

Master of Science in Applied Statistics, Analytics and Data Science

The Master of Science in Applied Statistics, Analytics and Data Science is offered by the Department of Biostatistics & Data Science (<https://catalog.ku.edu/medicine/biostatistics/>) located at the University of Kansas Medical Center (<http://www.kumc.edu/>). This program is offered 100% online. Graduates are equipped with hands-on statistical computing skills emphasizing proper application and problem solving and are prepared for careers in the rapidly growing fields of statistics, biostatistics, analytics, and data science. Many of the most employable graduate degrees involve statistics.

All coursework can be completed online, providing flexibility for working professionals who want to increase their knowledge of statistics, analytics, and data science. In response to workforce demand for knowledge and skills in analytics, data science, and statistics, students enrolled in this degree program may choose from one of three areas of emphasis:

- **Analytics Emphasis** will provide graduates with experience working with and analyzing large datasets using several of the most common statistical software tools.
- **Statistics Emphasis** will provide hands-on statistical computing in the context of statistical methods commonly applied in industry and government agencies.
- **Data Science Emphasis** will provide students with skills in statistical and computational methods for the acquisition and analysis of Big Data.

Characteristics of Graduates

Upon completion of the MS in Applied Statistics, Analytics and Data Science, the student should be prepared to immediately function as a statistician, analyst, and/or data scientist. Therefore, the student must have an understanding of the statistical theory underlying the methods most in-demand in the work force and should be proficient in the application of statistical methods within their field. Graduates of this program should be able to:

1. Demonstrate an understanding of statistical theory and practice.
2. Function as a collaborator on a project team.
3. Demonstrate proficiency in industry-standard statistical software.
4. Assume responsibility for the design and implementation of analyses for projects within his or her field.
5. Assist with the design and implementation of data management systems for projects within his or her field of application.
6. Prepare reports and publications resulting from said projects.
7. Effectively communicate the principles of statistics and analytics with his or her peers with varying statistical backgrounds.
8. Serve as an advocate for good statistical design and practice.

The application process for the M.S. in Applied Statistics, Analytics and Data Science is an online process. Detailed instructions on how to apply are posted on the Department of Biostatistics & Data Science (<https://www.kumc.edu/school-of-medicine/academics/departments/biostatistics-and-data-science/academics/master-of-science-in-applied-statistics->

[analytics-and-data-science/admissions.html](https://www.kumc.edu/school-of-medicine/academics/departments/biostatistics-and-data-science/academics/master-of-science-in-applied-statistics-and-analytics-and-data-science/admissions.html)) website. Students may be admitted to begin the fall, spring or summer semester.

Admission requirements:

- A bachelor's degree from a regionally accredited institution documented by submission of an official transcript indicating the degree has been conferred before entering the program. Official transcripts from institutions attended post-baccalaureate are also required.
- Students with degrees from outside the U.S. may be subject to transcript evaluation indicating the degree is equivalent to a U.S. degree and meets the minimum cumulative GPA requirements.
- A cumulative grade-point average (GPA) of at least a 3.0 on a 4.0 scale for the bachelor's degree.
- Applicants who are not native speakers of English, whether domestic or international, must demonstrate they meet the Minimum English Proficiency Requirement (<https://www.kumc.edu/academic-and-student-affairs/departments/office-of-international-programs/inbound-programs/information-for-students/academic-english-requirements.html>).
- Average grade of B or higher in Calculus I and II courses (i.e., single variable differentiation and integration or equivalent) or completion of STAT 655: Foundations of Mathematics for Data Science with a grade of B or higher.
- Successful completion of any computer programming language course or demonstration of mastery via credentials or work experience.
- Contact information for three references who are familiar with the applicant's work and character and who have agreed to write letters of recommendation.
- A personal statement describing your career goals and your interest in the program.
- A current resume or curriculum vitae listing scholarships/fellowships, awards and history of employment.
- Graduate Record Examination (GRE) scores (or other graduate examination scores, such as the GMAT) are recommended, but not required.

Applicants will be assessed based on these requirements.

