University, History of Education, 2004 M.A., Beijing Normal University, Philosophy, 2002 B.A., Beijing Normal University, Philosophy, 1999	**Research Focus:** Using big data and text mining technology to explore new topics in the interface between marketing and finance and in entertainment marketing. **External Research Funding [Career Total]:** $0 **Publications:** 12 peer reviewed journals 10 peer reviewed conference publications **Mentorship:** 11 PhD dissertation committees [chaired 5] 15 Undergraduate Research Mentor
Irina Nesmelova, Professor of Physics (F)	OPTI 8000 Selected Topics in Optics [3]; Spring 2023	Ph.D., Kazan State University, Mathematics and Physics, 1999 M.S., Kazan State University, Physics, 1990	**Research Focus:** Experimental biophysics, including moderately large dataset analysis with ML techniques relevant to the biomedical field. **External Research Funding [Career Total]:** $2.13 Million **Publications:** 53 peer reviewed journals 8 peer reviewed conference publications 2 book chapters 1 editor/co-editor volume **Mentorship:** 17 PhD dissertation committees [chaired 6] 5 Master's thesis committees chaired 24 Undergraduate Research Mentor

1	2	3	4
NAME (F, P)	**COURSES TAUGHT** **Including Term, Course Number & Title, Credit Hours (D, UN, UT, G) [Dual]** Note – for substantive change prospectuses/applications, list the courses *to be taught*, not historical teaching assignments	**ACADEMIC DEGREES & COURSEWORK** **Relevant to Courses Taught, Including Institution & Major** **List specific graduate coursework, if needed**	**OTHER QUALIFICATIONS & COMMENTS** **Related to Courses Taught**
Srinivas Pulugurtha, Professor of Civil Engineering and Environmental Sciences (F)	DSBA 6010 Special Topics in DSBA: Traffic Safety [3]; Spring 2023 INES 8090 Top Infrastruct & Environ Syst [3]; S/F 2019, S/F 2020, S/F 2021, S/F 2022, Spring 2023 CEGR 8163 GIS for Civil Engineers [3]; Fall 2020 CEGR 8164 Traffic Safety [3]; Spring 2021, Spring 2023 CEGR 8090 Special Topics: Urban Systems Engineering [3]; Fall 2021 CEGR 8161 Traffic Control and Operation [3]; Spring 2022 CEGR 8183 Intelligent Transpo Systems [3]; Fall 2022	Ph.D., University of Nevada, Las Vegas, Civil Engineering, 1998 M.S., Indian Institute of Technology, Civil Engineering, 1995 B.S., Nagarjuna University, Civil Engineering, 1992	**Research Focus:** Diverse fields of transportation - traffic safety, alternative modes of transportation, Intelligent Transportation Systems [ITS] and connected and automated vehicles; system planning, GIS and AI. **External Research Funding [Career Total]:** $12.2 Million **Publications:** 127 peer reviewed journals 125 peer reviewed conference publications 6 editor/co-editor volumes **Mentorship:** 34 PhD dissertation committees [chaired 21, including 6 current] 58 Master's thesis committees [chaired 22] 4 Undergraduate Research Mentor
Zbigniew Ras, Professor of Computer Science (F)	DSBA 6162/ITSC 8162 Knowledge Discovery in Databases [3]; S/F 2019, Spring 2020, S/F 2021, S/F 2022, Spring 2023 ITCS 8150 Intelligent Systems [3]; Fall 2019, Fall 2020, Fall 2021, Fall 2022	D.Sc. (Habilitation), Polish Academy of Sciences, Computer Science, 2004 Ph.D., University of Warsaw, Computer Science, 1973 M.S., University of Warsaw, Mathematics, 1970	**Research Focus:** Knowledge discovery, data mining, AI, health informatics, business analytics, recommendation systems, music information retrieval, art, flexible query answering, soft computing **External Research Funding [Career Total]: $4,676,000** **Publications:** 44 peer reviewed journals 15 journal special issues editor 104 peer reviewed conference publications 47 book chapters 61 books editor/co-editor (mostly Springer) 3 monographs **Mentorship:** 23 PhD graduates in CS 100+ Master's thesis advisor

Abbreviations: F, P: Full-time or Part-time; D, UN, UT, G: Developmental, Undergraduate Nontransferable, Undergraduate Transferable, Graduate; Dual: High School Dual Enrollment Course

1	2	3	4
NAME (F, P)	**COURSES TAUGHT** **Including Term, Course Number & Title, Credit Hours (D, UN, UT, G) [Dual]** Note – for substantive change prospectuses/applications, list the courses *to be taught*, not historical teaching assignments	**ACADEMIC DEGREES & COURSEWORK** **Relevant to Courses Taught, Including Institution & Major** **List specific graduate coursework, if needed**	**OTHER QUALIFICATIONS & COMMENTS** **Related to Courses Taught**
Wenwu Tang, Associate Professor of Geography and Earth Sciences (F)	GEOG 8120 Spatial Statistics [3]; Spring 2019, Spring 2020, Spring 2022 GEOG 8282 CyberGIS and Big Data [3]; Spring 2021, Spring 2023 INES 8090 Top Infrastruct & Environ Syst [3]; Spring 2021, Spring 2022, Spring 2023	Ph.D., University of Iowa, Geography, 2008 M.S., Nanjing University, Geography, 2001 B.S., East China Normal University, Geography, 1998	**Research Focus:** Computational science and geographic information science that include: spatiotemporal analysis and modeling of complex adaptive spatial systems (CASS); application of artificial intelligence and, in particular, machine learning and software agents in the study of CASS. **External Research Funding [Career Total]:** $6.3 Million **Publications:** 70 peer reviewed journals 12 peer reviewed conference publications 2 published books 18 book chapters **Mentorship:** 14 PhD dissertation committees [chaired 2] 5 Master's thesis committees chaired
Jean-Claude Thill, Knight Distinguished Professor of Geography and Earth Sciences (F)	DSBA 6010 Special Topics: Geospatial Analytics [3]; Spring 2023	Ph.D., Catholic University of Louvain, Geography, 1988 M.S., Catholic University of Louvain, Regional Planning, 1984 B.S., Catholic University of Louvain, Geography, 1982	**Research Focus:** Geospatial data analytics, research design, computational social science. **External Research Funding [Career Total]:** $8.2 Million **Publications:** 170 peer reviewed journals 5 peer reviewed conference publications 1 published book 12 book chapters 5 editor/co-editor volumes **Mentorship:** 64 PhD dissertation committees [chaired 28, including 4 current] 36 Master's thesis committees chaired 10 Undergraduate Research Mentor

1	2	3	4
NAME (F, P)	**COURSES TAUGHT** **Including Term, Course Number & Title, Credit Hours (D, UN, UT, G) [Dual]** Note – for substantive change prospectuses/applications, list the courses *to be taught*, not historical teaching assignments	**ACADEMIC DEGREES & COURSEWORK** **Relevant to Courses Taught, Including Institution & Major** **List specific graduate coursework, if needed**	**OTHER QUALIFICATIONS & COMMENTS** **Related to Courses Taught**
Scott Tonidandel, Professor of Management (F)	OSCI 8103 Rsrch Design & Quant Meth 2 [3]; Spring 2019, Spring 2020, Spring 2021, Spring 2022, Spring 2023 OSCI 8899 Org Sci Readings & Research [3]; Fall 2019	Ph.D., Rice University, Psychology, 2001 M.A., Rice University, Psychology, 1999 B.A. Davidson College, Psychology, 1996	**Research Focus:** People analytics and the interface of big data and the organizational sciences. Use of machine learning and natural language processing [NLP] to evaluate leaders, provide feedback and score competencies. **External Research Funding [Career Total]:** $2 Million **Publications:** 64 peer reviewed journals 93 peer reviewed conference publications 11 book chapters 1 editor/co-editor **Mentorship:** 10 PhD dissertation committees [chaired 2] 2 Master's thesis committees chaired 20 Undergraduate Research Mentor
Damien Williams, Assistant Professor of Philosophy (F)	DSBA/ITCS 6010 Special Topics: Disability, Technology, and Artificial Intelligence [3]; Spring 2023	Ph.D., Virginia Polytechnic Institute and State University, Science and Technology Studies, 2022 M.S., Virginia Polytechnic Institute and State University, Science and Technology Studies, 2018 M.A., Georgia State University, Philosophy, 2008 B.A., Georgia State University, Philosophy, 2005	**Research Focus:** Philosophical and social underpinnings and implications of technology, especially artificial intelligence and algorithms. **External Research Funding [Career Total]:** $35,961 **Publications:** 3 peer reviewed journals 3 peer reviewed conference publications

Abbreviations: F, P: Full-time or Part-time; D, UN, UT, G: Developmental, Undergraduate Nontransferable, Undergraduate Transferable, Graduate; Dual: High School Dual Enrollment Course

1	2	3	4
NAME (F, P)	**COURSES TAUGHT** **Including Term, Course Number & Title, Credit Hours (D, UN, UT, G) [Dual]** Note – for substantive change prospectuses/applications, list the courses *to be taught*, not historical teaching assignments	**ACADEMIC DEGREES & COURSEWORK** **Relevant to Courses Taught, Including Institution & Major** **List specific graduate coursework, if needed**	**OTHER QUALIFICATIONS & COMMENTS** **Related to Courses Taught**
Shan Yan, Professor of Biology (F)	BIOL 8102 Cell and Molecular Biology [3]; Spring 2019, Spring 2020, Spring 2021, Spring 2022, Spring 2023	Ph.D., Fudan University, Developmental Biology, 2004 M.S., Shandong University, Cell Biology, 2001 B.S., Shandong University, Biochemistry, 1998	**Research Focus:** Research in molecular mechanisms of genome integrity and cancer etiology **External Research Funding [Career Total]:** $3.7 Million **Publications:** 45 peer reviewed journals 6 peer reviewed conference publications 1 published book 1 book chapters 5 editor/co-editor volumes **Mentorship:** 26 PhD dissertation committees [chaired 5] 5 Master's thesis committees chaired 25 Undergraduate Research Mentor
Wlodek Zadrozny, Professor of Computer Science (F)	DSBA 6345 Modern Data Science Systems [3]; Spring 2021, Spring 2022, Spring 2023 DSBA 6100 Big Data Analytics for Comp Ad [3]; Fall 2021 ITCS 8156 Machine Learning [3]; Fall 2022	Ph.D., Polish Academy of Sciences, Mathematics, 1980 M.S., Warsaw University, Mathematics, 1976	**Research Focus:** Natural Language Processing [NLP] and machine learning; application of NLP to causality extraction and analysis of medical documents. **External Research Funding [Career Total]:** $4 Million **Publications:** 40 peer reviewed journals 60 peer reviewed conference publications 4 book chapters 4 editor/co-editor volumes **Mentorship:** 17 PhD dissertation committees [chaired 5] 4 Master's thesis committees chaired

1	2	3	4
NAME (F, P)	**COURSES TAUGHT** **Including Term, Course Number & Title, Credit Hours (D, UN, UT, G) [Dual]** Note – for substantive change prospectuses/applications, list the courses *to be taught*, not historical teaching assignments	**ACADEMIC DEGREES & COURSEWORK** **Relevant to Courses Taught, Including Institution & Major** **List specific graduate coursework, if needed**	**OTHER QUALIFICATIONS & COMMENTS** **Related to Courses Taught**
Lina Zhou, Professor of Business Information Systems and Operations Management (F)	DSBA 6201 Busn Intelligence & Analytics [3]; Fall 2019, Spring 2021, Spring 2022, Spring 2023	Ph.D., Peking University, Computer Science, 1998 M.S., University of Arizona, Management Information Systems, 2001 M.S., Shanxi University, Computer Science, 1994 B.S., Shanxi University, Computer Science, 1991	**Research Focus:** Online misinformation, phishing detection, social media analytics, natural language processing, technology-supported domestic violence intervention, IT control weaknesses analytics. **External Research Funding [Career Total]:** $2 Million **Publications:** 95 peer reviewed journals 115 peer reviewed conference publications 2 book chapters 2 editor/co-editor volumes **Mentorship:** 35 PhD dissertation committees [chaired 10] 3 Master's thesis committees chaired 2 Undergraduate Research Mentor

UNC CHARLOTTE

Office of Academic Affairs

9201 University City Boulevard, Charlotte, NC 28223-0001
t/ 704.687.5717 www.uncc.edu

Date: November 21, 2019

To: Philip L. Dubois
Chancellor

From: Joan F. Lorden
Provost and Vice Chancellor for Academic Affairs

Re: Establishment of the School of Data Science

On October 24, 2019, the Faculty Council endorsed the proposal to create a School of Data Science (SDS) to replace the more loosely organized Data Science Initiative. The deans and participating faculty have recommended the SDS. According to our policy, I am requesting your approval and that of the Board of Trustees to launch the SDS.

The Data Science Initiative has housed our two interdisciplinary master's programs in data science, the M.S. in Data Science and Business Analytics and the MS in Health Informatics and Analytics, supported the Executive Education program, and encouraged collaborative research. We now have a proposal in the approval pipeline for a B.S. in Data Science and a need to expand master's level data science instruction to disciplines beyond business and health. As the interest in data science has grown, it has become apparent that a more formal and robust organization with a clear governance structure is needed.

Following extensive consultation, the SDS was developed under the leadership of the deans of Computing and Informatics, Business, Health and Human Services, and Liberal Arts & Sciences. The four deans and I will comprise the Board of Directors for the School, the College of Computing and Informatics will continue to serve as the administrative home for data science, and Dr. Doug Hague who has led the Data Science Initiative for the past two years will serve as the Interim Executive Director of the School. The attached document lays out the current plans for the School. The funding and support staff for the School were put in place for the Data Science Initiative and no additional support is required at this time.

cc: Nancy Gutierrez, Dean, College of Liberal Arts & Sciences
Fatma Mili, Dean, College of Computing and Informatics
Jennifer Troyer, Interim Dean, Belk College of Business
Catrine Tudor-Locke, Dean, College of Health and Human Services
Doug Hague, Interim Executive Director, Data Science Initiative

Proposal to Create the School of Data Science
October 9, 2019

Background

The Data Science Initiative (DSI) is a university wide initiative that currently includes the College of Computing and Informatics (CCI), the Belk College of Business (BcoB), the College of Health and Human Services (CHHS), and the College of Liberal Arts & Sciences (CLAS). The main components envisioned for the DSI included degree programs, research, and community engagement, including executive education.

