University Council

January 10, 2025

UNIVERSITY CURRICULUM COMMITTEE – 2024-2025
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Dear Colleagues:

The attached proposal from the Franklin College of Arts and Sciences to offer the existing major in Data Science (M.S.) online will be an agenda item for the January 17, 2025, Full University Curriculum Committee meeting.

Sincerely,

Susan Sanchez, Chair

cc: Provost S. Jack Hu
Dr. Marisa Pagnattaro

PROPOSAL FOR AN ONLINE PROGRAM

Date: August 26, 2024

School/College: Franklin College of Arts and Sciences

Department/Division: Statistics

Program (Major and Degree): Data Science (M.S.)

Program CIP: 30300101

Will any areas of emphasis be offered under this major? Area of Emphasis in Applied Data Science

Proposed Effective Date: Fall 2025

1. Assessment

The demand for employees with data science skills is rapidly increasing, fueled by the widespread use of large-scale data across industries. Many professionals aspire to transition into the field of data science due to its promising career prospects, higher earning potential, and the opportunity to work on cutting-edge technologies. Professionals with an undergraduate STEM degree who are already working in data-related roles also aspire to acquire advanced data science degrees to qualify for higher-level positions or leadership roles within their organizations.

According to the Bureau of Labor Statistics (BLS) Occupational Outlook Handbook, employment growth for data scientists is expected to stem from an increased demand for data-driven decisions. As per the BLS Job Outlook, employment of data scientists is projected to grow 35% from 2022 to 2032, much faster than the average for all occupations. About 17,700 openings for data scientists are projected each year, on average, over the decade. Many of those openings are expected to result from the need to replace workers who transfer to different occupations or exit the labor force due to retirement. Additionally, according to the BLS Occupational Employment and Wage Statistics for Georgia published in May 2023 and the nationwide data on the demand for data scientists, Georgia is among the top 8 states in the U.S. with metro-Atlanta also among the top 8 metropolitan areas in the U.S. having the highest employment levels for data scientists.

Currently, the major in Data Science (M.S.) is offered on the Athens campus. Expanding this offering to an online platform allows working professionals to take advantage of a flexible pathway to transition or advance in their careers, providing a tailored learning experience that balances academic rigor with practical relevance.

2. Admission Requirements

For admission into the online master's degree in Data Science with Area of Emphasis in Applied Data Science, all applicants are expected to have:

1. **Undergraduate degree:** A bachelor's degree from a regionally accredited institution in the United States or a comparable degree from a foreign academic institution While a

bachelor's degree in a quantitative field (e.g., mathematics, statistics, computer science, engineering, economics) can be a plus, applicants from other disciplines who demonstrate quantitative skills are strongly encouraged to apply to the program.

2. **GPA Requirement:** A minimum GPA of 3.0 on a 4.0 scale from undergraduate studies. However, flexibility is possible if the applicant has strong professional experience or other compensatory qualifications.
3. **Quantitative Coursework**: Completion of at least one introductory course in probability and statistics and some working knowledge of calculus and linear algebra is preferred.
4. **Programming skills:** Basic proficiency in a programming language is preferred. This can be demonstrated through coursework, professional experience, or online courses or certifications.
5. **Professional Experience**: Since the program also targets working professionals, relevant work experience in a related field is preferred. This shows the ability to apply theoretical knowledge in practical settings.
6. **Statement of Purpose**: A personal statement outlining the applicant's background, achievements, and future goals, relevant experience, and reasons for pursuing the online degree is required. This helps assess the applicant's motivation and suitability for the program.
7. **Resume:** A student may include a recent copy of his/her resume as part of the application packet; however, this is not required.
8. **Letters of Recommendation:** Two or three letters from professionals or academics who can speak to the applicant's qualifications and potential for success in the program are required.
9. **English Proficiency:** For non-native English speakers, proof of English proficiency (e.g., TOEFL, IELTS) may be required to ensure they can succeed in the coursework.
10. **Test Scores:** Students may choose to submit standardized test scores, most commonly GRE or GMAT. However, this is not required for admission into the program.