After an applicant has been admitted, a program may defer an applicant's admission for one year after which time the applicant must submit a new application.

Admission requirements are subject to change. In most cases, use the catalog of the year student entered the program. *Other years' catalogs*.

The M.S. in Applied Statistics, Analytics and Data Science degree program consists of 30 credit hours. Students choose one or more emphasis area(s) from Analytics, Statistics, or Data Science. The program consists of a common foundation of 15 credit hours of statistics courses in addition to the 9 credit hours specific to the emphasis area and 6 credit hours of electives. A student can choose electives such that multiple emphasis areas can be completed if desired.

Degree requirements:

- Degree requirements are normally completed within 2 years of admission to the program although a maximum of 7 years is allowed.
- Completion of a minimum of 30 credit hours.

- Cumulative grade-point average (GPA) of at least a 3.0 for all KU graduate coursework.
- No more than two grades of C are allowed in courses required for the degree.
- Enrollment in a minimum of one credit hour the semester the student will graduate.
- Successful completion of a general examination (<https://catalog.ku.edu/graduate-studies/kumc/#ThesisDefense>) the semester the student will graduate. A comprehensive examination is administered during the final term of enrollment concurrent with successful completion of the required coursework. If the comprehensive exam is not taken in the student's final term of required coursework, they must complete the comprehensive exam within one year of that term, be currently enrolled in a course, and maintain a cumulative GPA of 3.0 or higher. The examination has two purposes: 1) to assess the student's strengths and weaknesses and 2) to determine whether the student should be awarded the MS degree. The examination is created and administered by a committee of at least three members of the Department Graduate Faculty. If this examination is failed, subject to committee approval, a second examination may be taken no sooner than three months later. The committee can recommend that the student leave the program following the semester in which the examination is taken. After two failures, no further examination is permitted and the student will not be awarded the degree.

- Successful completion of the following courses:

- Foundation courses (15 credit hours.)

Code	Title	Hours
STAT 805	Professionalism, Ethics and Leadership in the Statistical Sciences	3
STAT 835	Categorical Data Analysis	3
STAT 840	Linear Regression	3
STAT 850	Multivariate Statistics	3
STAT 823	Introduction to Programming and Applied Statistics in R	3
Total Hours		15

- Emphasis courses (9 credit hours.)

Code	Title	Hours
Analytics Emphasis		
STAT 820	SAS Programming I (OR DATA 817 Introduction to Tableau AND DATA 819 Introduction to Python AND DATA 822 Introduction to SQL)	3
STAT 830	Experimental Design	3
STAT 880	Data Mining and Analytics	3
Statistics Emphasis		
STAT 825	Nonparametric Methods	3
STAT 830	Experimental Design	3
STAT 871	Mathematical Statistics	3
Data Science Emphasis		
DATA 824	Data Visualization and Acquisition	3
DATA 881	Statistical Learning I	3

STAT 880	Data Mining and Analytics or DATA 882 Statistical Learning II	3
----------	--	---

- Elective courses (minimum of 6 credit hours.) Specific courses are determined in consultation with the student's advisor. Any course taken for elective credit external to the department must be approved by the department's curriculum committee for the master's programs.

Degree requirements and course descriptions are subject to change. Any courses taken as an equivalent must be approved by the Graduate Director and the Office of Graduate Studies. In most cases, use the catalog of the year student entered the program. *Other years' catalogs*.

Annual Evaluations:

Students are evaluated each May by their faculty advisor and Program Chair. These evaluations provide feedback to the student regarding the progress that they are making toward the degree.

Typical Plan of Study

Students may choose to pursue one of three emphasis areas for the MS in Applied Statistics, Analytics and Data Science degree. The emphasis areas were developed based on the knowledge and skillset demanded by the workforce.

- **Analytics Emphasis** will provide graduates with experience working with and analyzing large datasets using several of the most common statistical software tools.
- **Statistics Emphasis** will provide hands-on statistical computing in the context of statistical methods commonly applied in industry and government agencies.
- **Data Science Emphasis** will provide students with skills in statistical and computational methods for the acquisition and analysis of Big Data.