DSI started in 2012 with a certificate in Health Informatics (HI), quickly followed by a certificate in Data Science and Business Analytics (DSBA), a Professional Master of Science (PSM) in HI and a PSM in DSBA. Today, over 250 students are enrolled in those four programs. DSI programs are among the most selective and most diverse graduate STEM programs at UNC Charlotte. In support of DSI, the University has added faculty and staff positions to the four participating colleges and made investments in data, computing, storage, network, and office infrastructure.

Since the inception of DSI, the Executive Education component has designed and delivered custom programs for 12 organizations and engaged 140 participants across 40+ organizations in open programs. Research grants and contracts from federal funding agencies, state government, and industry have totaled over $8.5M. As part of the research infrastructure, the System for Observation of Populous and/or Heterogenous Information (SOPHI) integrated 34 leading open source big data software systems and 15 data streaming and syndication services. Over 180 terabytes of data (structured and unstructured) have been collected thus far.

Recently, DSI faculty embarked on three major initiatives: (1) designing an undergraduate degree in Data Science; (2) designing a Ph.D. in Data Science, and (3) participating in an NSF-funded IUCRC Center for Visual and Decision Informatics.

Proposal: From an Initiative to a School

UNC Charlotte faculty and the Charlotte community have strongly embraced DSI. It has evolved beyond an initiative and is ripe to be grounded in a more robust administrative structure. In considering the further evolution of DSI, we need to ensure that the unique elements that characterize the DSI and make it successful are preserved, and we need to acknowledge the challenges of the current administrative structure. In light of this, we propose that a School of Data Science (SDS) be developed.

Successful features of DSI that will be preserved in SDS:

- Leadership in Data Science: UNC Charlotte embraced this initiative almost a decade before most other institutions, giving UNC Charlotte a head start in this domain that we must nurture and capitalize on;
- Articulation of a comprehensive mission that encompasses research, education, lifelong learning, and full engagement with the community;
- A collaborative transdisciplinary approach involving committed faculty from across the University; and
- High visibility and name recognition in the Charlotte community.

Challenges of DSI as an initiative that SDS will address:

- The Graduate School managed DSI's interdisciplinary academic programs. However, the planned undergraduate degree in Data Science necessitates that a new academic home be found for managing DSI's academic programs.
- Academic research is defined by the faculty. All faculty positions allocated to DSI are located in academic departments, not in the DSI. As a result, there is little sense of community or sense of belonging to DSI from the faculty and little or no sense of a common research agenda. In fact, there is no public roster of DSI faculty.
- Traditionally, an academic program is governed by the faculty of that program who design it, own it, teach it, and vote on changes to it. The diffuse nature of DSI raises issues of governance of data science programs.

To preserve the areas of strength and address the issues raised, we propose the following:

- To ground research and academic programs, an academic unit will be created to house data science programs, degrees, and faculty;
- To distinguish the data science unit from traditional single-discipline departments, we propose to make it a School of Data Science (SDS).
- To preserve its transdisciplinary nature, faculty in data science will have the opportunity to have joint appointments with percentage allocations to the SDS and another department/center within the University (e.g. SDS+Statistics, SDS+Economics, SDS+ Computer Science, SDS+Public Health, SDS+Public Policy, SDS+Geography, SDS+Psychology, SDS+Architecture).
- Because the foundation of data science is statistics and computing[1], and to ensure the transdisciplinary nature of SDS, the School will be managed by an Executive Director who will report to a Board of Directors made up of the Provost and the deans of the College of Liberal Arts & Sciences, the College of Computing and Informatics, the Belk College of Business, and the College of Health and Human Services.
- Administrative oversight will reside in the College of Computing and Informatics.

[1] http://sites.nationalacademies.org/cstb/currentprojects/cstb_175246.

- The SDS Board of Directors will hire the Executive Director who, with guidance and oversight from the Board, will establish broad policies, oversee the budget, and provide strategic direction.

The proposal for the School of Data Science is informed by the work of others in defining the type of programming needed to prepare students at all levels and in creating an organizational structure that can best support a highly interdisciplinary and rapidly expanding field. In 2018, The National Academy of Science (NAS) issued a report from the Committee on Envisioning the Data Science Discipline entitled, "Data Science for Undergraduates: Opportunities and Options."[2] The report recommends that Data Science degrees provide students with "data acumen" and a wide range of competencies including:

- Mathematical/Computational/Statistical Foundations,
- Data management, visualization, modeling, and assessment,
- Workflow and reproducibility,
- Communication and teamwork,
- Domain-specific considerations, and
- Ethical problem-solving.

On June 13, 2018, the NAS held a workshop on "Programs and Approaches for Data Science Education at the Ph.D. level" in Washington, DC. Dr. Michael Turner, Chair of the Department of Criminal Justice and Criminology and a member of the committee designing the Data Science Ph.D., represented UNC Charlotte. Universities presenting and discussing their models included NYU, Yale, MIT, Penn State, and UC Davis. The approaches presented showed alignment of the following characteristics:

- An interdisciplinary approach with a core of data science and domains with room for customization to needs and requirements.
- A build-and-iterate approach that allows programs to be developed quickly with continuous assessment and refinements.
- The need for a faculty group who owns the program to have a strong sense of community. Most data science programs use a combination of core faculty (most are joint appointments) and affiliate faculty. A shared space is also advocated as a strong unifier. Almost every presenter mentioned this as a key ingredient to develop community, dialog, relationships, etc.
- A distinct organizational structure which has an inclusive (transdisciplinary) mission, but which also has the autonomy to establish core competencies for the degrees.

[2] http://sites.nationalacademies.org/cstb/currentprojects/cstb_175246.

School of Data Science Overview

Mission

The School of Data Science is UNC Charlotte's transdisciplinary academic unit for knowledge creation, dissemination, and application in data science and analytics. It uses science, technology, education, and engagement to address social, economic, health, and environmental issues.

Goals

- SDS develops and offers exemplary academic programs at all academic levels, including continuing and executive education, rooted in data acumen and applied to diverse knowledge domains.
- SDS serves as a hub of data science research and development for the campus research community and beyond. SDS also serves the research community through a data science research infrastructure.
- SDS nurtures a growing engagement with the community by promoting, facilitating, and utilizing the application of data science to social, economic, educational, health, and environmental issues.

Governance and Administrative Structure

SDS is headed by an Executive Director who sets a vision for the school, manages its resources and programs, and serves as the representative to the UNC Charlotte community and external potential partners. The position is defined in Appendix A. The SDS Executive Director reports to the SDS Board of Directors.

SDS includes core faculty and affiliate faculty as defined below.

Core Faculty

Core faculty are hired as joint appointments between SDS and other units, as applicable. Joint appointments are defined and managed as specified in the *Academic Personnel Procedures Handbook*[3]. In particular,

- Core faculty appointments are specified in terms of a commitment of at least 30% to the School with the remaining commitment to a disciplinary unit in one of the colleges.
- Current and new position requests for data science faculty are made in coordination with appropriate departments and colleges, with the specific percentage and duties specified in the faculty contract at the time of hiring.
- All core SDS faculty with teaching responsibilities will typically be part of the faculty of one or more interdisciplinary degree programs within SDS.

[3] https://provost.uncc.edu/academic-budget-personnel/handbook/f-policy-statement-joint-appointments

- Joint search committees make hiring recommendations to the appropriate chair and the SDS executive director, with final approvals by the dean of the college in which the majority joint appointment resides.
- All core faculty have full voting rights in both of their units.

Affiliate Faculty

Faculty desiring to be affiliated with SDS can apply for a three-year renewable term. SDS bylaws establish criteria and procedures for approving such requests. Affiliate faculty are not members of the School level curriculum committee. An exception to this is specified in the section Transitional Period.

Academic Programs

SDS offers bachelor's, master's, and Ph.D. degrees in data science. In particular, the following programs are already in place or in development:

B.S. in Data Science

In August 2018, UNC Charlotte submitted a letter of intent to develop a proposal for a new Bachelor of Science in Data Science. In September 2018, a faculty committee was convened made up of representatives from CCI, CLAS, BCoB, and CHHS. That committee has developed a draft proposal for review through the Faculty Governance process. If approved, the intent is to submit the formal Request to Establish to the UNC System Office by Fall 2019.

Master's Programs

The current M.S. in Data Science and Business Analytics (DSBA) continues to enjoy significant success in recruiting and retaining highly qualified students. For the first time, Spring 2019 enrollment in the DSBA exceeded 200 students (MS + Cert). Admission to the program remains competitive with the overall acceptance rate at roughly 35%. The Academic Program Committee is made up of faculty representatives from BCoB and CCI.

The current M.S. in Health Informatics and Analytics (HIAN) is a smaller program, currently enrolling 50-60 graduate students. The program was recently restructured and closely integrated with related graduate programs in CHHS. A number of courses are available online. The Academic Program Committee is made up of faculty representatives from CHHS and CCI.

The purpose of SDS is in part to manage interdisciplinary academic programs in data science. Students attracted to the data science field and UNC Charlotte can currently choose one of the two MS programs. Both programs limit the breadth of transdisciplinarity to their designed domain of application discipline. Faculty members participating in curriculum committees for these programs are similarly disciplinarily focused. At the same time, there are numerous requests for the creation of diverse concentrations, new applied data science courses, and

"stackable certificates." Such a diversity of academic offerings would clearly fulfill the interdisciplinary mission and goals of SDS, including the coursework of interest to academic disciplines currently not represented in DSI from the College of Liberal Arts & Sciences and the College of Arts + Architecture. For example, a possible approach that will be explored by SDS is a generic introductory data science course sequence that can be followed with opportunities for a "deeper dive" into more than one knowledge domain (e.g., Statistics, Computing, Public Policy, Urban Studies, Psychology, Computational Design/Architecture).

Ph.D. in Data Science

A cross-college committee is developing an initial proposal for the Ph.D. program. Similar to the proposed undergraduate program, the intent is to create a transdisciplinary model. The degree would be based on a core of data science skills and techniques. Academic partners would have the opportunity to develop specific domain areas to "stack" on the core competencies.

Curricular Governance

SDS core faculty will define a set of bylaws similar to that used by other units and accounting for the fact that SDS reports to a Board of Directors. In particular,

- SDS will have program-level curricular committees (undergraduate and graduate) through which all curricular changes are initiated.
- Members of the program-level curriculum committees are nominated as per the SDS bylaws. The program-level curriculum committee members shall be composed of faculty with close ties to the program, as defined in the bylaws.
- Proposals from program-level curriculum committees will be considered by an SDS curriculum committee, which shall contain a core faculty representative from each program-level curriculum committee.
- Proposals approved by the SDS curriculum committee will be presented for approval to the SDS Executive Director.
- Proposals approved by the SDS Executive Director will be submitted for approval to the SDS Board of Directors.

Transitional Period

A transition plan for governance is recommended for the DSBA and the HIAN degrees, to be reviewed annually. The Executive Director will review the status of the transition on an annual basis and provide a recommendation to the SDS Board of Directors for continuation or termination of the transition period. During the transitional period:

1. The DSBA will have a DSBA Program director. The Program Director must be a core faculty member in SDS.
2. The HIAN will have a HIAN Program Director. The Program Director must be a core faculty member in SDS.

3. The DSBA will have a curriculum committee of faculty composed of 50% from BCoB and 50% from CCI.
4. The HIAN will have a curriculum committee of faculty composed of 50% from CHHS and 50% from CCI.
5. During the transition phase, DSBA faculty can be affiliate faculty and vote on all curriculum proposals for the DSBA program.
6. During the transition phase, HIAN faculty can be affiliate faculty and vote on all curriculum proposals for the HIAN program.

Campus and External Engagement

SDS will maintain capabilities to serve and facilitate campus-wide data science research needs (e.g. data lake service - SOPHI, data curation, access). Understanding that data science has and will continue to have a central role in the economy of Charlotte, the State, and region, SDS will seek opportunities to engage the community in areas such as the organization of conferences and events, participation in local and regional research and development initiatives, and formal and informal initiatives promoting effective use of data science.

SDS will facilitate a discussion with related programs and concentrations to develop an aligned face of data science for students and external stakeholders. This may encompass the development of joint market messages, pathways for students (e.g. a data science website), and even a potential formalization through an affiliate program structure.

Given the emergence of Data Science as a field that revolutionizes science, communities, and industry, SDS external engagement will be central to its mission. External engagement will develop around the opportunities for life-long learning and executive education, cooperative research, and relationships that enhance the community.

Resources

Budget

Currently, DSI is supported by commitments of general funds for faculty, staff, and operations. Funds from the School-Based Tuition Increments (SBTI) associated with the Health Informatics and Analytics (HIAN) and the Data Science and Business Analytics (DSBA) programs support additional staffing, assistantships, program marketing, annual data and software purchases, and faculty travel.

Space

One of the objectives of the creation of SDS is the enabling of a sense of community among core data science faculty. Co-location plays an important role in that. Furthermore, the proximity of SDS faculty to collaborating colleges is also highly desirable. Space is currently provided in the

Bioinformatics building for DSI administrative functions. SDS administration will work with the colleges to develop strategies that enable physical interaction between SDS faculty and staff and those of the colleges.

Faculty and Staff

Through funds from the Chancellor, nine new faculty and staff positions were funded to support the creation of the Data Science Initiative. The positions were placed in the College of Computing and Informatics, the Belk College of Business, and the College of Health and Human Services. Additional DSI positions were created through repurposing existing lines, investment by Academic Affairs, use of SBTI funds, and position requests by the colleges. Today, over forty people at the University are engaged either full or part time in DSI and many more are interested in the field. The creation of SDS will provide a structure for additional participation and collaboration.