3. Program Content

The Area of Emphasis in Applied Data Science, which will be offered online, requires completion of 30 credit hours.

Core Courses (15 hours):
STAT 6361E, Advanced Python and Data Structures (3 hours) - **NEW**
STAT 6381E, Introduction to Python and Data Science (3 hours) - **NEW**
STAT 6382E, Statistics for Data Science with R Programming (3 hours) - **NEW**
STAT 6383E, Statistical Modeling in Data Science (3 hours) - **NEW**
STAT 6384E, Basics of Clustering and Classification Algorithms (3 hours) - **NEW**

Advanced Courses (15 hours):
LING 6750E, Natural Language Processing (3 hours) - **NEW**
MIST 7510E, Data Management and SQL (3 hours) - **NEW**
STAT 6385E, Advanced R Programming for Data Science (3 hours) - **NEW**
STAT 6386E, Advanced Machine Learning and Deep Learning Methods (3 hours) - **NEW**
STAT 6387E, Advanced Statistical Modeling for Data Science (3 hours) - **NEW**

4. Student Support Services

An **Admissions and Advising committee** for the program will be formed. This committee will consist of members who will oversee the admission process and those who will provide academic advising after admission.

Academic Advising: The Advising committee members will provide robust advising to help students navigate the program and achieve their academic and career goals.

Technical Support: The Office of Online Education will maintain a reliable and user-friendly Learning Management System that supports multimedia content, interactive elements, and assessments. Furthermore, they will also ensure that students have access to technical support for any issues related to the online learning platform.

Financial Aid: Students needing advice on financial aid will be directed to the Office of Student Financial Aid for information about financial assistance.

Career Planning: The UGA Career Center offers excellent career counseling to meet the unique career development needs of graduate and professional students, including opportunities to build professional network and career development eLC modules that are specifically designed to help achieve professional goals. Additionally, the Career Center also provides a variety of resources for student support.

Disability Services: The Disability Resource Center (DRC) at the University of Georgia is dedicated to supporting students with disabilities who qualify for admission. Their mission is to ensure equal educational opportunities in compliance with the ADA and other relevant legislation, while also fostering a welcoming academic, physical, and social environment for these students. The DRC's professional staff work directly with students to evaluate their individual disability-related needs and develop appropriate plans for academic accommodations and services. The DRC also offers three key services to support a variety of student needs: the Test Accommodations Office for onsite classroom testing, the Assistive Technology Lab with various programs designed for people with disabilities, and Alternative Media Services to assist students with print or reading disabilities by converting course materials into accessible formats.

Special Accommodations: The Office of Online Education and the Department of Statistics will work with DRC to ensure ensure that the program's online materials are accessible to all students, including those with disabilities.

5. Resident Requirements

Residence requirements for the online Data Science (M.S.) are the same as those for the on-campus program.

6. Program Management

Administration and Program Coordination:

Offered through the Franklin College of Arts and Sciences, the University of Georgia's online master's in Data Science, with an Area of Emphasis in Applied Data Science, is tailored for working professionals seeking career advancement. For over a decade, the Department of Statistics has housed a Big Data Analytics Lab that has made key contributions to solving grand challenges of big data analytics. Additionally, through UGA's cluster hire initiatives in artificial intelligence and data science, the Department has partnered with many units within UGA and recruited talented data scientists engaged in a variety of interdisciplinary research. This makes the Department of

Statistics uniquely qualified to administer the online master's in Data Science, with an Area of Emphasis in Applied Data Science.

The Head of the Department of Statistics will offer general guidance, while a Program Director will be appointed as the primary contact and coordinator who will oversee program maintenance and program quality. In addition to instructional duties, the Program Director will oversee all aspects of the online program to ensure its smooth operation.

Timetable:

For working professionals, the proposed asynchronous online master's program offers the flexibility to pursue advanced education in applied data science without the need to relocate or pause their careers. In terms of duration of the program, this is a five-semester program that begins in the fall semester of Year 1 and ends in the spring semester of Year 2, as illustrated in the Program of Study below.