Below is the typical plan of study based on which emphasis is chosen.

Analytics Emphasis for MS in Applied Statistics, Analytics AND DATA SCIENCE

Year 1

Fall	Hours	Spring	Hours	Summer	Hours
STAT 820	3	STAT 835	3	STAT 805	3
STAT 840	3	STAT 850	3	STAT 823	3
6		6		6	

Year 2

Fall	Hours	Spring	Hours
STAT 830	3	STAT 880	3
Elective	3	Elective	3
		General Exam may be scheduled beginning of the Spring semester if approved by advisor to proceed.	
6		6	

Total Hours 30

Statistics Emphasis for MS in Applied Statistics, Analytics AND DATA SCIENCE

Year 1			
Fall	Hours Spring	Hours Summer	Hours
STAT 820	3 STAT 835	3 STAT 805	3
STAT 840	3 STAT 850	3 STAT 830	3
	6	6	6
Year 2			
Fall	Hours Spring	Hours	
STAT 825	3 STAT 871	3	
Elective	3 Elective	3	
	General Exam may be scheduled beginning of the Spring semester if approved by advisor to proceed.		
	6	6	
Total Hours 30			

DATA SCIENCE EMPHASIS FOR MS IN APPLIED STATISTICS, ANALYTICS AND DATA SCIENCE

Year 1			
Fall	Hours Spring	Hours Summer	Hours
STAT 840	3 STAT 823	3 STAT 805	3
STAT 850	3 STAT 835	3 STAT 880	3
	6	6	6
Year 2			
Fall	Hours Spring	Hours	
DATA 881	3 DATA 824	3	
Elective	3 Elective	3	
	General Exam may be scheduled beginning of the Spring semester if approved by advisor to proceed.		
	6	6	
Total Hours 30			

Because the MS in Applied Statistics, Analytics and Data Science degree signifies that the holder is prepared for entry into the practice of applied statistics research, it follows that graduates must have the knowledge and skills necessary to function in a broad range of academic and research situations. The **Technical Standards** include those physical, cognitive, and behavioral standards that are required for the satisfactory completion of all aspects of the curriculum and the development of professional attributes required by all students at graduation. Therefore, the following

abilities and expectations must be met by all students **with or without accommodations** admitted to the MS program:

- 1. Observation.** A student must be able to observe and evaluate class demonstrations and field experiences relevant to the field of statistics. He or she must be able to read and comprehend text, numbers, tables and graphs, both in print and displayed electronically. Observation necessitates the functional use of the senses of vision and hearing.
- 2. Communication.** A student must be able to communicate effectively and efficiently in English in oral, written, and electronic form with other students, faculty, staff, researchers, and the public. Effective communication includes: the ability to understand assigned readings, lectures, and technical and professional materials; the ability to analyze information; the ability to present results of such analyses verbally and in writing; the ability to independently prepare papers and presentations; and the ability to follow verbal and written instructions. Use of computers and other technology is imperative to this communication.
- 3. Motor.** A student must have sufficient motor function to attend classes, prepare assignments, use electronic media, deliver lectures and make public presentations. Class requirements may also include field work in a variety of collaborative environments.
- 4. Intellectual, conceptual, integrative and quantitative abilities.** A student must possess the ability to understand and read and understand documents written in English, to understand and work with measurements and calculations, and to engage in reasoning, analysis, synthesis and critical thinking. A student must be able to exercise sufficient judgment to recognize and correct performance deviations, and be able to draw on all the above mentioned abilities to be an effective problem solver, researcher, and communicator.
- 5. Behavioral and social attributes.** A student must have the emotional health required for the full use of his or her intellectual ability. A student must be able to exercise sound judgment, and to act ethically and with integrity. He or she must develop mature, sensitive, and effective professional relationships with others. A student must be self-motivated, reliable and responsible to complete assigned tasks in a timely manner with no supervision. Students must be able to give attention to detail and have the flexibility to function in a research setting, including adapting to changes in time, place and structure of academic and research settings. The student must have the ability to work with diverse groups.