Appendix A

Executive Director: School of Data Science

Job Description and Accountabilities

The Executive Director of the School of Data Science provides leadership to the School of Data Science in line with the School's mission to be the University's transdisciplinary academic unit for knowledge creation, dissemination, and application in data science and analytics. It uses science, technology, education, and outreach to address health, social, economic, and environmental issues.

Leadership

- Creating an aspirational vision for the School and rallying faculty, staff, and school partners around the School
- Modeling a collaborative style and personal and professional integrity within the School, and across units in UNC Charlotte, and beyond
- Being open and accessible, listening to faculty and staff views and concerns, and acting on them
- Cultivating a culture conducive to the productivity and well-being of faculty, staff, and students

Resource Management

- Managing staff through assignment and support in a way consistent with the School's values and priorities
- Requesting resources for the School and managing them well
- Monitoring the wellbeing of the School through data collection and assessment
- Playing an active role in fundraising through business partnerships and other external activities

Faculty and Staff Development, and Retention

- Assessing the needs of the School and requesting/raising resources for meeting these needs
- Collaborating with all partner units in recruiting and hiring faculty and staff who contribute to the vision and values of the School
- Ensuring that faculty and staff receive mentoring and development that supports their professional development and growth and that creates a sense of belonging in and ownership of the School
- Conducting formative staff evaluations and contributing to faculty evaluation through a process that inspires and encourages faculty and staff to excel

- Monitoring the well-being of faculty and staff and ensuring adequate retention of talent

Education

- Continuing to develop and grow the School's curricula in a way consistent with the School's mission
- Ensuring that curricula and pedagogy are timely, relevant, and adaptable
- Collaborating with partnering units in scheduling courses that promote students' progress towards graduation, consistent with the school's values and priorities (for example, interdisciplinary)
- Participating in and overseeing the recruitment and advising of students
- Monitoring students' success and wellbeing
- Cultivating an inclusive culture with visible and proactively equitable processes

Research

- Shaping a School-wide and University-wide data-science research and development vision
- Hiring faculty to realize the research vision of SDS
- Initiating and nurturing collaborations with academic, industrial, and governmental partners that enable the research and development agenda of SDS
- Supporting faculty and graduate students in their research

Communication

- Serving as the voice of the School (on behalf of the faculty, staff, and students) to the colleges and University
- Communicating to the School relevant events, decisions, and directions
- Cultivating significant partnerships for the School

Appointment, Review, reappointment

- The Executive Director will be appointed by the SDS Board of Directors.
- The Executive Director will undergo an annual evaluation by the SDS Board of Directors.
- The Executive Director will be reviewed for reappointment every three years following Academic Affairs guidelines for the annual review of administrators.

UNIVERSITY OF NORTH CAROLINA CHARLOTTE | SCHOOL OF DATA SCIENCE

Letters of Support for PhD in Data Science

Belk College of Business

George Banks, Chair, Department of Management

Sangkil Moon, Chair, Marketing Department

College of Engineering

Harish Cherukuri, Chair, Department of Mechanical Engineering and Engineering Science

Glenn Moglen, Chair, Department of Civil and Environmental Engineering

Asis Nasipuri, Chair, Department of Electrical and Computer Engineering

College of Health and Human Services

J.P. Barfield, Chair, Department of Applied Physiology, Health and Clinical Sciences

Susan McLennon, Director, School of Nursing

Diana Rowan, Director, School of Social Work

Jan Warren-Findlow, Chair, Department of Public Health Sciences

College of Humanities and Earth & Social Sciences

Cheryl Brown, Chair, Department of Political Science and Public Administration

Sara Gagné, Chair, Department of Geography and Earth Sciences

Daniel Grano, Chair, Department of Communication Studies

Scott Fitzgerald, Chair, Department of Sociology

Trevor Pearce, Chair, Department of Philosophy

Elizabeth Stearns, Director, Public Policy PhD Program

Scott Tonidandel, Director, Organizational Science PhD Program

Michael Turner, Chair, Department of Criminal Justice and Criminology

College of Science

Glenn Boreman, Chair, Department of Physics and Optical Science

Taufiquar Khan, Chair, Department of Mathematics and Statistics

Christine Richardson, Chair, Department of Biological Sciences

Re: PhD in Data Science-request for support

1 message

George Banks <gbanks3@charlotte.edu> Wed, Oct 11, 2023 at 5:42 PM
To: Doug Hague <dhague@charlotte.edu>

Hi Doug,

I support this proposal!

George

On Wed, Oct 11, 2023 at 5:32 PM Doug Hague <dhague@charlotte.edu> wrote:

> BCoB Chairs,
>
> Per our conversation today at the Chairs Council, I wanted to document some practices and expected interactions with you and your faculty around the proposed PhD program. These should sound very familiar to you as the practices are just extending our current practices from our DSBA MS program to the new PhD program. Also, as we talked with the Graduate Council, in addition to having each college provide approval as part of the SDS Board, they would like to have documented consults with the Chairs. Thus, after you read this long email please respond to me through email with a simple "I support this proposal." or a "I'd like to meet to discuss further." or a "This doesn't impact me." or, if you really feel this way, a "No, I'm not going to support this proposal." If you prefer, you can just send me a memo under your letterhead that states your response. It would be greatly appreciated if you could respond by Friday.
>
> Ethan-I've copied David Mauer per your suggestion, would you brief him and let me know if you have further questions?
>
> Summary of expected collaborations/interactions.
>
> The new program consists of core courses in Ethics/Data Governance, Statistics for Data Science, Machine Learning, and Artificial Intelligence as well as seminars. I have new faculty lines requested (and I've said the program won't move forward without these lines and additional funding) that will add capacity to teach these new courses. For SDS faculty wanting to have data science PhD students, participation in the seminar will be one way to engage more deeply. If you want to see the details, the curriculog proposal is here (make sure to log into Curriculog prior to clicking on the link).
>
> Beyond these core courses, we expect the majority of courses to be either special topics or 8000 level courses (and potentially 6000 level for areas with MS degrees only) in other domain areas where we would add a few students each year to select courses. The students would likely be being advised/mentored by our joint/affiliate faculty that are in your department. The expectation would be that we would bolster the number of students by a few such that the course has more SCH being generated and thus more easily justified.
>
> I also expect to continue the practice that if SDS asks a faculty to teach a course that you would not normally teach or is over and above what your college has committed to SDS, that SDS would pay to support a part timer and you would receive funding directly to your department (currently $8000/section) to use to backfill teaching capacity or other needed expenditures. We have been doing this for our undergraduate courses with CHESS and it seems to work ok. We have also been cross listing/adding a few students to various courses from our MS program for quite a while so I'm expecting to keep the same process where we work with you, your faculty, and your schedulers on providing the right number of seats. We would also consider having seats for your students as appropriate in SDS courses (we do this today for some PhD students that want to take DSBA courses). The SDS PhD advisors and GPD are required to

approve all course selections by students so there should not be anyone signing up that we are not aware of and would discuss with you.

BTW-Each faculty that is part of SDS has at least a "consider cross-listing courses with SDS" in their affiliation MOU so I'm hoping this isn't a surprise that we may ask to add a few students to your graduate courses.

Side Note: Our PhD planning committee discussed long and hard about how this transdisciplinary program fits together with all the other PhD programs. Their conclusion, which I agree with, is that this program will not compete for students as 1) the backgrounds required for entry into our programs are different and 2) the research needs/skills are different, and 3) the job profiles at the hiring entities are very different. and thus students will self-select through the application process and faculty would select different students based upon their research needs. If you'd like to discuss the thought process on this Jean-Claude Thill and Monica Johar were the co-chairs and can provide details.

Please let me know if you have any questions, concerns or would like to dive deeper.

Thanks

Doug

Doug Hague (he/him/his)| Executive Director and Professor of Practice
School of Data Science | UNC Charlotte
1028D | Colvard Building
9105 University Road. | Charlotte, NC 28223
Phone: 704-562-6867 | dhague@charlotte.edu

--

George C. Banks, Ph.D.
Chair, Department of Management | Affiliate Faculty School of Data Science
Editor-in-Chief, *The Leadership Quarterly*
Co-director, The Center for Leadership Science | Research activities
Deputy Title IX Coordinator-Office of Civil Rights and Title IX

Doug Hague <dhague@uncc.edu>

Re: PhD in Data Science-request for support

1 message

Sangkil Moon <smoon13@charlotte.edu> Thu, Oct 12, 2023 at 6:53 AM
To: Doug Hague <dhague@charlotte.edu>

Doug,
I support this proposal.
Regards,
Sangkil

Sangkil Moon
Cullen Endowed Professor of Marketing
Chair of the Marketing Department
UNC Charlotte, The Belk College of Business
"Hope, Effort, and Happiness (희망, 노력, 그리고 행복)"
My Homepage

On Wed, Oct 11, 2023 at 5:32 PM Doug Hague <dhague@charlotte.edu> wrote:

> BCoB Chairs,
>
> Per our conversation today at the Chairs Council, I wanted to document some practices and expected interactions with you and your faculty around the proposed PhD program. These should sound very familiar to you as the practices are just extending our current practices from our DSBA MS program to the new PhD program. Also, as we talked with the Graduate Council, in addition to having each college provide approval as part of the SDS Board, they would like to have documented consults with the Chairs. Thus, after you read this long email please respond to me through email with a simple "I support this proposal." or a "I'd like to meet to discuss further." or a "This doesn't impact me." or, if you really feel this way, a "No, I'm not going to support this proposal." If you prefer, you can just send me a memo under your letterhead that states your response. It would be greatly appreciated if you could respond by Friday.
>
> Ethan-I've copied David Mauer per your suggestion, would you brief him and let me know if you have further questions?
>
> Summary of expected collaborations/interactions.
>
> The new program consists of core courses in Ethics/Data Governance, Statistics for Data Science, Machine Learning, and Artificial Intelligence as well as seminars. I have new faculty lines requested (and I've said the program won't move forward without these lines and additional funding) that will add capacity to teach these new courses. For SDS faculty wanting to have data science PhD students, participation in the seminar will be one way to engage more deeply. If you want to see the details, the curriculog proposal is here (make sure to log into Curriculog prior to clicking on the link).
>
> Beyond these core courses, we expect the majority of courses to be either special topics or 8000 level courses (and potentially 6000 level for areas with MS degrees only) in other domain areas where we would add a few students each year to select courses. The students would likely be being advised/mentored by our joint/affiliate faculty that are in your department. The expectation would be that we would bolster the number of students by a few such that the course has more SCH being generated and thus more easily justified.

I also expect to continue the practice that if SDS asks a faculty to teach a course that you would not normally teach or is over and above what your college has committed to SDS, that SDS would pay to support a part timer and you would receive funding directly to your department (currently $8000/section) to use to backfill teaching capacity or other needed expenditures. We have been doing this for our undergraduate courses with CHESS and it seems to work ok. We have also been cross listing/adding a few students to various courses from our MS program for quite a while so I'm expecting to keep the same process where we work with you, your faculty, and your schedulers on providing the right number of seats. We would also consider having seats for your students as appropriate in SDS courses (we do this today for some PhD students that want to take DSBA courses). The SDS PhD advisors and GPD are required to approve all course selections by students so there should not be anyone signing up that we are not aware of and would discuss with you.

BTW-Each faculty that is part of SDS has at least a "consider cross-listing courses with SDS" in their affiliation MOU so I'm hoping this isn't a surprise that we may ask to add a few students to your graduate courses.

Side Note: Our PhD planning committee discussed long and hard about how this transdisciplinary program fits together with all the other PhD programs. Their conclusion, which I agree with, is that this program will not compete for students as 1) the backgrounds required for entry into our programs are different and 2) the research needs/skills are different, and 3) the job profiles at the hiring entities are very different. and thus students will self-select through the application process and faculty would select different students based upon their research needs. If you'd like to discuss the thought process on this Jean-Claude Thill and Monica Johar were the co-chairs and can provide details.

Please let me know if you have any questions, concerns or would like to dive deeper.

Thanks

Doug

Doug Hague (he/him/his)| Executive Director and Professor of Practice
School of Data Science | UNC Charlotte
1028D | Colvard Building
9105 University Road. | Charlotte, NC 28223
Phone: 704-562-6867 | dhague@charlotte.edu

Doug Hague <dhague@uncc.edu>

Re: Request for consult for PhD in Data Science

1 message

Harish Cherukuri <harish.cherukuri@charlotte.edu> Fri, Oct 13, 2023 at 8:54 AM
To: Doug Hague <dhague@charlotte.edu>
Cc: Simon Hsiang <shsiang1@charlotte.edu>, Glenn Moglen <gmoglen@charlotte.edu>, Asis Nasipuri <Asis.Nasipuri@uncc.edu>, Lingguang Song <lsong2@charlotte.edu>

Doug, I support this proposal.