	Summer	Fall	Spring
Year 1		STAT 6381E, Introduction to Python and Data Science (3 hours) STAT 6382E, Statistics for Data Science with R Programming (3 hours)	STAT 6361E, Advanced Python and Data Structures (3 hours) MIST 7510E, Data Management and SQL (3 hours)
Year 2	STAT 6383E, Statistical Modeling for Data Science (3 hours) STAT 6384E, Basics of Clustering and Classification Algorithms (3 hours)	STAT 6385E, Advanced R Programming for Data Science (3 hours) STAT 6386E, Advanced Machine Learning and Deep Learning Methods (3 hours)	STAT 6387E, Advanced Statistical Modeling for Data Science (3 hours) LING 6750E, Natural Languages Processing (3 hours)

Given below is a list of seven overall learning outcomes for the proposed curriculum. These learning outcomes ensure that graduates are well-prepared to tackle a variety of challenges in the data science field, equipped with both theoretical knowledge and practical skills.

1. **Programming Proficiency:** Develop strong programming skills in Python and R, enabling the implementation of complex statistical data analysis and machine learning models.
2. **Statistical Analysis:** Gain a deep understanding of statistical methods and their application to data science, including both basic and advanced statistical modeling techniques.
3. **Machine Learning Expertise:** Acquire expertise in a variety of machine learning algorithms and frameworks, with the ability to apply them to solve real-world data problems.
4. **Data Management Skills:** Learn effective data management practices, including the use of SQL for database querying and data integration.
5. **Problem-Solving and Critical Thinking:** Enhance problem-solving and critical thinking skills through practical projects and real-world data science applications.

6. **Communication and Visualization:** Develop the ability to communicate complex data insights clearly and effectively, using data visualization tools and techniques.
7. **Application of Deep Learning:** Gain hands-on experience with deep learning and its applications, preparing for advanced roles in data science and AI.
8. **Natural Language Processing (NLP):** Learn various text preprocessing techniques, build, train, evaluate, and optimize NLP models, and apply state-of-the-art NLP techniques to solve real-world problems in various domains.

The table below provides a **curriculum map**, giving a comprehensive overview of how each of the 10 courses in the online master's in data science program aligns with the key learning outcomes, what the associated instructional activities are, and how students will be assessed. This ensures a well-rounded educational experience that prepares students for various aspects of the data science field.

Course	Learning Outcomes	Instructional Activities	Assessments
STAT 6361E, Advanced Python and Data Structures	**SLO1.** Develop proficiency in advanced Python programming; Understand and implement various data structures; Optimize code for performance.	Pre-recorded video lectures, reading assignments, interactive coding tutorials, case studies, discussion forums	Weekly coding assignments, Online Quizzes, Timed Exams, individual projects
STAT 6381E, Introduction to Python and Data Science	**SLO1.** Develop programming skills in Python; Understand data manipulation and visualization; Gain an overview of the data science process.	Pre-recorded video lectures, reading assignments, interactive coding tutorials, case studies, discussion forums	Weekly coding assignments, Online Quizzes, Timed Exams, mini-individual projects
STAT 6382E, Statistics for Data Science with R Programming	**SLO2.** Master basic and intermediate statistical concepts; Use R for statistical analysis and visualization; Apply statistical methods to data science problems.	Pre-recorded video lectures, reading assignments, interactive coding tutorials, case studies, discussion forums	Weekly homework assignments, Online Quizzes, Timed Exams, individual projects
STAT 6383E, Statistical Modeling in Data Science	**SLO2, SLO5.** Understand statistical models and their applications; Build and evaluate models using Python or R; Analyze and interpret complex datasets.	Pre-recorded video lectures, reading assignments, interactive coding tutorials, case studies, discussion forums	Weekly homework assignments, Online Quizzes, Timed Exams, model-building assignments, case study analysis, individual and group projects
STAT 6384E, Basics of Clustering and Classification Algorithms	**SLO3.** Understand principles of clustering and classification; Implement algorithms like k-means,	Pre-recorded video lectures, reading assignments, interactive coding tutorials, case studies, discussion forums	Weekly homework assignments, Online Quizzes, Timed Exams, individual or