NOTE: Reasonable accommodations will be considered and may be made to qualified students who disclose a disability, so long as such accommodation does not significantly alter the essential requirements of the curriculum and the training program. Students who disclose that they have a disability are considered for the program if they are otherwise qualified. Qualified students with a disability who wish to request accommodations should provide the appropriate documentation of disability and submit a request for accommodation to the University's Office for Academic Accommodations.

TAKING TIME OFF

Because of the nature of the Applied Statistics, Analytics, and Data Science online programs, students are not required to be continuously enrolled. Students who are in good academic standing are allowed two consecutive semesters of non-enrollment (i.e., one academic year) without a leave of absence (LOA) request being submitted.

If a student decides to take a semester off, they should contact the Assistant Director of Graduate Education or the Academic Program

Specialist. On the 20th day of the first term with no enrollments, the student's email account will be deactivated.

If a student does not enroll for two consecutive semesters and they need additional time off, they will be required to submit an LOA and take official leave. The Office of Graduate Studies may grant an LOA for up to one academic year, with the possibility of one additional year extension. If a student has been inactive, exceeded the maximum allowable absence (three academic years), and does not want to reactivate, they will be formally dismissed from the program.

To ensure success in completing all degree requirements, if a student is absent for more than two academic years, they may be required to retake courses that are covered on the comprehensive exam.

REACTIVATION

To return from taking a non-LOA absence, students will need to contact the Assistant Director of Graduate Education or the Academic Program Specialist and complete the reactivation form found at this link (<https://apps.kumc.edu/reactivationform/>).

Once a reactivation request is approved, the student's KUMC email account will be reactivated. In order to avoid a possible late enrollment fee, this form should be submitted at least one month prior to the first day of class of the term for which the student is returning; however, earlier completion of the form is permitted.

LEAVE OF ABSENCE (LOA) FROM THE UNIVERSITY

The Office of Graduate Studies may grant a leave of absence (LOA) from an academic program for up to one academic year, with the possibility of extension. The student must complete the official Leave of Absence Checklist. A leave of absence may be granted in extraordinary circumstances (e.g. cases of illness, emergency, financial hardship, military leave, pregnancy/childbirth), to pursue family responsibilities, or to pursue full-time activities related to long-range professional goals. The LOA request must be submitted at the beginning of the semester. Evidence of progress toward degree will also be a determining factor in the decision to grant leave. If the leave of absence is approved at the program level, the program forwards the student's request along with the program's recommendation to the Dean of Graduate Studies for approval. If approved by the Dean of Graduate Studies, the time on leave from the academic program will not be counted towards the maximum time granted to complete a degree (7 years).

All steps to complete a leave request are outlined on the Leave of Absence Checklist. First, students discuss the leave with their mentor/advisor and/or their Program Director. If those administrators believe that the leave is the best path forward for the student, the student completes the official Leave of Absence Checklist. Second, students meet with individuals in the Registrar's Office and Financial Aid to verify understanding of how the leave could impact their enrollment, access to campus resources, health insurance, and/or loans. Third, the student completes the section of the form asking for details about their leave and how they can be contacted. Fourth, the student returns the form to their Program Director for a second signature that acknowledges the student completed all steps. The form is then forwarded to the Dean of Graduate Studies for a final approval. After the Dean of Graduate Studies approves the Leave of Absence form, the form is forwarded to the Office of the Registrar to be recorded in the student's academic record.

When a student is ready to return from an LOA, the student must complete the Request for Return from Leave of Absence Checklist. The

form requires the student to complete information about when they will return as well as a signature from the Program Director. After the Program Director approves the Return LOA Checklist, the Program Director will send the form to the Office of Graduate Studies. The Office of Graduate Studies will review and respond with an approval via email. Then, the Office of Graduate Studies will send the form to the Office of the Registrar to reactivate the student in Enroll & Pay.

The Requests for Leave of Absence and for Return from Leave of Absence checklists are on the Graduate Studies Policies and Regulations page (<https://www.kumc.edu/academic-and-student-affairs/departments/graduate-studies/policies-and-regulations.html>) of their department website.