On Thu, Oct 5, 2023 at 12:10 PM Doug Hague <dhague@charlotte.edu> wrote:

> Harish, Siman, Glenn,
>
> Per our conversation this morning about the PhD in Data Science proposal, below is the ways I believe the program will work, but I wanted to document some practices and expected interactions with you and your faculty around the proposed PhD program. These may sound familiar to you as the practices are just extending our current practices from our DSBA MS program to the new PhD program. Also, as we talked with the Graduate Council this week, in addition to having each college provide approval as part of the SDS Board, they would like to have documented consults with the Chairs. Thus, after you read this long email please respond to me through email with a simple "I support this proposal." or a "I'd like to meet to discuss further." or a "This doesn't impact me." or, if you really feel this way, a "No, I'm not going to support this proposal." If you prefer, you can just send me a memo under your letterhead that states your response.
>
> Asis, Jingguang-Barbara is working on a time for us to meet.
>
> Summary of expected collaborations/interactions.
> The new program consists of core courses in Ethics/Data Governance, Statistics for Data Science, Machine Learning, and Artificial Intelligence as well as seminars. I have new faculty lines requested (and I've said the program won't move forward without these lines and additional funding) that will add capacity to teach these new courses. For SDS faculty wanting to have data science PhD students, participation in the seminar will be one way to engage more deeply. If you want to see the details, the curriculog proposal is here.
>
> Beyond these core courses, we expect the majority of courses to be either special topics or 8000 level courses (and potentially 6000 level for areas with MS degrees only) in other domain areas where we would add a few students each year to select courses. The students would likely be being advised/mentored by our joint/affiliate faculty that are in your department. The expectation would be that we would bolster the number of students by a few such that the course has more SCH being generated and thus more easily justified.
>
> I also expect to continue the practice that if SDS asks a faculty to teach a course that you would not normally teach or is over and above what your college has committed to SDS, that SDS would pay to buy them out of their load and you would receive funding directly to your department (currently $8000/section) to use to backfill teaching capacity or other needed expenditures. We have been doing this for our undergraduate courses with CHESS and it seems to work ok. We have also been cross listing/adding a few students to various courses from our MS program for quite a while so I'm expecting to keep the same process where we work with you, your faculty, and your schedulers on providing the right number of seats. We would also consider having seats for your students as appropriate in SDS courses (we do this today for some PhD students that want to take DSBA courses). The SDS PhD advisors and GPD are required to approve all course selections by students so there should not be anyone signing up that we are not aware of and would discuss with you.
>
> BTW-Each faculty that is part of SDS has at least a "consider cross-listing courses with SDS" in their affiliation MOU so I'm hoping this isn't a surprise that we may ask to add a few students to your graduate courses.
>
> Side Note: Our PhD planning committee discussed long and hard about how this transdisciplinary program fits together with all the other PhD programs. Their conclusion, which I agree with, is that this program will not compete for students as 1) the backgrounds required for entry into our programs are different and 2) the research needs/skills are different, and 3) the job profiles at the hiring entities are very different. and thus students will self-select through the application process and faculty would select different students based upon their research needs. If you'd like to discuss the thought process on this Jean-Claude Thill and Monica Johar were the co-chairs and can provide details.
>
> Please let me know if you have any questions, concerns or would like to dive deeper.

Thanks

Doug
Doug Hague (he/him/his)| Executive Director and Professor of Practice
School of Data Science | UNC Charlotte
1028D | Colvard Building
9105 University Road. | Charlotte, NC 28223
Phone: 704-562-6867 | dhague@charlotte.edu

Re: Request for consult for PhD in Data Science

1 message

Glenn Moglen <gmoglen@charlotte.edu> Fri, Oct 13, 2023 at 1:45 PM
To: Doug Hague <dhague@charlotte.edu>
Cc: Barbara Howard <bparris4@charlotte.edu>

Dear Doug,

We were scheduled to talk today at 4pm. I've just re-read your original email/proposal and I can't now recall what my concern was. My understanding is that currently you have Wei Fan and Srinivas Pulugurtha participating in your program.

Having reviewed this further, I now support your proposal.

I will cancel our meeting in just a moment. I apologize that I dragged out this process as long as I have. I had some misgivings at one time, but I think your proposal is reasonable as presented.

Take care.
- Glenn

On Thu, Oct 5, 2023 at 12:10 PM Doug Hague <dhague@charlotte.edu> wrote:

> Harish, Siman, Glenn,
>
> Per our conversation this morning about the PhD in Data Science proposal, below is the ways I believe the program will work, but I wanted to document some practices and expected interactions with you and your faculty around the proposed PhD program. These may sound familiar to you as the practices are just extending our current practices from our DSBA MS program to the new PhD program. Also, as we talked with the Graduate Council this week, in addition to having each college provide approval as part of the SDS Board, they would like to have documented consults with the Chairs. Thus, after you read this long email please respond to me through email with a simple "I support this proposal." or a "I'd like to meet to discuss further." or a "This doesn't impact me." or, if you really feel this way, a "No, I'm not going to support this proposal." If you prefer, you can just send me a memo under your letterhead that states your response.
>
> Asis, Jingguang-Barbara is working on a time for us to meet.
>
> Summary of expected collaborations/interactions.
> The new program consists of core courses in Ethics/Data Governance, Statistics for Data Science, Machine Learning, and Artificial Intelligence as well as seminars. I have new faculty lines requested (and I've said the program won't move forward without these lines and additional funding) that will add capacity to teach these new courses. For SDS faculty wanting to have data science PhD students, participation in the seminar will be one way to engage more deeply. If you want to see the details, the curriculog proposal is here.
>
> Beyond these core courses, we expect the majority of courses to be either special topics or 8000 level courses (and potentially 6000 level for areas with MS degrees only) in other domain areas where we would add a few students each year to select courses. The students would likely be being advised/mentored by our joint/affiliate faculty that are in your department. The expectation would be that we would bolster the number of students by a few such that the course has more SCH being generated and thus more easily justified.
>
> I also expect to continue the practice that if SDS asks a faculty to teach a course that you would not normally teach or is over and above what your college has committed to SDS, that SDS would pay to buy them out of their load and you would receive funding directly to your department (currently $8000/section) to use to backfill teaching capacity or other needed expenditures. We have been doing this for our undergraduate courses with CHESS and it seems to work ok. We have also been cross listing/adding a few students to various courses from our MS program for quite a while so I'm expecting to keep the same process where we work with you, your faculty, and your schedulers on providing the right number of seats. We would also consider having seats for your students as appropriate in SDS courses (we do this today for some PhD students that want to take DSBA courses). The SDS PhD advisors and GPD are required to approve all course selections by students so there should not be anyone signing up that we are not aware of and would discuss with you.

BTW-Each faculty that is part of SDS has at least a "consider cross-listing courses with SDS" in their affiliation MOU so I'm hoping this isn't a surprise that we may ask to add a few students to your graduate courses.

Side Note: Our PhD planning committee discussed long and hard about how this transdisciplinary program fits together with all the other PhD programs. Their conclusion, which I agree with, is that this program will not compete for students as 1) the backgrounds required for entry into our programs are different and 2) the research needs/skills are different, and 3) the job profiles at the hiring entities are very different. and thus students will self-select through the application process and faculty would select different students based upon their research needs. If you'd like to discuss the thought process on this Jean-Claude Thill and Monica Johar were the co-chairs and can provide details.

Please let me know if you have any questions, concerns or would like to dive deeper.

Thanks

Doug
Doug Hague (he/him/his)| Executive Director and Professor of Practice
School of Data Science | UNC Charlotte
1028D | Colvard Building
9105 University Road. | Charlotte, NC 28223
Phone: 704-562-6867 | dhague@charlotte.edu

Doug Hague <dhague@uncc.edu>

Re: Request for consult for PhD in Data Science

1 message

Asis Nasipuri <asis.nasipuri@charlotte.edu> Thu, Oct 12, 2023 at 3:58 PM
To: Doug Hague <dhague@charlotte.edu>

Thank you for meeting with us today Doug.

I support your proposal. I think this will serve a number of folks, both prospective students and faculty. All the best

-Asis

Asis Nasipuri, Professor and Chair
Electrical and Computer Engineering
EPIC 2252 | The University of North Carolina at Charlotte
9201 University City Boulevard | Charlotte, NC 28223-0001
Phone: 704-687-8418 | Cell: 704-287-6163 | Fax: 704-687-5588 |
Email: asis.nasipuri@charlotte.edu | URL: webpages.charlotte.edu/~anasipur

On Thu, Oct 5, 2023 at 12:10 PM Doug Hague <dhague@charlotte.edu> wrote:

> Harish, Siman, Glenn,
>
> Per our conversation this morning about the PhD in Data Science proposal, below is the ways I believe the program will work, but I wanted to document some practices and expected interactions with you and your faculty around the proposed PhD program. These may sound familiar to you as the practices are just extending our current practices from our DSBA MS program to the new PhD program. Also, as we talked with the Graduate Council this week, in addition to having each college provide approval as part of the SDS Board, they would like to have documented consults with the Chairs. Thus, after you read this long email please respond to me through email with a simple "I support this proposal." or a "I'd like to meet to discuss further." or a "This doesn't impact me." or, if you really feel this way, a "No, I'm not going to support this proposal." If you prefer, you can just send me a memo under your letterhead that states your response.
>
> Asis, Jingguang-Barbara is working on a time for us to meet.
>
> Summary of expected collaborations/interactions.
> The new program consists of core courses in Ethics/Data Governance, Statistics for Data Science, Machine Learning, and Artificial Intelligence as well as seminars. I have new faculty lines requested (and I've said the program won't move forward without these lines and additional funding) that will add capacity to teach these new courses. For SDS faculty wanting to have data science PhD students, participation in the seminar will be one way to engage more deeply. If you want to see the details, the curriculog proposal is here.
>
> Beyond these core courses, we expect the majority of courses to be either special topics or 8000 level courses (and potentially 6000 level for areas with MS degrees only) in other domain areas where we would add a few students each year to select courses. The students would likely be being advised/mentored by our joint/affiliate faculty that are in your department. The expectation would be that we would bolster the number of students by a few such that the course has more SCH being generated and thus more easily justified.
>
> I also expect to continue the practice that if SDS asks a faculty to teach a course that you would not normally teach or is over and above what your college has committed to SDS, that SDS would pay to buy them out of their load and you would receive funding directly to your department (currently $8000/section) to use to backfill teaching capacity or other needed expenditures. We have been doing this for our undergraduate courses with CHESS and it seems to work ok. We have also been cross listing/adding a few students to various courses from our MS program for quite a while so I'm expecting to keep the same process where we work with you, your faculty, and your schedulers on providing the right number of seats. We would also consider having seats for your students as appropriate in SDS courses (we do this today for some PhD students that want to take DSBA courses). The SDS PhD advisors and GPD are required to approve all course selections by students so there should not be anyone signing up that we are not aware of and would discuss with you.

BTW-Each faculty that is part of SDS has at least a "consider cross-listing courses with SDS" in their affiliation MOU so I'm hoping this isn't a surprise that we may ask to add a few students to your graduate courses.

Side Note: Our PhD planning committee discussed long and hard about how this transdisciplinary program fits together with all the other PhD programs. Their conclusion, which I agree with, is that this program will not compete for students as 1) the backgrounds required for entry into our programs are different and 2) the research needs/skills are different, and 3) the job profiles at the hiring entities are very different. and thus students will self-select through the application process and faculty would select different students based upon their research needs. If you'd like to discuss the thought process on this Jean-Claude Thill and Monica Johar were the co-chairs and can provide details.

Please let me know if you have any questions, concerns or would like to dive deeper.

Thanks

Doug
Doug Hague (he/him/his)| Executive Director and Professor of Practice
School of Data Science | UNC Charlotte
1028D | Colvard Building
9105 University Road. | Charlotte, NC 28223
Phone: 704-562-6867 | dhague@charlotte.edu

Doug Hague <dhague@uncc.edu>

Re: Consult for PhD in Data Science-response requested this week.

1 message

Auguste Barfield <jpbarfield@charlotte.edu> Wed, Oct 11, 2023 at 3:21 AM
To: Doug Hague <dhague@charlotte.edu>

I support this proposal -

On Tue, Oct 10, 2023 at 11:51 AM Doug Hague <dhague@charlotte.edu> wrote:

> Jan, Susan, Diana, JP,
>
> Thanks for the quick discussion today during the EC meeting. I've been asked by the Graduate Council to gain support through consultations with Chairs/Directors. Since we've been collaborating through joint and affiliated faculty for a while, I wanted to document some practices and expected interactions with you and your faculty around the proposed PhD program. These should sound very familiar to you as the practices are just extending our current practices from our HIA/DSBA MS program to the new PhD program. Thus, after you read this long email please respond to me through email with a simple "I support this proposal." or a "I'd like to meet to discuss further." or a "This doesn't impact me." or, if you really feel this way, a "No, I'm not going to support this proposal." If you prefer, you can just send me a memo under your letterhead that states your response.
>
> Summary of expected collaborations/interactions.
> The new program consists of core courses in Ethics/Data Governance, Statistics for Data Science, Machine Learning, and Artificial Intelligence as well as seminars. I have new faculty lines requested (and I've said the program won't move forward without these lines and additional funding) that will add capacity to teach these new courses. For SDS faculty wanting to have data science PhD students, participation in the seminar will be one way to engage more deeply. If you want to see the details, the curriculog proposal is here.
>
> Beyond these core courses, we expect the majority of courses to be either special topics or 8000 level courses (and potentially 6000 level for areas with MS degrees only) in other domain areas where we would add a few students each year to select courses. The students would likely be being advised/mentored by our joint/affiliate faculty that are in your department. The expectation would be that we would bolster the number of students by a few such that the course has more SCH being generated and thus more easily justified.
>
> I also expect to continue the practice that if SDS asks a faculty to teach a course that you would not normally teach or is over and above what your college has committed to SDS, that SDS would pay to buy them out of their load and you would receive funding directly to your department (currently $8000/section) to use to backfill teaching capacity or other needed expenditures. We have been doing this for our undergraduate courses with CHESS and it seems to work ok. We have also been cross listing/adding a few students to various courses from our MS program for quite a while so I'm expecting to keep the same process where we work with you, your faculty, and your schedulers on providing the right number of seats. We would also consider having seats for your students as appropriate in SDS courses (we do this today for some PhD students that want to take DSBA courses). The SDS PhD advisors and GPD are required to approve all course selections by students so there should not be anyone signing up that we are not aware of and would discuss with you.
>
> BTW-Each faculty that is part of SDS has at least a "consider cross-listing courses with SDS" in their affiliation MOU so I'm hoping this isn't a surprise that we may ask to add a few students to your graduate courses.
>
> Side Note: Our PhD planning committee discussed long and hard about how this transdisciplinary program fits together with all the other PhD programs. Their conclusion, which I agree with, is that this program will not compete for students as 1) the backgrounds required for entry into our programs are different and 2) the research needs/skills are different, and 3) the job profiles at the hiring entities are very different. and thus students will self-select through the application process and faculty would select different students based upon their research needs. If you'd like to discuss the thought process on this Jean-Claude Thill and Monica Johar were the co-chairs and can provide details.
>
> Please let me know if you have any questions, concerns or would like to dive deeper.
>
> Thanks
>
> Doug

Doug Hague (he/him/his)| Executive Director and Professor of Practice
School of Data Science | UNC Charlotte
1028D | Colvard Building
9105 University Road. | Charlotte, NC 28223
Phone: 704-562-6867 | dhague@charlotte.edu

--
J.P. Barfield, FACSM
Chair, Department of Applied Physiology, Health, & Clinical Sciences
College of Health and Human Services
UNC Charlotte
Belk 235; 704-687-1843
jpbarfield@charlotte.edu

Doug Hague <dhague@uncc.edu>

Re: Consult for PhD in Data Science-response requested this week.