	decision trees; Evaluate model performance.		group classification projects
MIST 7510E, Data Management and SQL	**SLO4.** Learn fundamentals of database management systems; Develop proficiency in SQL; Understand data warehousing and integration techniques.	Pre-recorded video lectures, reading assignments, interactive coding tutorials, case studies, discussion forums	Weekly coding assignments, Online Quizzes, Timed Exams, individual and/or group database projects
STAT 6385E, Advanced R Programming for Data Science	**SLO1.** Develop advanced programming skills in R; Implement complex data analysis and visualization techniques; Utilize advanced R packages.	Pre-recorded video lectures, reading assignments, interactive coding tutorials, case studies, discussion forums	Advanced coding assignments, Online Quizzes, Timed Exams, individual final project
STAT 6386E, Advanced Machine Learning and Deep Learning Methods	**SLO7.** Gain expertise in advanced machine learning and deep learning; Explore novel applications. Understand theoretical foundations; Apply techniques to large-scale data problems.	Pre-recorded video lectures, reading assignments, interactive coding tutorials, case studies, discussion forums	Weekly homework assignments, Online Quizzes, Timed Exams, individual and/or group deep learning projects
STAT 6387E, Advanced Statistical Modeling for Data Science	**SLO2, SLO5, SLO6.** Master advanced statistical modeling techniques; Apply models to complex datasets; Interpret and communicate results.	Pre-recorded video lectures, reading assignments, interactive coding tutorials, case studies, discussion forums	Weekly homework assignments, Online Quizzes, Timed Exams, individual and/or group advanced statistical modeling project
LING 6750E, Natural Language Processing	**SLO8.** Learn various text processing techniques; Gain experience building, training, evaluating, and optimizing NLP models; Explore novel applications in various domains.	Pre-recorded video lectures, reading assignments, interactive coding tutorials, case studies, discussion forums	Weekly homework assignments, Online Quizzes, Timed Exams, individual and/or group deep learning projects

Application Details:

The Admissions and Advising Committee have developed admissions criteria for selecting applicants to ensure fairness and inclusivity. This committee will work with the Office of Online Education to evaluate and review applications to ensure candidates meet the program's admissions requirements. Periodically, this committee will also refine the admissions criteria.

Since the program begins in the fall semester of each year, the following schedule will be adopted:

Domestic Applicants

- Fall: March 15 (applications received by this deadline will receive priority consideration)
- Fall: July 1 (final deadline)

International Applicants

- Fall: March 15

International applicants must also submit TOEFL or IELTS scores.

Matriculation Details:

The program curriculum is designed so that a typical working professional starting the program in the fall semester can take two courses per semester and complete the entire program in five semesters. As the program expands and more resources become available, it may be possible to offer multiple sections of these courses during a calendar year, providing additional flexibility for students.

Program Maintenance and Quality:

A plan for program maintenance and program quality of the online master's degree in Data Science with an Area of Emphasis in Applied Data Science is outlined below. This encompasses several key areas, including continuous improvement, curriculum review, faculty development, student support, and technology infrastructure.

1. **Continuous Improvement**

- **Regular Review Cycles:** Establish a cycle (e.g., annually or biennially) for reviewing the program's goals, outcomes, and content.
- **Feedback Mechanisms:** Collect feedback from students, faculty, and industry partners regularly through surveys, focus groups, and advisory boards.
- **Benchmarking**: Compare the program against leading similar programs to identify areas for improvement.

2. **Curriculum Review**

- **Alignment with Industry Standards**: Ensure the curriculum is aligned with current industry needs and standards by consulting with industry experts and professional organizations.
- **Updating Course Content:** Regularly update course materials to reflect the latest developments in data science, including new tools, techniques, and best practices.

3. **Faculty Development**

- **Professional Development**: Provide opportunities for faculty to stay current in their field through workshops, conferences, and continuing education.
- **Teaching Effectiveness**: Offer training in online pedagogy and instructional design to enhance faculty's ability to deliver engaging and effective online courses.
- **Research Opportunities**: Support faculty research in data science, encouraging them to integrate their findings into the curriculum.

