

Master of Science in Health Data Science and Informatics

The goal of the M.S. in Health Data Science and Informatics program is to prepare students to work as a health data scientist or health informaticist in academia or health care industries. Upon completion of the M.S. in Health Data Science and Informatics the students will have an extensive understanding of biostatistical principles and computing and informatics skills with applications in clinical and other diverse data resources.

At the completion of the M.S. program in Health Data Science and Informatics the graduate should be able to:

- demonstrate a broad knowledge and understanding of diverse resources and types of data.
- a broad understanding of statistical principles, computing skills and apply them in health outcome data.
- function as a collaborator on a research team.
- assume responsibility for the computing and data visualization analyses for health science investigations.
- assist with the design and implementation of data management systems for large health science studies.
- prepare reports and publications resulting from health science studies.

With the rising emphasis on highly personalized data in health care, pharmaceutical, insurance and other organizations, so rises the need for health data scientists and health informaticists. The U.S. Bureau of Labor Statistics estimates a 31 percent growth in jobs for data scientists over the next 10 years (2019-2029) and reports a current median salary of \$124,100. Our program will bring statistics, data science, and informatics together with a focus on health data. This combination of skill sets is highly sought after and is required in many healthcare institutions and industries.

The Master of Science in Health Data Science and Informatics degree typically compliments prior education and careers in:

- Pharmaceutical Industry
- Health Care
- Insurance Company
- Consulting
- Education
- Health Analytics
- Health Research
- Government
- Biotechnology

The application for admission to the M.S. in Health Data Science and Informatics 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-health-data-science/admissions.html>) website.

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>).
- A background check is required during the admission process; it may affect the student's eligibility to enter the program.
- Letter grade of B or better in Calculus I and II (or the equivalent) or completion of STAT 655: Foundations of Mathematics for Data Science with a grade of B or higher.
- Successful completion of a course in any computer programming language 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 current resume or curriculum vitae.
- A personal statement describing your career goals and interest in the program.
- 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 the student entered the program. *Other years' catalogs*.

The program consists of 36 credit hours including annual evaluations and the successful completion of the Master's Comprehensive Examination.

The M.S. in Health Data Science and Informatics degree program consists of 36-credit program. Students choose one or more emphasis area(s) from Health Data Science and Health Informatics. The program is organized into three sections: 20 credit hours of required statistics and computing foundation, 10 credit hours of specific to the emphasis area, and 6 credit hours of elective courses designed to equip students with skills in statistical and computational methods for the acquisition and analysis of Big Data.

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 36 credit hours.
- Cumulative grade-point average (GPA) of at least a 3.0 for all KU graduate coursework.
- 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. The Health Data Science emphasis general examination is given upon completion of the following courses: HDSC 835, HDSC 840, HDSC 881, and HDSC 861. The Health Informatics emphasis general examination is given upon completion of the following courses: HDSC 835, HDSC 840, HDSC 881, and HDSC 831. The examination has two purposes: to assess the student's strengths and weaknesses and 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, a second examination may be taken no sooner than three months later and is subject to committee approval. 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 MS degree.

Required Statistics and Computing Foundation Courses (20 semester credit hours)

Code	Title	Hours
HDSC 805	Professionalism, Ethics and Leadership in the Statistical Sciences	3
HDSC 812	Clinical Data Management	3
DATA 817	Introduction to Tableau	1
HDSC 819	Introduction to Python	1
HDSC 823	Introduction to Programming and Applied Statistics in R	3
HDSC 835	Categorical Data Analysis	3
HDSC 840	Linear Regression	3
HDSC 881	Statistical Learning I	3

Health Data Science Foundation Courses (10 semester credit hours)

Code	Title	Hours
HDSC 822	Introduction to SQL	1
HDSC 824	Data Visualization and Acquisition	3
HDSC 845	Survival Analysis	3
HDSC 861	Observational Health Data Analysis	3

Health Informatics Foundation Courses (10 semester credit hours)

Code	Title	Hours
HDSC 790	Introduction to Artificial Intelligence and Machine Learning	1
HDSC 826	Data Literacy	3
HDSC 831	Advanced Health Informatics (Advanced Health Informatics)	3

HDSC 883	Processing and Analysis of Medical Information Systems	3
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Electives (6 semester credit hours)

Successful completion of a minimum of 6 credit hours of elective coursework from the list below, or other courses under BIOS/STAT/DATA prefix offered by the department. Specific courses are determined in consultation with the student's advisor.

Code	Title	Hours
HDSC 790	Introduction to Artificial Intelligence and Machine Learning	1
HDSC 815	Introduction to Bioinformatics	3
HDSC 820	SAS Programming I	3
HDSC 824	Data Visualization and Acquisition	3
HDSC 826	Data Literacy	3
HDSC 830	Experimental Design	3
HDSC 831	Advanced Health Informatics (Advanced Health Informatics)	3
HDSC 845	Survival Analysis	3
HDSC 855	Statistical Methods in Genomics Research	3
HDSC 861	Observational Health Data Analysis	3
HDSC 880	Data Mining and Analytics	3
HDSC 882	Statistical Learning II	3
HDSC 883	Processing and Analysis of Medical Information Systems	3

- Regular attendance at the Department Journal Club and Seminar Series is required.

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 graduate advisors and the director of the graduate program. These evaluations provide feedback to the student regarding the progress they are making in meeting program requirements, classroom performance, and research performance.

TYPICAL PLAN OF STUDY

Students may choose to pursue one of two emphasis areas for the MS in Health Data Science and Informatics degree. The emphasis areas were developed based on the knowledge and skillset demanded by the workforce.

- **Health Data Science Emphasis** will provide students with skills in statistical and computational methods for visualization, analysis, and interpretation the data.
- **Health Informatics Emphasis** will offer students to acquire focused knowledge in statistics and computing with an application to electronic health records (EHR) data acquisition, storage, and management.

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

HEALTH DATA SCIENCE EMPHASIS

Year 1

Summer	Hours Fall	Hours Spring	Hours
HDSC 823	3 HDSC 835	3 HDSC 812	3
	HDSC 840	3 HDSC 845	3
	HDSC 824	3 DATA 817	1
	3	9	7

Year 2

Summer	Hours Fall	Hours Spring	Hours
HDSC 805	3 HDSC 881	3 HDSC 861	3
HDSC 819	1 HDSC 822	1 Elective	3
	Elective	3 General Exam should be scheduled if approved by advisor to proceed.	
	4	7	6

Total Hours 36**HEALTH INFORMATICS EMPHASIS****Year 1**

Summer	Hours Fall	Hours Spring	Hours
HDSC 823	3 HDSC 835	3 HDSC 831	3
HDSC 819	1 HDSC 840	3 HDSC 812	3
	HDSC 881	3 HDSC 817	1
		Introduction to Tableau	
	4	9	7

Year 2

Summer	Hours Fall	Hours Spring	Hours
HDSC 805	3 HDSC 883	3 HDSC 826	3
HDSC 790	1 Elective	3 Elective	3
		General Exam should be scheduled if approved by advisor to proceed.	
	4	6	6

Total Hours 36

Because the M.S. in Health Data Science and Informatics degree signifies that the holder is prepared for entry into the practice of data science and informatics 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 M.S. program:

1. Observation. A student must be able to observe and evaluate class demonstrations and field experiences relevant to the field of data science and informatics. 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, or significantly affect the safety of patient care. 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.