1 message

Susan McLennon <smclenno@charlotte.edu> Tue, Oct 10, 2023 at 12:16 PM
To: Doug Hague <dhague@charlotte.edu>

I support this program

Sue

On Tue, Oct 10, 2023 at 11:51 AM Doug Hague <dhague@charlotte.edu> wrote:

> Jan, Susan, Diana, JP,
>
> Thanks for the quick discussion today during the EC meeting. I've been asked by the Graduate Council to gain support through consultations with Chairs/Directors. Since we've been collaborating through joint and affiliated faculty for a while, I wanted to document some practices and expected interactions with you and your faculty around the proposed PhD program. These should sound very familiar to you as the practices are just extending our current practices from our HIA/DSBA MS program to the new PhD program. Thus, after you read this long email please respond to me through email with a simple "I support this proposal." or a "I'd like to meet to discuss further." or a "This doesn't impact me." or, if you really feel this way, a "No, I'm not going to support this proposal." If you prefer, you can just send me a memo under your letterhead that states your response.
>
> Summary of expected collaborations/interactions.
> The new program consists of core courses in Ethics/Data Governance, Statistics for Data Science, Machine Learning, and Artificial Intelligence as well as seminars. I have new faculty lines requested (and I've said the program won't move forward without these lines and additional funding) that will add capacity to teach these new courses. For SDS faculty wanting to have data science PhD students, participation in the seminar will be one way to engage more deeply. If you want to see the details, the curriculog proposal is here.
>
> Beyond these core courses, we expect the majority of courses to be either special topics or 8000 level courses (and potentially 6000 level for areas with MS degrees only) in other domain areas where we would add a few students each year to select courses. The students would likely be being advised/mentored by our joint/affiliate faculty that are in your department. The expectation would be that we would bolster the number of students by a few such that the course has more SCH being generated and thus more easily justified.
>
> I also expect to continue the practice that if SDS asks a faculty to teach a course that you would not normally teach or is over and above what your college has committed to SDS, that SDS would pay to buy them out of their load and you would receive funding directly to your department (currently $8000/section) to use to backfill teaching capacity or other needed expenditures. We have been doing this for our undergraduate courses with CHESS and it seems to work ok. We have also been cross listing/adding a few students to various courses from our MS program for quite a while so I'm expecting to keep the same process where we work with you, your faculty, and your schedulers on providing the right number of seats. We would also consider having seats for your students as appropriate in SDS courses (we do this today for some PhD students that want to take DSBA courses). The SDS PhD advisors and GPD are required to approve all course selections by students so there should not be anyone signing up that we are not aware of and would discuss with you.
>
> BTW-Each faculty that is part of SDS has at least a "consider cross-listing courses with SDS" in their affiliation MOU so I'm hoping this isn't a surprise that we may ask to add a few students to your graduate courses.
>
> Side Note: Our PhD planning committee discussed long and hard about how this transdisciplinary program fits together with all the other PhD programs. Their conclusion, which I agree with, is that this program will not compete for students as 1) the backgrounds required for entry into our programs are different and 2) the research needs/skills are different, and 3) the job profiles at the hiring entities are very different. and thus students will self-select through the application process and faculty would select different students based upon their research needs. If you'd like to discuss the thought process on this Jean-Claude Thill and Monica Johar were the co-chairs and can provide details.
>
> Please let me know if you have any questions, concerns or would like to dive deeper.
>
> Thanks

Doug

Doug Hague (he/him/his)| Executive Director and Professor of Practice
School of Data Science | UNC Charlotte
1028D | Colvard Building
9105 University Road. | Charlotte, NC 28223
Phone: 704-562-6867 | dhague@charlotte.edu

--

Susan M. McLennon, PhD, APRN, CHPN
Professor, Director School of Nursing
Gerontology Program Affiliated Faculty
gerontology.charlotte.edu
University of North Carolina at Charlotte | School of Nursing, Room 449B
9201 University City Blvd. | Charlotte, NC 28223
704.687.7974
smclenno@charlotte.edu

Doug Hague <dhague@uncc.edu>

Re: Consult for PhD in Data Science-response requested this week.

1 message

Diana Rowan <drowan@charlotte.edu> Tue, Oct 10, 2023 at 12:07 PM
To: Doug Hague <dhague@charlotte.edu>

Hi Doug,

Thanks for this explanation of what was presented at our CHHS Executive Committee. The School of Social Work is in support of what you propose and we are willing to arrange for any of our faculty that are affiliated with the School of Data Science to be involved in course development and instruction. Let us know how we can be supportive!

Thanks,
Diana

Diana Rowan, Ph.D., MSW, LCSW (She, Her, Hers)
Professor and Interim Director - School of Social Work
Director, Academy for Veteran and Military Health
Affiliate Faculty - Department of Africana Studies
UNC Charlotte
9201 University City Blvd. | Charlotte, NC 28223
drowan@charlotte.edu

University of North Carolina at Charlotte horizontal logo

I live and work on colonized land traditionally belonging to the Catawba, Cheraw, Sugeree, Wateree, and Waxhaw Peoples and affirm Indigenous sovereignty, history, and contributions.

GREEN DOT Safe Zone QM Fifth Edition

On Tue, Oct 10, 2023 at 11:51 AM Doug Hague <dhague@charlotte.edu> wrote:

> Jan, Susan, Diana, JP,
>
> Thanks for the quick discussion today during the EC meeting. I've been asked by the Graduate Council to gain support through consultations with Chairs/Directors. Since we've been collaborating through joint and affiliated faculty for a while, I wanted to document some practices and expected interactions with you and your faculty around the proposed PhD program. These should sound very familiar to you as the practices are just extending our current practices from our HIA/DSBA MS program to the new PhD program. Thus, after you read this long email please respond to me through email with a simple "I support this proposal." or a "I'd like to meet to discuss further." or a "This doesn't impact me." or, if you really feel this way, a "No, I'm not going to support this proposal." If you prefer, you can just send me a memo under your letterhead that states your response.
>
> Summary of expected collaborations/interactions.
> The new program consists of core courses in Ethics/Data Governance, Statistics for Data Science, Machine Learning, and Artificial Intelligence as well as seminars. I have new faculty lines requested (and I've said the program won't move forward without these lines and additional funding) that will add capacity to teach these new courses. For SDS faculty wanting to have data science PhD students, participation in the seminar will be one way to engage more deeply. If you want to see the details, the curriculog proposal is here.

Beyond these core courses, we expect the majority of courses to be either special topics or 8000 level courses (and potentially 6000 level for areas with MS degrees only) in other domain areas where we would add a few students each year to select courses. The students would likely be being advised/mentored by our joint/affiliate faculty that are in your department. The expectation would be that we would bolster the number of students by a few such that the course has more SCH being generated and thus more easily justified.

I also expect to continue the practice that if SDS asks a faculty to teach a course that you would not normally teach or is over and above what your college has committed to SDS, that SDS would pay to buy them out of their load and you would receive funding directly to your department (currently $8000/section) to use to backfill teaching capacity or other needed expenditures. We have been doing this for our undergraduate courses with CHESS and it seems to work ok. We have also been cross listing/adding a few students to various courses from our MS program for quite a while so I'm expecting to keep the same process where we work with you, your faculty, and your schedulers on providing the right number of seats. We would also consider having seats for your students as appropriate in SDS courses (we do this today for some PhD students that want to take DSBA courses). The SDS PhD advisors and GPD are required to approve all course selections by students so there should not be anyone signing up that we are not aware of and would discuss with you.

BTW-Each faculty that is part of SDS has at least a "consider cross-listing courses with SDS" in their affiliation MOU so I'm hoping this isn't a surprise that we may ask to add a few students to your graduate courses.

Side Note: Our PhD planning committee discussed long and hard about how this transdisciplinary program fits together with all the other PhD programs. Their conclusion, which I agree with, is that this program will not compete for students as 1) the backgrounds required for entry into our programs are different and 2) the research needs/skills are different, and 3) the job profiles at the hiring entities are very different. and thus students will self-select through the application process and faculty would select different students based upon their research needs. If you'd like to discuss the thought process on this Jean-Claude Thill and Monica Johar were the co-chairs and can provide details.

Please let me know if you have any questions, concerns or would like to dive deeper.

Thanks

Doug

Doug Hague (he/him/his)| Executive Director and Professor of Practice
School of Data Science | UNC Charlotte
1028D | Colvard Building
9105 University Road. | Charlotte, NC 28223
Phone: 704-562-6867 | dhague@charlotte.edu

Doug Hague <dhague@uncc.edu>

Re: Consult for PhD in Data Science-response requested this week.

1 message

Jan Warren-Findlow <jwarren1@charlotte.edu> Thu, Oct 12, 2023 at 11:18 AM
To: Doug Hague <dhague@charlotte.edu>

The big issue for us is the mentoring aspect. Once we split into 2 departments, it gets tight for us to support, mentor, advise and Chair all the stuff for 40 PhD students that we already have. We already support several CCI PhD students (here's Jan gnashiing her teeth) while getting pressure from the Grad School about not supporting our own students.

I have no control over what faculty would choose to do in this instance. Having more students in methods courses is not an issue as long as they can work within our schedules. We would be unlikely to have any schedule flexibility given the many different constituents that we already have to serve.

So yes I support but with reservations.... does that help?

Jan Warren-Findlow, PhD @DrJanWF
Pronouns: she/her/herself
Dept. of Public Health Sciences | UNC Charlotte
Professor and Chair
voice: 704/687-7908 | fax: 704/687-1644
jwarren1@charlotte.edu | https://publichealth.charlotte.edu/
Join us on Twitter - @CLTPublicHealth
Jan's Zoom Room
UNIVERSITY OF NORTH CAROLINA CHARLOTTE | PUBLIC HEALTH SCIENCES

On Thu, Oct 12, 2023 at 9:51 AM Doug Hague <dhague@charlotte.edu> wrote:

> Jan,
>
> Any thoughts? Would you like to meet to discuss? I want to move the curriculog forward tomorrow so if you could respond by then that would be great (unless I missed your response already?). If you are not able to respond by then, I can always add to curriculog once it is back in my hands.
>
> Thanks
>
> Doug
>
> Doug Hague (he/him/his)| Executive Director and Professor of Practice
> School of Data Science | UNC Charlotte
> 1028D | Colvard Building
> 9105 University Road. | Charlotte, NC 28223
> Phone: 704-562-6867 | dhague@charlotte.edu

On Tue, Oct 10, 2023 at 11:51 AM Doug Hague <dhague@charlotte.edu> wrote:

> Jan, Susan, Diana, JP,
>
> Thanks for the quick discussion today during the EC meeting. I've been asked by the Graduate Council to gain support through consultations with Chairs/Directors. Since we've been collaborating through joint and affiliated faculty for a while, I wanted to document some practices and expected interactions with you and your faculty around the proposed PhD program. These should sound very familiar to you as the practices are just extending our current practices from our HIA/DSBA MS program to the new PhD program. Thus, after you read this long email please respond to me through email with a simple "I support this proposal." or a "I'd like to meet to discuss further." or a "This doesn't impact me." or, if you really feel this way, a "No, I'm not going to support this proposal." If you prefer, you can just send me a memo under your letterhead that states your response.
>
> Summary of expected collaborations/interactions.
> The new program consists of core courses in Ethics/Data Governance, Statistics for Data Science, Machine Learning, and Artificial Intelligence as well as seminars. I have new faculty lines requested (and I've said the program won't move forward without these lines and additional funding) that will add capacity to teach these new courses. For SDS faculty wanting to have data science PhD students, participation in the seminar will be one way to engage more deeply. If you want to see the details, the curriculog proposal is here.
>
> Beyond these core courses, we expect the majority of courses to be either special topics or 8000 level courses (and potentially 6000 level for areas with MS degrees only) in other domain areas where we would add a few students each year to select courses. The students would likely be being advised/mentored by our joint/affiliate faculty that are in your department. The expectation would be that we would bolster the number of students by a few such that the course has more SCH being generated and thus more easily justified.
>
> I also expect to continue the practice that if SDS asks a faculty to teach a course that you would not normally teach or is over and above what your college has committed to SDS, that SDS would pay to buy them out of their load and you would receive funding directly to your department (currently $8000/section) to use to backfill teaching capacity or other needed expenditures. We have been doing this for our undergraduate courses with CHESS and it seems to work ok. We have also been cross listing/adding a few students to various courses from our MS program for quite a while so I'm expecting to keep the same process where we work with you, your faculty, and your schedulers on providing the right number of seats. We would also consider having seats for your students as appropriate in SDS courses (we do this today for some PhD students that want to take DSBA courses). The SDS PhD advisors and GPD are required to approve all course selections by students so there should not be anyone signing up that we are not aware of and would discuss with you.
>
> BTW-Each faculty that is part of SDS has at least a "consider cross-listing courses with SDS" in their affiliation MOU so I'm hoping this isn't a surprise that we may ask to add a few students to your graduate courses.
>
> Side Note: Our PhD planning committee discussed long and hard about how this transdisciplinary program fits together with all the other PhD programs. Their conclusion, which I agree with, is that this program will not compete for students as 1) the backgrounds required for entry into our programs are different and 2) the research needs/skills are different, and 3) the job profiles at the hiring entities are very different. and thus students will self-select through the application process and faculty would select different students based upon their research needs. If you'd like to discuss the thought process on this Jean-Claude Thill and Monica Johar were the co-chairs and can provide details.
>
> Please let me know if you have any questions, concerns or would like to dive deeper.
>
> Thanks
>
> Doug
>
> Doug Hague (he/him/his)| Executive Director and Professor of Practice
> School of Data Science | UNC Charlotte
> 1028D | Colvard Building
> 9105 University Road. | Charlotte, NC 28223

Phone: 704-562-6867 | dhague@charlotte.edu

UNIVERSITY OF NORTH CAROLINA CHARLOTTE | SCHOOL OF DATA SCIENCE

CHARLOTTE
POLITICAL SCIENCE AND PUBLIC ADMINISTRATION

TO: Doug Hague, Executive Director and Professor of Practice
School of Data Science

FROM: Cheryl L. Brown
Chair, Department of Political Science and Public Administration

DATE: October 13, 2023

SUBJECT: Proposed Ph.D. Program in the School of Data Science

The Department of Political Science and Public Administration supports the proposed Ph.D. Program in the School of Data Science at the University of North Carolina at Charlotte.

