

HEALTH DATA SCIENCE (M.S.)

<https://chhs.unh.edu/health-management-policy/program/ms/health-data-science>

Description

This program is 100% online with 2 virtual residencies (one after the first semester of the program and one at the end of the program).

The Master of Science in Health Data Science (MSHDS), offered by the College of Health and Human Services, prepares students for careers related to data analytics within the health care industry. Graduates from the MSHDS program will have the skills necessary to function as health data science practitioners in a wide-range of roles in the health care industry. Students can expect to develop skills in health data acquisition, management and cleansing tools, analytic tools and techniques relative to both large and small data types and sources within the health care industry, and interpretation and presentation tools and design of health care data.

The MSHDS program places a strong emphasis on developing a well-rounded, versatile health data practitioner that has a strong understanding of all phases of health care data analysis from programming to interpretation and presentation. Graduates will be able to understand and navigate the requirements and complexities of health care data that are unique to the US Health System. In addition, within the context of the MSHDS curriculum students will develop the necessary skills of teamwork, presentation, and ability to adapt as needed in a dynamic, rapidly changing work environment and industry.

The MSHDS is a 36-credit, online masters program with two virtual residencies that trains students in the skills necessary to be an effective health data science practitioner. Embedded is a 12 credit, four-course Certificate in Health Data Science. The core courses develop deep quantitative tools, applications and reasoning, critical thinking and translational skills such as visualization, communication and interactive design. The MS degree can be completed in as little as 14 months and has starting points in both fall and spring. The first semester (e-terms 1 & 2) constitute the Graduate Certificate in Health Data Science which provides students exposure to, but not depth, in the methods of health data science. This program also practicum driven throughout the final four e-terms, where students will complete a current work-based or outside industry or government sponsored real-world analytic problem.

The curriculum for the 14-month, interdisciplinary, full-time MS HDS program has two starts, Fall and Spring and is conducted online with two virtual residencies. The 36-credit program is comprised of ten core health data analytics and data science courses and two elective tracks (Health Care Informatics and Health Systems Research).

The program rests primarily on the coding languages of R and Python, but also SAS and SQL. Students receive training in a multitude of quantitative tools and algorithms such as machine learning and deep learning and how they are utilized and applied within the health care industry. They also are exposed to computational and analytic environments such as enterprise systems to streaming and distributed cloud systems.

The practicum courses are designed to instruct on two primary areas of content. One is to apply the core tools to a real-world project. The second is to provide useful exposure to the processes and professional

development of the student in the role of health data analytics professional. Students will have the opportunity to learn methodologies such as LEAN and Agile project management. Students will also be exposed to conceptual mapping for health data practitioners such as design thinking. They will do this both within projects should they or the host choose, or as added learning.

FLOW OF THE MS IN HEALTH DATA SCIENCE PROGRAM

The Master of Science in Health Data Science begins each Fall (August) and Spring (January). The first Fall and Spring semesters consist of two e-terms (each 8-weeks in length) each, followed by one e-term in Summer and a final semester (two e-terms) the following Fall. Each semester builds in level of mastery.

Fall (Foundation of Health Systems, Health Data Stats, Programming and Translation)

The initial semester brings together both the Graduate Certificate in Health Data Science (GCHDS) students and the MS students, to learn side by side. In the fall, students learn the foundations and functioning of the US Health System, the basics of statistical and mathematical thinking relative to health data, programming in three languages, and the foundations of data cleaning, visualization, and presentation.

In addition, a number of "soft" skills are introduced such as LEAN project management and Agile training. Students who complete the fall semester (e-terms 1 and 2) will qualify for the Graduate Certificate. If they so choose, they may continue on with the MSHDS.

Spring/Summer/Fall (Intermediate and Advanced Health Data Analytics and Health Data Science)

These semesters mirror one another yet build in tools and applications. Students will develop skills in machine learning, wrangling unstructured health data and will work towards pulling together all program skills and applying to a capstone practicum in the summer/fall. During the practicum, students will develop skills in project scoping, background, data transfer, and understanding policies and procedures in place via the host or by the type of data being used. Students will also engage in data mining, modelling and storytelling with outcomes for ultimate presentation back to the host site. In the final e-term in the Fall, students can choose from several electives and, if they choose, can select an elective track (Health Care Informatics or Health Systems Research).

Students will also receive opportunities to further develop professional skills and certifications around LEAN should they choose.

Elective Tracks

The Elective Tracks consist of two required courses, taken in the final fall e-term. The final curriculum objective is to allow for specialization in a targeted area of student interest to provide students with a deeper knowledge in the subject area of their choice. Current track options are Health Care Informatics and Health Research Systems.

Key Program Highlights

- Consists of 12 online courses, 36 credit hours, 2 specialization electives
- 14-month masters or 16-week graduate certificate
- Gain expertise in advanced machine learning, text analytics, programming, visual analytics, and big data framework within the health care industry.

- Curriculum stays relevant to the ever-changing technology with an ability for the students to choose their specialization (i.e. Health Care Informatics or Health Systems Research)
- Students from diverse backgrounds – not just technical fields
- Work hands-on, team-based learning
- Communication in all forms such as presentations, interviewing, to work in groups and individually.

Requirements

The MSHDS requires the completion of **36 credits**.

Code	Title	Credits
Required Courses:		
HDS 800	Mathematics and Statistics for Health Data Science	3
HDS 801	The U.S. Healthcare System	3
HDS 802	Programming in Healthcare Environments	3
HDS 803	Translation of Health Data	3
HDS 804	Health Data Systems	3
HDS 805	Applied Machine Learning in Healthcare	3
HDS 806	Outcomes Research	3
HDS 807	Unstructured Health Data	3
HDS 808	Current Topics in Health Systems	3
HDS 811	Health Data Science Practice	3
Choose two electives:		
Healthcare Informatics Electives		
HDS 820	Health Systems Informatics	
or HDS 821	Big Data Algorithms in Biological Sciences	
or HDS 890	HDS Independent Study	
Health Systems Research Electives		
HDS 822	AI and Deep Learning in Healthcare	
or HDS 823	Advanced Statistics in Healthcare	
or HDS 890	HDS Independent Study	
Total Credits		36

Student Learning Outcomes

To prepare students to professionally interpret health care data and present findings to the appropriate audiences using appropriate tools and design with the following:

- Use of ethics, probability, Inference, Data Exploration and Imputation, as well as the ability to design experiments.
- Use of Databases and storage, including SQL and NoSQL, Mongo DB, AWS.
- Application programs and to address large and small data with programs such as Python, R, SAS, JMP, Tableau, Power BI, GIS/QGIS, Hadoop, Spark, Hive, Pig.
- Introductory and advanced Algorithms for text and data mining.
- Use of cleansing tools, such as Natural Language and use of Neural Networks Natural Language for translation of and processing of data for storytelling.
- Foundations and advanced of Predictive Modelling using Time Series, Forecasting, Multivariate Techniques,
- Propensity Score Matching and Clustering using Bayesian, Survival, Survey and psychometry analysis.
- Cost effectiveness using Econometrics, QALY measurement, Pharmaco-economics, Reimbursement and their relation to structure and operations and strategic decision-making.
- Policy, Population Health, Epidemiologic Methods, Governance.
- Project Management approaches with LEAN, Agile.