4**. Quality Assurance**

- **Accreditation**: Seek and maintain accreditation from relevant accrediting bodies to ensure the program meets high standards of quality.
- **Assessment and Evaluation**: Develop a comprehensive assessment plan that includes regular evaluation of student learning outcomes and program effectiveness.
- **External Review**: Periodically invite external reviewers to assess the program and provide recommendations for improvement.

5. **Community and Collaboration**

- **Industry Partnerships**: Build and maintain partnerships with industry to provide students with internship opportunities, guest lectures, and job placements.
- **Alumni Engagement**: Create an active alumni network to support current students and keep the curriculum relevant through their insights and experiences.

By addressing these areas, the program can ensure high quality, relevance, and continuous improvement, making it attractive and valuable to students and industry stakeholders alike.

Similar Programs in the Vicinity:

The following table lists two USG institutions that offer an online master's program that can be classified as an applied data science program for working professionals:

USG Institution Name	**Title of the Program with Link**	**Notes**
Georgia Institute of Technology	Online Master of Science in Analytics	The College of Business, the College of Computing, and the College of Engineering offers this program.
Georgia Southern University	Online Master of Science in Computer Science	The Department of Computer Science offers this program with a concentration in data mining and data warehousing. OnlineEducation.com classifies this program as a master's in data science program based on the curriculum.

The proposed online master's program in Data Science with an Area of Emphasis in Applied Data Science offers a distinct and compelling opportunity to meet the growing demand for skilled data scientists in Georgia. Unlike the business, computer science, and engineering focus of the Georgia Institute of Technology's program or the computer science emphasis at Georgia Southern University, UGA's program led by the Department of Statistics focuses squarely on providing applied data science skills through a relevant blend of statistics, data science, computer science, and management information system courses. This ensures a comprehensive curriculum that integrates advanced techniques from these disciplines, equipping students with a wide array of tools for analyzing and modeling data.

One of the program's attractive features is that it will use faculty experts from three departments to develop and teach courses in the online program. This ensures that students receive in-depth,

interdisciplinary training, preparing them to tackle diverse data challenges across various fields. Additionally, this program also offers an opportunity for working professionals who earned their undergraduate degree in computer science, data science, management information systems, statistics, or other STEM majors to return to UGA to pursue the online program in Applied Data Science.

Importantly, despite the presence of two existing online programs in Georgia, the demand for data scientists far exceeds supply. UGA's proposed online master's degree in Data Science is uniquely positioned to address this critical shortfall of skilled professionals, significantly enhancing the talent pool and benefiting the entire state of Georgia.

7. Library and Laboratory Resources

Online students will have access to the same quality UGA Libraries resources as those students in traditional programs, such as GIL, Galileo, and the Distance Learning Librarian. The program will use the current UGA online Learning Management System, E-Learning Commons (eLC), to offer all courses.

There are no laboratory requirements for the program. In terms of library access, students will have access to Galileo and GIL. Students will be required to meet the basic technology necessary to use eLC as the program is designed to be online.

Online UGA library resources already exist that are adequate to support this program. No laboratory is needed.

8. Budget

See attached.

9. Program Costs Assessed to Students

No additional program costs for students pursuing the Area of Emphasis in Applied Data Science are anticipated.

10. E-Rate

The Area of Emphasis in Applied Data Science will apply for an eRate of $275 per credit hour.

Documentation of Approval and Notification

Proposal: Offer the existing major in Data Science (M.S.) online

College: Franklin College of Arts and Sciences

Departments: Statistics

Proposed Effective Term: Fall 2025

School/College:

- Department of Statistics Interim Department Head, Dr. Daniel Hall, 1/9/2025
- Franklin College of Arts and Sciences Associate Dean, Dr. Paula Lemons, 10/18/2024
- Graduate School Associate Dean, Dr. Anne Shaffer, 11/13/2024

Use of Course:

- Department of Linguistics Head, Dr. Keith Langston, 1/6/2025
- Department of Management Information Systems Head, Dr. Gerald Kane, 1/6/2025