At this time, we do not have any questions or concerns. We welcome continued updates.

UNC Charlotte
9201 University City Blvd.
Charlotte, NC 28213
704.687.8622 telephone
charlotte.edu

Doug Hague <dhague@uncc.edu>

Re: Official Consult for PhD in Data Science

1 message

Sara Gagne <sgagne@charlotte.edu> Mon, Oct 9, 2023 at 9:03 AM
To: Doug Hague <dhague@charlotte.edu>

Hi Doug,

Thanks for the update. I support this proposal.

Sara

Sara A. Gagné, PhD
Chair and Associate Professor of Landscape Ecology
Editor-in-Chief, Current Landscape Ecology Reports
UNC Charlotte | Dept. of Geography and Earth Sciences
McEniry 317
9201 University City Blvd. | Charlotte, NC 28223
704-687-5976
www.saragagne.com
@urban_nature_clt

On Wed, Oct 4, 2023 at 3:12 PM Doug Hague <dhague@charlotte.edu> wrote:

> CHESS Chairs with SDS faculty, and interdisciplinary program Directors,
>
> While I have talked to many of you about the PhD in Data Science proposal and we've been collaborating through joint and affiliated faculty for a while, I wanted to document some practices and expected interactions with you and your faculty around the proposed PhD program. These should sound very familiar to you as the practices are just extending our current practices from our DSBA MS program to the new PhD program. Also, as we talked with the Graduate Council, in addition to having each college provide approval as part of the SDS Board, they would like to have documented consults with the Chairs. Thus, after you read this long email please respond to me through email with a simple "I support this proposal." or a "I'd like to meet to discuss further." or a "This doesn't impact me." or, if you really feel this way, a "No, I'm not going to support this proposal." If you prefer, you can just send me a memo under your letterhead that states your response.
>
> Summary of expected collaborations/interactions.
> The new program consists of core courses in Ethics/Data Governance, Statistics for Data Science, Machine Learning, and Artificial Intelligence as well as seminars. I have new faculty lines requested (and I've said the program won't move forward without these lines and additional funding) that will add capacity to teach these new courses. For SDS faculty wanting to have data science PhD students, participation in the seminar will be one way to engage more deeply. If you want to see the details, the curriculog proposal is here.
>
> Beyond these core courses, we expect the majority of courses to be either special topics or 8000 level courses (and potentially 6000 level for areas with MS degrees only) in other domain areas where we would add a few students each year to select courses. The students would likely be being advised/mentored by our joint/affiliate faculty that are in your department. The expectation would be that we would bolster the number of students by a few such that the course has more SCH being generated and thus more easily justified.
>
> I also expect to continue the practice that if SDS asks a faculty to teach a course that you would not normally teach or is over and above what your college has committed to SDS, that SDS would pay to buy them out of their load and you would receive funding directly to your department (currently $8000/section) to use to backfill teaching capacity or other

needed expenditures. We have been doing this for our undergraduate courses with CHESS and it seems to work ok. We have also been cross listing/adding a few students to various courses from our MS program for quite a while so I'm expecting to keep the same process where we work with you, your faculty, and your schedulers on providing the right number of seats. We would also consider having seats for your students as appropriate in SDS courses (we do this today for some PhD students that want to take DSBA courses). The SDS PhD advisors and GPD are required to approve all course selections by students so there should not be anyone signing up that we are not aware of and would discuss with you.

BTW-Each faculty that is part of SDS has at least a "consider cross-listing courses with SDS" in their affiliation MOU so I'm hoping this isn't a surprise that we may ask to add a few students to your graduate courses.

Side Note: Our PhD planning committee discussed long and hard about how this transdisciplinary program fits together with all the other PhD programs. Their conclusion, which I agree with, is that this program will not compete for students as 1) the backgrounds required for entry into our programs are different and 2) the research needs/skills are different, and 3) the job profiles at the hiring entities are very different. and thus students will self-select through the application process and faculty would select different students based upon their research needs. If you'd like to discuss the thought process on this Jean-Claude Thill and Monica Johar were the co-chairs and can provide details.

Please let me know if you have any questions, concerns or would like to dive deeper.

Thanks

Doug

Doug Hague (he/him/his)| Executive Director and Professor of Practice
School of Data Science | UNC Charlotte
1028D | Colvard Building
9105 University Road. | Charlotte, NC 28223
Phone: 704-562-6867 | dhague@charlotte.edu

Re: Official Consult for PhD in Data Science

1 message

Daniel Grano <dgrano@charlotte.edu> Thu, Oct 5, 2023 at 11:40 AM
To: Doug Hague <dhague@charlotte.edu>

Hi Doug,

Thank you for sending this along. I support this proposal.

Best,

Dan

On Wed, Oct 4, 2023 at 3:12 PM Doug Hague <dhague@charlotte.edu> wrote:

> CHESS Chairs with SDS faculty, and interdisciplinary program Directors,
>
> While I have talked to many of you about the PhD in Data Science proposal and we've been collaborating through joint and affiliated faculty for a while, I wanted to document some practices and expected interactions with you and your faculty around the proposed PhD program. These should sound very familiar to you as the practices are just extending our current practices from our DSBA MS program to the new PhD program. Also, as we talked with the Graduate Council, in addition to having each college provide approval as part of the SDS Board, they would like to have documented consults with the Chairs. Thus, after you read this long email please respond to me through email with a simple "I support this proposal." or a "I'd like to meet to discuss further." or a "This doesn't impact me." or, if you really feel this way, a "No, I'm not going to support this proposal." If you prefer, you can just send me a memo under your letterhead that states your response.
>
> Summary of expected collaborations/interactions.
> The new program consists of core courses in Ethics/Data Governance, Statistics for Data Science, Machine Learning, and Artificial Intelligence as well as seminars. I have new faculty lines requested (and I've said the program won't move forward without these lines and additional funding) that will add capacity to teach these new courses. For SDS faculty wanting to have data science PhD students, participation in the seminar will be one way to engage more deeply. If you want to see the details, the curriculog proposal is here.
>
> Beyond these core courses, we expect the majority of courses to be either special topics or 8000 level courses (and potentially 6000 level for areas with MS degrees only) in other domain areas where we would add a few students each year to select courses. The students would likely be being advised/mentored by our joint/affiliate faculty that are in your department. The expectation would be that we would bolster the number of students by a few such that the course has more SCH being generated and thus more easily justified.
>
> I also expect to continue the practice that if SDS asks a faculty to teach a course that you would not normally teach or is over and above what your college has committed to SDS, that SDS would pay to buy them out of their load and you would receive funding directly to your department (currently $8000/section) to use to backfill teaching capacity or other needed expenditures. We have been doing this for our undergraduate courses with CHESS and it seems to work ok. We have also been cross listing/adding a few students to various courses from our MS program for quite a while so I'm expecting to keep the same process where we work with you, your faculty, and your schedulers on providing the right number of seats. We would also consider having seats for your students as appropriate in SDS courses (we do this today for some PhD students that want to take DSBA courses). The SDS PhD advisors and GPD are required to approve all course selections by students so there should not be anyone signing up that we are not aware of and would discuss with you.
>
> BTW-Each faculty that is part of SDS has at least a "consider cross-listing courses with SDS" in their affiliation MOU so I'm hoping this isn't a surprise that we may ask to add a few students to your graduate courses.
>
> Side Note: Our PhD planning committee discussed long and hard about how this transdisciplinary program fits together with all the other PhD programs. Their conclusion, which I agree with, is that this program will not compete for students as 1) the backgrounds required for entry into our programs are different and 2) the research needs/skills are different, and 3) the job profiles at the hiring entities are very different. and thus students will self-select through the application

process and faculty would select different students based upon their research needs. If you'd like to discuss the thought process on this Jean-Claude Thill and Monica Johar were the co-chairs and can provide details.

Please let me know if you have any questions, concerns or would like to dive deeper.

Thanks

Doug

Doug Hague (he/him/his)| Executive Director and Professor of Practice
School of Data Science | UNC Charlotte
1028D | Colvard Building
9105 University Road. | Charlotte, NC 28223
Phone: 704-562-6867 | dhague@charlotte.edu

--
Daniel A. Grano, Ph.D
Professor and Department Chair, Department of Communication Studies
Core Faculty, Health & Medical Humanities Program
Faculty Affiliate, American Studies
5058 Colvard
University of North Carolina at Charlotte
9201 University City Boulevard
Charlotte, NC 28223

Pronouns: he, him, his

Email: dgrano@charlotte.edu

schedule an appointment with me: https://calendly.com/dan_grano

Doug Hague <dhague@uncc.edu>

Re: Official Consult for PhD in Data Science

1 message

Scott T Fitzgerald <sfitzger@charlotte.edu> Thu, Oct 5, 2023 at 1:39 PM
To: Doug Hague <dhague@charlotte.edu>

Hi Doug,

I support this proposal.

-Scott

On Wed, Oct 4, 2023 at 3:12 PM Doug Hague <dhague@charlotte.edu> wrote:

> CHESS Chairs with SDS faculty, and interdisciplinary program Directors,
>
> While I have talked to many of you about the PhD in Data Science proposal and we've been collaborating through joint and affiliated faculty for a while, I wanted to document some practices and expected interactions with you and your faculty around the proposed PhD program. These should sound very familiar to you as the practices are just extending our current practices from our DSBA MS program to the new PhD program. Also, as we talked with the Graduate Council, in addition to having each college provide approval as part of the SDS Board, they would like to have documented consults with the Chairs. Thus, after you read this long email please respond to me through email with a simple "I support this proposal." or a "I'd like to meet to discuss further." or a "This doesn't impact me." or, if you really feel this way, a "No, I'm not going to support this proposal." If you prefer, you can just send me a memo under your letterhead that states your response.
>
> Summary of expected collaborations/interactions.
> The new program consists of core courses in Ethics/Data Governance, Statistics for Data Science, Machine Learning, and Artificial Intelligence as well as seminars. I have new faculty lines requested (and I've said the program won't move forward without these lines and additional funding) that will add capacity to teach these new courses. For SDS faculty wanting to have data science PhD students, participation in the seminar will be one way to engage more deeply. If you want to see the details, the curriculog proposal is here.
>
> Beyond these core courses, we expect the majority of courses to be either special topics or 8000 level courses (and potentially 6000 level for areas with MS degrees only) in other domain areas where we would add a few students each year to select courses. The students would likely be being advised/mentored by our joint/affiliate faculty that are in your department. The expectation would be that we would bolster the number of students by a few such that the course has more SCH being generated and thus more easily justified.
>
> I also expect to continue the practice that if SDS asks a faculty to teach a course that you would not normally teach or is over and above what your college has committed to SDS, that SDS would pay to buy them out of their load and you would receive funding directly to your department (currently $8000/section) to use to backfill teaching capacity or other needed expenditures. We have been doing this for our undergraduate courses with CHESS and it seems to work ok. We have also been cross listing/adding a few students to various courses from our MS program for quite a while so I'm expecting to keep the same process where we work with you, your faculty, and your schedulers on providing the right number of seats. We would also consider having seats for your students as appropriate in SDS courses (we do this today for some PhD students that want to take DSBA courses). The SDS PhD advisors and GPD are required to approve all course selections by students so there should not be anyone signing up that we are not aware of and would discuss with you.
>
> BTW-Each faculty that is part of SDS has at least a "consider cross-listing courses with SDS" in their affiliation MOU so I'm hoping this isn't a surprise that we may ask to add a few students to your graduate courses.
>
> Side Note: Our PhD planning committee discussed long and hard about how this transdisciplinary program fits together with all the other PhD programs. Their conclusion, which I agree with, is that this program will not compete for students as 1) the backgrounds required for entry into our programs are different and 2) the research needs/skills are different, and 3) the job profiles at the hiring entities are very different. and thus students will self-select through the application

process and faculty would select different students based upon their research needs. If you'd like to discuss the thought process on this Jean-Claude Thill and Monica Johar were the co-chairs and can provide details.

Please let me know if you have any questions, concerns or would like to dive deeper.

Thanks

Doug

Doug Hague (he/him/his)| Executive Director and Professor of Practice
School of Data Science | UNC Charlotte
1028D | Colvard Building
9105 University Road. | Charlotte, NC 28223
Phone: 704-562-6867 | dhague@charlotte.edu

Scott T. Fitzgerald, Ph.D.
Professor & Chair, Department of Sociology
Professor, Public Policy
UNC Charlotte
Phone: 704-687-7805 Office: Fretwell 476-F
sfitzger@charlotte.edu | https://pages.uncc.edu/scott-fitzgerald/
Pronouns: he/him/his

The University of North Carolina at Charlotte acknowledges that we are on colonized land traditionally belonging to the Catawba, Cheraw, Sugeree, Wateree, and Waxhaw Peoples, all of whom have stewarded this land throughout the generations.

--

Doug Hague <dhague@uncc.edu>

Re: Official Consult for PhD in Data Science

1 message

Trevor Pearce <tpearce6@uncc.edu> Wed, Oct 4, 2023 at 4:24 PM
To: Doug Hague <dhague@charlotte.edu>

I support this proposal.

On Wed, Oct 4, 2023 at 3:13 PM Doug Hague <dhague@charlotte.edu> wrote:

> CHESS Chairs with SDS faculty, and interdisciplinary program Directors,
>
> While I have talked to many of you about the PhD in Data Science proposal and we've been collaborating through joint and affiliated faculty for a while, I wanted to document some practices and expected interactions with you and your faculty around the proposed PhD program. These should sound very familiar to you as the practices are just extending our current practices from our DSBA MS program to the new PhD program. Also, as we talked with the Graduate Council, in addition to having each college provide approval as part of the SDS Board, they would like to have documented consults with the Chairs. Thus, after you read this long email please respond to me through email with a simple "I support this proposal." or a "I'd like to meet to discuss further." or a "This doesn't impact me." or, if you really feel this way, a "No, I'm not going to support this proposal." If you prefer, you can just send me a memo under your letterhead that states your response.
>
> Summary of expected collaborations/interactions.
> The new program consists of core courses in Ethics/Data Governance, Statistics for Data Science, Machine Learning, and Artificial Intelligence as well as seminars. I have new faculty lines requested (and I've said the program won't move forward without these lines and additional funding) that will add capacity to teach these new courses. For SDS faculty wanting to have data science PhD students, participation in the seminar will be one way to engage more deeply. If you want to see the details, the curriculog proposal is here.
>
> Beyond these core courses, we expect the majority of courses to be either special topics or 8000 level courses (and potentially 6000 level for areas with MS degrees only) in other domain areas where we would add a few students each year to select courses. The students would likely be being advised/mentored by our joint/affiliate faculty that are in your department. The expectation would be that we would bolster the number of students by a few such that the course has more SCH being generated and thus more easily justified.
>
> I also expect to continue the practice that if SDS asks a faculty to teach a course that you would not normally teach or is over and above what your college has committed to SDS, that SDS would pay to buy them out of their load and you would receive funding directly to your department (currently $8000/section) to use to backfill teaching capacity or other needed expenditures. We have been doing this for our undergraduate courses with CHESS and it seems to work ok. We have also been cross listing/adding a few students to various courses from our MS program for quite a while so I'm expecting to keep the same process where we work with you, your faculty, and your schedulers on providing the right number of seats. We would also consider having seats for your students as appropriate in SDS courses (we do this today for some PhD students that want to take DSBA courses). The SDS PhD advisors and GPD are required to approve all course selections by students so there should not be anyone signing up that we are not aware of and would discuss with you.
>
> BTW-Each faculty that is part of SDS has at least a "consider cross-listing courses with SDS" in their affiliation MOU so I'm hoping this isn't a surprise that we may ask to add a few students to your graduate courses.
>
> Side Note: Our PhD planning committee discussed long and hard about how this transdisciplinary program fits together with all the other PhD programs. Their conclusion, which I agree with, is that this program will not compete for students as 1) the backgrounds required for entry into our programs are different and 2) the research needs/skills are different, and 3) the job profiles at the hiring entities are very different. and thus students will self-select through the application process and faculty would select different students based upon their research needs. If you'd like to discuss the thought process on this Jean-Claude Thill and Monica Johar were the co-chairs and can provide details.
>
> Please let me know if you have any questions, concerns or would like to dive deeper.
>
> Thanks

Doug

Doug Hague (he/him/his)| Executive Director and Professor of Practice
School of Data Science | UNC Charlotte
1028D | Colvard Building
9105 University Road. | Charlotte, NC 28223
Phone: 704-562-6867 | dhague@charlotte.edu

Doug Hague <dhague@uncc.edu>

Re: Official Consult for PhD in Data Science

1 message

Elizabeth Stearns <elizabeth.stearns@charlotte.edu> Fri, Oct 6, 2023 at 4:06 PM
To: Doug Hague <dhague@charlotte.edu>

> Doug,
>
> On behalf of the Public Policy program, I offer support for the proposed doctoral program in Data Science and look forward to our future collaborations.
>
> Best,
> Elizabeth
>
> On Wed, Oct 4, 2023 at 3:12 PM Doug Hague <dhague@charlotte.edu> wrote:
> > CHESS Chairs with SDS faculty, and interdisciplinary program Directors,
> >
> > While I have talked to many of you about the PhD in Data Science proposal and we've been collaborating through joint and affiliated faculty for a while, I wanted to document some practices and expected interactions with you and your faculty around the proposed PhD program. These should sound very familiar to you as the practices are just extending our current practices from our DSBA MS program to the new PhD program. Also, as we talked with the Graduate Council, in addition to having each college provide approval as part of the SDS Board, they would like to have documented consults with the Chairs. Thus, after you read this long email please respond to me through email with a simple "I support this proposal." or a "I'd like to meet to discuss further." or a "This doesn't impact me." or, if you really feel this way, a "No, I'm not going to support this proposal." If you prefer, you can just send me a memo under your letterhead that states your response.
> >
> > Summary of expected collaborations/interactions.
> > The new program consists of core courses in Ethics/Data Governance, Statistics for Data Science, Machine Learning, and Artificial Intelligence as well as seminars. I have new faculty lines requested (and I've said the program won't move forward without these lines and additional funding) that will add capacity to teach these new courses. For SDS faculty wanting to have data science PhD students, participation in the seminar will be one way to engage more deeply. If you want to see the details, the curriculog proposal is here.
> >
> > Beyond these core courses, we expect the majority of courses to be either special topics or 8000 level courses (and potentially 6000 level for areas with MS degrees only) in other domain areas where we would add a few students each year to select courses. The students would likely be being advised/mentored by our joint/affiliate faculty that are in your department. The expectation would be that we would bolster the number of students by a few such that the course has more SCH being generated and thus more easily justified.
> >
> > I also expect to continue the practice that if SDS asks a faculty to teach a course that you would not normally teach or is over and above what your college has committed to SDS, that SDS would pay to buy them out of their load and you would receive funding directly to your department (currently $8000/section) to use to backfill teaching capacity or other needed expenditures. We have been doing this for our undergraduate courses with CHESS and it seems to work ok. We have also been cross listing/adding a few students to various courses from our MS program for quite a while so I'm expecting to keep the same process where we work with you, your faculty, and your schedulers on providing the right number of seats. We would also consider having seats for your students as appropriate in SDS courses (we do this today for some PhD students that want to take DSBA courses). The SDS PhD advisors and GPD are required to approve all course selections by students so there should not be anyone signing up that we are not aware of and would discuss with you.
> >
> > BTW-Each faculty that is part of SDS has at least a "consider cross-listing courses with SDS" in their affiliation MOU so I'm hoping this isn't a surprise that we may ask to add a few students to your graduate courses.
> >
> > Side Note: Our PhD planning committee discussed long and hard about how this transdisciplinary program fits together with all the other PhD programs. Their conclusion, which I agree with, is that this program will not compete for students as 1) the backgrounds required for entry into our programs are different and 2) the research needs/skills are different, and 3) the job profiles at the hiring entities are very different. and thus students will self-select through

the application process and faculty would select different students based upon their research needs. If you'd like to discuss the thought process on this Jean-Claude Thill and Monica Johar were the co-chairs and can provide details.

Please let me know if you have any questions, concerns or would like to dive deeper.

Thanks

Doug

Doug Hague (he/him/his)| Executive Director and Professor of Practice
School of Data Science | UNC Charlotte
1028D | Colvard Building
9105 University Road. | Charlotte, NC 28223
Phone: 704-562-6867 | dhague@charlotte.edu

--

****

Elizabeth Stearns, Ph.D.

Professor of Sociology and Public Policy

Director, Public Policy Program

Associate Chair in Sociology

University of North Carolina at Charlotte

9201 University City Blvd.

Charlotte, NC 28223

704-687-7834

elizabeth.stearns@charlotte.edu

Pronouns: she, her, hers

The University of North Carolina at Charlotte acknowledges that we are on colonized land traditionally belonging to the Catawba, Cheraw, Sugeree, Wateree, and Waxhaw Peoples, all of whom have stewarded this land throughout the generations.

--

****

Elizabeth Stearns, Ph.D.

Professor of Sociology and Public Policy

Director, Public Policy Program

Associate Chair in Sociology

University of North Carolina at Charlotte

9201 University City Blvd.

Charlotte, NC 28223

704-687-7834

elizabeth.stearns@charlotte.edu

Pronouns: she, her, hers

The University of North Carolina at Charlotte acknowledges that we are on colonized land traditionally belonging to the Catawba, Cheraw, Sugeree, Wateree, and Waxhaw Peoples, all of whom have stewarded this land throughout the generations.

Doug Hague <dhague@uncc.edu>

Re: Official Consult for PhD in Data Science

1 message

Scott Tonidandel <scott.tonidandel@charlotte.edu> Thu, Oct 5, 2023 at 7:44 AM
To: Doug Hague <dhague@charlotte.edu>

Hi Doug,

I support this proposal.

Best,
Scott T

On Wed, Oct 4, 2023 at 3:12 PM Doug Hague <dhague@charlotte.edu> wrote:

> CHESS Chairs with SDS faculty, and interdisciplinary program Directors,
>
> While I have talked to many of you about the PhD in Data Science proposal and we've been collaborating through joint and affiliated faculty for a while, I wanted to document some practices and expected interactions with you and your faculty around the proposed PhD program. These should sound very familiar to you as the practices are just extending our current practices from our DSBA MS program to the new PhD program. Also, as we talked with the Graduate Council, in addition to having each college provide approval as part of the SDS Board, they would like to have documented consults with the Chairs. Thus, after you read this long email please respond to me through email with a simple "I support this proposal." or a "I'd like to meet to discuss further." or a "This doesn't impact me." or, if you really feel this way, a "No, I'm not going to support this proposal." If you prefer, you can just send me a memo under your letterhead that states your response.
>
> Summary of expected collaborations/interactions.
> The new program consists of core courses in Ethics/Data Governance, Statistics for Data Science, Machine Learning, and Artificial Intelligence as well as seminars. I have new faculty lines requested (and I've said the program won't move forward without these lines and additional funding) that will add capacity to teach these new courses. For SDS faculty wanting to have data science PhD students, participation in the seminar will be one way to engage more deeply. If you want to see the details, the curriculog proposal is here.
>
> Beyond these core courses, we expect the majority of courses to be either special topics or 8000 level courses (and potentially 6000 level for areas with MS degrees only) in other domain areas where we would add a few students each year to select courses. The students would likely be being advised/mentored by our joint/affiliate faculty that are in your department. The expectation would be that we would bolster the number of students by a few such that the course has more SCH being generated and thus more easily justified.
>
> I also expect to continue the practice that if SDS asks a faculty to teach a course that you would not normally teach or is over and above what your college has committed to SDS, that SDS would pay to buy them out of their load and you would receive funding directly to your department (currently $8000/section) to use to backfill teaching capacity or other needed expenditures. We have been doing this for our undergraduate courses with CHESS and it seems to work ok. We have also been cross listing/adding a few students to various courses from our MS program for quite a while so I'm expecting to keep the same process where we work with you, your faculty, and your schedulers on providing the right number of seats. We would also consider having seats for your students as appropriate in SDS courses (we do this today for some PhD students that want to take DSBA courses). The SDS PhD advisors and GPD are required to approve all course selections by students so there should not be anyone signing up that we are not aware of and would discuss with you.
>
> BTW-Each faculty that is part of SDS has at least a "consider cross-listing courses with SDS" in their affiliation MOU so I'm hoping this isn't a surprise that we may ask to add a few students to your graduate courses.
>
> Side Note: Our PhD planning committee discussed long and hard about how this transdisciplinary program fits together with all the other PhD programs. Their conclusion, which I agree with, is that this program will not compete for students as 1) the backgrounds required for entry into our programs are different and 2) the research needs/skills are different, and 3) the job profiles at the hiring entities are very different. and thus students will self-select through the application process and faculty would select different students based upon their research needs. If you'd like to discuss the thought process on this Jean-Claude Thill and Monica Johar were the co-chairs and can provide details.

Please let me know if you have any questions, concerns or would like to dive deeper.

Thanks

Doug

Doug Hague (he/him/his)| Executive Director and Professor of Practice
School of Data Science | UNC Charlotte
1028D | Colvard Building
9105 University Road. | Charlotte, NC 28223
Phone: 704-562-6867 | dhague@charlotte.edu

Doug Hague <dhague@uncc.edu>

Re: Official Consult for PhD in Data Science

1 message

Michael Turner <mgturner@uncc.edu> Thu, Oct 5, 2023 at 4:00 AM
To: Doug Hague <dhague@charlotte.edu>

Hi Doug

I support this proposal and look forward to continuing our relationship with SDS.

Take care

Mt

Sent from my iPhone

> On Oct 4, 2023, at 9:13 PM, Doug Hague <dhague@charlotte.edu> wrote:
>
> CHESS Chairs with SDS faculty, and interdisciplinary program Directors,
>
> While I have talked to many of you about the PhD in Data Science proposal and we've been collaborating through joint and affiliated faculty for a while, I wanted to document some practices and expected interactions with you and your faculty around the proposed PhD program. These should sound very familiar to you as the practices are just extending our current practices from our DSBA MS program to the new PhD program. Also, as we talked with the Graduate Council, in addition to having each college provide approval as part of the SDS Board, they would like to have documented consults with the Chairs. Thus, after you read this long email please respond to me through email with a simple "I support this proposal." or a "I'd like to meet to discuss further." or a "This doesn't impact me." or, if you really feel this way, a "No, I'm not going to support this proposal." If you prefer, you can just send me a memo under your letterhead that states your response.
>
> Summary of expected collaborations/interactions.
> The new program consists of core courses in Ethics/Data Governance, Statistics for Data Science, Machine Learning, and Artificial Intelligence as well as seminars. I have new faculty lines requested (and I've said the program won't move forward without these lines and additional funding) that will add capacity to teach these new courses. For SDS faculty wanting to have data science PhD students, participation in the seminar will be one way to engage more deeply. If you want to see the details, the curriculog proposal is here.
>
> Beyond these core courses, we expect the majority of courses to be either special topics or 8000 level courses (and potentially 6000 level for areas with MS degrees only) in other domain areas where we would add a few students each year to select courses. The students would likely be being advised/mentored by our joint/affiliate faculty that are in your department. The expectation would be that we would bolster the number of students by a few such that the course has more SCH being generated and thus more easily justified.
>
> I also expect to continue the practice that if SDS asks a faculty to teach a course that you would not normally teach or is over and above what your college has committed to SDS, that SDS would pay to buy them out of their load and you would receive funding directly to your department (currently $8000/section) to use to backfill teaching capacity or other needed expenditures. We have been doing this for our undergraduate courses with CHESS and it seems to work ok. We have also been cross listing/adding a few students to various courses from our MS program for quite a while so I'm expecting to keep the same process where we work with you, your faculty, and your schedulers on providing the right number of seats. We would also consider having seats for your students as appropriate in SDS courses (we do this today for some PhD students that want to take DSBA courses). The SDS PhD advisors and GPD are required to

approve all course selections by students so there should not be anyone signing up that we are not aware of and would discuss with you.

BTW-Each faculty that is part of SDS has at least a "consider cross-listing courses with SDS" in their affiliation MOU so I'm hoping this isn't a surprise that we may ask to add a few students to your graduate courses.

Side Note: Our PhD planning committee discussed long and hard about how this transdisciplinary program fits together with all the other PhD programs. Their conclusion, which I agree with, is that this program will not compete for students as 1) the backgrounds required for entry into our programs are different and 2) the research needs/skills are different, and 3) the job profiles at the hiring entities are very different. and thus students will self-select through the application process and faculty would select different students based upon their research needs. If you'd like to discuss the thought process on this Jean-Claude Thill and Monica Johar were the co-chairs and can provide details.

Please let me know if you have any questions, concerns or would like to dive deeper.

Thanks

Doug

Doug Hague (he/him/his)| Executive Director and Professor of Practice
School of Data Science | UNC Charlotte
1028D | Colvard Building
9105 University Road. | Charlotte, NC 28223
Phone: 704-562-6867 | dhague@charlotte.edu

Doug Hague <dhague@uncc.edu>

Re: Request for support/feedback on PhD in Data Science

1 message

Glenn Boreman <gboreman@charlotte.edu> Thu, Oct 5, 2023 at 11:51 AM
To: Doug Hague <dhague@charlotte.edu>

I support this proposal

Glenn D. Boreman
Professor and Chair, Dept. of Physics & Optical Science
Director, Opto Center
University of North Carolina at Charlotte

On Wed, Oct 4, 2023 at 3:31 PM Doug Hague <dhague@charlotte.edu> wrote:

> Glenn, TK, Christine,
>
> While I have talked to some of you about the PhD in Data Science proposal and we've been collaborating through joint and affiliated faculty for a while, I wanted to document some practices and expected interactions with you and your faculty around the proposed PhD program. These should sound very familiar to you as the practices are just extending our current practices from our DSBA MS program to the new PhD program. Also, as we talked with the Graduate Council this week, in addition to having each college provide approval as part of the SDS Board, they would like to have documented consults with the Chairs. Thus, after you read this long email please respond to me through email with a simple "I support this proposal." or a "I'd like to meet to discuss further." or a "This doesn't impact me." or, if you really feel this way, a "No, I'm not going to support this proposal." If you prefer, you can just send me a memo under your letterhead that states your response.
>
> Summary of expected collaborations/interactions.
> The new program consists of core courses in Ethics/Data Governance, Statistics for Data Science, Machine Learning, and Artificial Intelligence as well as seminars. I have new faculty lines requested (and I've said the program won't move forward without these lines and additional funding) that will add capacity to teach these new courses. For SDS faculty wanting to have data science PhD students, participation in the seminar will be one way to engage more deeply. If you want to see the details, the curriculog proposal is here.
>
> Beyond these core courses, we expect the majority of courses to be either special topics or 8000 level courses (and potentially 6000 level for areas with MS degrees only) in other domain areas where we would add a few students each year to select courses. The students would likely be being advised/mentored by our joint/affiliate faculty that are in your department. The expectation would be that we would bolster the number of students by a few such that the course has more SCH being generated and thus more easily justified.
>
> I also expect to continue the practice that if SDS asks a faculty to teach a course that you would not normally teach or is over and above what your college has committed to SDS, that SDS would pay to buy them out of their load and you would receive funding directly to your department (currently $8000/section) to use to backfill teaching capacity or other needed expenditures. We have been doing this for our undergraduate courses with CHESS and it seems to work ok. We have also been cross listing/adding a few students to various courses from our MS program for quite a while so I'm expecting to keep the same process where we work with you, your faculty, and your schedulers on providing the right number of seats. We would also consider having seats for your students as appropriate in SDS courses (we do this today for some PhD students that want to take DSBA courses). The SDS PhD advisors and GPD are required to approve all course selections by students so there should not be anyone signing up that we are not aware of and would discuss with you.
>
> BTW-Each faculty that is part of SDS has at least a "consider cross-listing courses with SDS" in their affiliation MOU so I'm hoping this isn't a surprise that we may ask to add a few students to your graduate courses.
>
> Side Note: Our PhD planning committee discussed long and hard about how this transdisciplinary program fits together with all the other PhD programs. Their conclusion, which I agree with, is that this program will not compete for students as 1) the backgrounds required for entry into our programs are different and 2) the research needs/skills are different, and 3) the job profiles at the hiring entities are very different. and thus students will self-select through the application

process and faculty would select different students based upon their research needs. If you'd like to discuss the thought process on this Jean-Claude Thill and Monica Johar were the co-chairs and can provide details.

Please let me know if you have any questions, concerns or would like to dive deeper.

Thanks

Doug
Doug Hague (he/him/his)| Executive Director and Professor of Practice
School of Data Science | UNC Charlotte
1028D | Colvard Building
9105 University Road. | Charlotte, NC 28223
Phone: 704-562-6867 | dhague@charlotte.edu

Doug Hague <dhague@uncc.edu>

Re: Request for support/feedback on PhD in Data Science

1 message

Taufiquar Khan <taufiquar.khan@charlotte.edu> Wed, Oct 4, 2023 at 3:59 PM
To: Doug Hague <dhague@charlotte.edu>
Cc: Glenn Boreman <gboreman@uncc.edu>, Christine Richardson <caricha2@charlotte.edu>

Doug,

I support the proposal.

We have several faculty in our department who are affiliates of your school as well as I believe several of us were involved in the discussions of this particular proposal. As we have been already collaborating in terms of math and stat courses to offer for your undergrad to MS and now in the future PhD students in data science, we will need additional lines as you have already indicated in your proposal.

Please let me know if you need any further information or details.

Thanks,

-TK

On Wed, Oct 4, 2023 at 3:31 PM Doug Hague <dhague@charlotte.edu> wrote:

> Glenn, TK, Christine,
>
> While I have talked to some of you about the PhD in Data Science proposal and we've been collaborating through joint and affiliated faculty for a while, I wanted to document some practices and expected interactions with you and your faculty around the proposed PhD program. These should sound very familiar to you as the practices are just extending our current practices from our DSBA MS program to the new PhD program. Also, as we talked with the Graduate Council this week, in addition to having each college provide approval as part of the SDS Board, they would like to have documented consults with the Chairs. Thus, after you read this long email please respond to me through email with a simple "I support this proposal." or a "I'd like to meet to discuss further." or a "This doesn't impact me." or, if you really feel this way, a "No, I'm not going to support this proposal." If you prefer, you can just send me a memo under your letterhead that states your response.
>
> Summary of expected collaborations/interactions.
> The new program consists of core courses in Ethics/Data Governance, Statistics for Data Science, Machine Learning, and Artificial Intelligence as well as seminars. I have new faculty lines requested (and I've said the program won't move forward without these lines and additional funding) that will add capacity to teach these new courses. For SDS faculty wanting to have data science PhD students, participation in the seminar will be one way to engage more deeply. If you want to see the details, the curriculog proposal is here.
>
> Beyond these core courses, we expect the majority of courses to be either special topics or 8000 level courses (and potentially 6000 level for areas with MS degrees only) in other domain areas where we would add a few students each year to select courses. The students would likely be being advised/mentored by our joint/affiliate faculty that are in your department. The expectation would be that we would bolster the number of students by a few such that the course has more SCH being generated and thus more easily justified.
>
> I also expect to continue the practice that if SDS asks a faculty to teach a course that you would not normally teach or is over and above what your college has committed to SDS, that SDS would pay to buy them out of their load and you would receive funding directly to your department (currently $8000/section) to use to backfill teaching capacity or other needed expenditures. We have been doing this for our undergraduate courses with CHESS and it seems to work ok. We have also been cross listing/adding a few students to various courses from our MS program for quite a while so I'm expecting to keep the same process where we work with you, your faculty, and your schedulers on providing the right number of seats. We would also consider having seats for your students as appropriate in SDS courses (we do this today for some PhD students that want to take DSBA courses). The SDS PhD advisors and GPD are required to approve all course selections by students so there should not be anyone signing up that we are not aware of and would discuss with you.

BTW-Each faculty that is part of SDS has at least a "consider cross-listing courses with SDS" in their affiliation MOU so I'm hoping this isn't a surprise that we may ask to add a few students to your graduate courses.

Side Note: Our PhD planning committee discussed long and hard about how this transdisciplinary program fits together with all the other PhD programs. Their conclusion, which I agree with, is that this program will not compete for students as 1) the backgrounds required for entry into our programs are different and 2) the research needs/skills are different, and 3) the job profiles at the hiring entities are very different. and thus students will self-select through the application process and faculty would select different students based upon their research needs. If you'd like to discuss the thought process on this Jean-Claude Thill and Monica Johar were the co-chairs and can provide details.

Please let me know if you have any questions, concerns or would like to dive deeper.

Thanks

Doug
Doug Hague (he/him/his)| Executive Director and Professor of Practice
School of Data Science | UNC Charlotte
1028D | Colvard Building
9105 University Road. | Charlotte, NC 28223
Phone: 704-562-6867 | dhague@charlotte.edu

--
Thanks and regards,

Taufiquar R Khan, Ph.D.
Professor and Chair
Department of Mathematics and Statistics
University of North Carolina (UNC) at Charlotte|Fretwell 360E
9201 University City Blvd., Charlotte, NC 28223, USA
Phone: 704-687-0635 | Fax: 704-687-1392
taufiquar.khan@charlotte.edu | http://www.math.charlotte.edu

Doug Hague <dhague@uncc.edu>

Re: Request for support/feedback on PhD in Data Science

1 message

C Richardson <caricha2@uncc.edu> Thu, Oct 5, 2023 at 7:21 AM
To: Doug Hague <dhague@charlotte.edu>

Doug
Thank you for your email. I am excited to have new training opportunities for students at UNC Charlotte and BIOL supports this PhD program. Moving forward we would be interested in discussing course crosslisting opportunities.
Christine

> On Oct 4, 2023, at 3:31 PM, Doug Hague <dhague@charlotte.edu> wrote:
>
> Glenn, TK, Christine,
>
> While I have talked to some of you about the PhD in Data Science proposal and we've been collaborating through joint and affiliated faculty for a while, I wanted to document some practices and expected interactions with you and your faculty around the proposed PhD program. These should sound very familiar to you as the practices are just extending our current practices from our DSBA MS program to the new PhD program. Also, as we talked with the Graduate Council this week, in addition to having each college provide approval as part of the SDS Board, they would like to have documented consults with the Chairs. Thus, after you read this long email please respond to me through email with a simple "I support this proposal." or a "I'd like to meet to discuss further." or a "This doesn't impact me." or, if you really feel this way, a "No, I'm not going to support this proposal." If you prefer, you can just send me a memo under your letterhead that states your response.
>
> Summary of expected collaborations/interactions.
> The new program consists of core courses in Ethics/Data Governance, Statistics for Data Science, Machine Learning, and Artificial Intelligence as well as seminars. I have new faculty lines requested (and I've said the program won't move forward without these lines and additional funding) that will add capacity to teach these new courses. For SDS faculty wanting to have data science PhD students, participation in the seminar will be one way to engage more deeply. If you want to see the details, the curriculog proposal is here.
>
> Beyond these core courses, we expect the majority of courses to be either special topics or 8000 level courses (and potentially 6000 level for areas with MS degrees only) in other domain areas where we would add a few students each year to select courses. The students would likely be being advised/mentored by our joint/affiliate faculty that are in your department. The expectation would be that we would bolster the number of students by a few such that the course has more SCH being generated and thus more easily justified.
>
> I also expect to continue the practice that if SDS asks a faculty to teach a course that you would not normally teach or is over and above what your college has committed to SDS, that SDS would pay to buy them out of their load and you would receive funding directly to your department (currently $8000/section) to use to backfill teaching capacity or other needed expenditures. We have been doing this for our undergraduate courses with CHESS and it seems to work ok. We have also been cross listing/adding a few students to various courses from our MS program for quite a while so I'm expecting to keep the same process where we work with you, your faculty, and your schedulers on providing the right number of seats. We would also consider having seats for your students as appropriate in SDS courses (we do this today for some PhD students that want to take DSBA courses). The SDS PhD advisors and GPD are required to approve all course selections by students so there should not be anyone signing up that we are not aware of and would discuss with you.
>
> BTW-Each faculty that is part of SDS has at least a "consider cross-listing courses with SDS" in their affiliation MOU so I'm hoping this isn't a surprise that we may ask to add a few students to your graduate courses.

Side Note: Our PhD planning committee discussed long and hard about how this transdisciplinary program fits together with all the other PhD programs. Their conclusion, which I agree with, is that this program will not compete for students as 1) the backgrounds required for entry into our programs are different and 2) the research needs/skills are different, and 3) the job profiles at the hiring entities are very different. and thus students will self-select through the application process and faculty would select different students based upon their research needs. If you'd like to discuss the thought process on this Jean-Claude Thill and Monica Johar were the co-chairs and can provide details.

Please let me know if you have any questions, concerns or would like to dive deeper.

Thanks

Doug

Doug Hague (he/him/his)| Executive Director and Professor of Practice
School of Data Science | UNC Charlotte
1028D | Colvard Building
9105 University Road. | Charlotte, NC 28223
Phone: 704-562-6867 | dhague@charlotte.edu