BACHELOR OF SCIENCE WITH A MAJOR IN HEALTH DATA SCIENCE

Program Director: Ali Rahnavard

The bachelor's program in health data science offers an interdisciplinary degree that equips students with a comprehensive understanding of using data analytics, statistics, and machine learning to address crucial challenges in public health and biomedicine. This program focuses on managing, analyzing, and interpreting complex health and omics data, alongside providing a strong foundation in public health principles, health policy, and population health. Students gain expertise in applying data science tools and methodologies to real-world issues, including epidemic tracking, molecular epidemiology, health disparities, disease prevention, health promotion, and health services planning. The curriculum integrates modules on epidemiology, biostatistics, health informatics, biology, machine learning, and data ethics. Graduates are well-prepared for diverse career paths in public health departments, healthcare organizations, hospitals, biomedical research institutes, non-profit research institutions, and government agencies. They contribute significantly to data-driven public health initiatives and advancements in biomedicine. Through this program, students engage in real-world health applications and gain an understanding of the risk factors for public health and human diseases such as cancer and how infectious diseases spread and evolve.

ADMISSIONS

Information on the admission process is available on the Office of Undergraduate Admissions website (https://undergraduate.admissions.gwu.edu/). Applications may be submitted via the Common Application (https://go.gwu.edu/commonapp/).

Supporting documents not submitted online should be mailed to:

Office of Undergraduate Admissions
The George Washington University
800 21st Street NW, Suite 100
Washington, DC 20052

Contact for questions:

gwadm@gwu.edu or 202-994-6040

REQUIREMENTS

The following requirements must be fulfilled: 20 credits in general education courses, 56 to 57 credits in health data science core courses, 10 credits in health data science guided elective courses, and 33 to 34 credits in general elective courses.

Code	Title	Credits
University General Education Requirement		
One course in critical thinking in the humanities.		

Two courses in critical thinking, quantitative reasoning, or scientific reasoning in the social sciences. For exercise science and nutrition majors, must be satisfied with one of the following: ANTH 1002, ANTH 1003, or ANTH 1004.

One course that has an approved oral communication component, For exercise science and nutrition majors, must be satisfied with either COMM 1040 or COMM 1041.

One course in quantitative reasoning. For exercise science and nutrition majors, must be satisfied with one of the following: STAT 1051, STAT 1053, or STAT 1127.

One course in scientific reasoning with laboratory experience. For exercise science and nutrition majors, must be satisfied with BISC 1111.

UW 1020	University Writing	
or HONR 1015 (Origins and Evolution of Modern Thought)		

After successful completion of UW 1020 or HONR 1015, 6 credits distributed over at least two different Writing in the Disciplines (WID) courses taken in separate semesters (summer counts as one semester) are required. WID courses are designated by a "W" appended to the course number.

Approved courses can be found under University General Education Requirement (https://bulletin.gwu.edu/university-regulations/general-education/).

Code	Title	Credits
Required core courses		
PUBH 4201	Practical Computing	
or CSCI 1011	Introduction to Programming with Java	
or CSCI 1012	Introduction to Programming with Python	
PUBH 4202	Bioinformatics Algorithms and Data Structures	
or CSCI 1112	Algorithms and Data Structures	
PUBH 1142	Introduction to Health Data Science	
PUBH 1242	Health Data Mining	
PUBH 2242	Natural Language Processing for Healthcare	
PUBH 3242	Health Data Visualization	
MATH 1231	Single-Variable Calculus I	
MATH 1232	Single-Variable Calculus II	
BISC 1111	Introductory Biology: Cells and Molecules	
PUBH 2110	Public Health Biology	

or BISC 1112	Introductory Biology: The Biology of Organisms	
PUBH 2142	Introduction to Biostatistics for Public Health	
STAT 4157	Introduction to Mathematical Statistics I	
STAT 2118	Regression Analysis	
or STAT 2183	Intermediate Statistics Lab/Packages	
PUBH 1010	First-Year Experience in Public Health	
PUBH 1101	Introduction to Public Health and Health Services	
PUBH 3131	Epidemiology	
PUBH 3199	Topics in Public Health (Research Methods)	
PUBH 3136	Health Law	
or PUBH 3151	Current Issues in Bioethics	
PUBH 4199	Independent Study	

Electives

43 to 44 credits in elective courses, including 10 credits in health data science guided elective courses (below) and 33 to 34 credits in general elective courses. Most courses offered by GW can be taken as general electives. Students are encouraged to meet with their advisor to help select these courses. No more than 3 credits in Lifestyle, Sport, and Physical Activity (LSPA) courses can be counted toward the 120 credits required for the bachelor's degree. LSPA courses count as general electives,

Health data science guided electives

Code	Title	Credits
Biochemistry		
BIOC 3820	Bioinformatics and Computational Biochemistry	
Biological sciences		
BISC 2207	Genetics	
BISC 2213	Biology of Cancer	
BISC 2214	Developmental Biology	
BISC 2336	Introductory Microbiology	
BISC 2583	Biology of Proteins	
BISC 2585	Biometry	
Biomedical engineering		
BME 3825	Medical Measurement Laboratory	
BME 4482	Medical Measurements	
Computer science		
CSCI 1112	Algorithms and Data Structures	
CSCI 1121	Introduction to C Programming	
CSCI 1132	Data Structures and Software Design	
CSCI 1311	Discrete Structures I	
CSCI 2312	Discrete Structures II	
CSCI 2441	Database Systems and Team Projects	
CSCI 3212	Algorithms	
CSCI 3362	Probability for Computer Science	
CSCI 4341	Continuous Algorithms	
CSCI 4342	Computational Linear Algebra and Applications	
CSCI 4364	Machine Learning	
CSCI 4572	Computational Biology	
CSCI 4576	Introduction to Biomedical Computing	
CSCI 4577	Biomedical Computing	
Data science		
DATS 2101	Ethical Life in a Digital World	
DATS 2102	Data Visualization for Data Science	
DATS 2103	Data Mining for Data Science	
DATS 2104	Data Warehousing for Data Science	
Economics		
ECON 2123	Introduction to Econometrics	
ECON 3105	Economic Forecasting	
ECON 3148	Health Economics	
Electrical and eomputer engineering		
ECE 1120	C Programming for Electrical and Computer Engineering	
ECE 1125	Data Structures and Algorithms for ECE	
ECE 3220	Introduction to Digital Signal Processing	
ECE 3225	Signal and Image Analysis	
Mathematics		

MATH 2184	Linear Algebra I
MATH 2233	Multivariable Calculus
MATH 3125	Linear Algebra II
MATH 3342	Ordinary Differential Equations
MATH 3359	Introduction to Mathematical Modeling
MATH 3553	Introduction to Numerical Analysis
MATH 3740	Computational Complexity
MATH 4239	Real Analysis I
MATH 4240	Real Analysis II
Mechanical and aerospace engineering	
MAE 1117	Introduction to Engineering Computations
Physics	
PHYS 3100	Math Methods for Physics
PHYS 3181	Computational Physics
Public health	
PUBH 3201	Introduction to Bioinformatics
PUBH 3202	Introduction to Genomics
PUBH 3995	Undergraduate Research
Statistics	
STAT 2123	Introduction to Econometrics
STAT 2183W	Intermediate Statistical Laboratory: Statistical Computing Packages
STAT 3119	Design and Analysis of Experiments
STAT 4158	Introduction to Mathematical Statistics II
STAT 4181	Applied Time Series Analysis
STAT 4188	Nonparametric Statistics Inference
STAT 4189	Mathematical Probability and Applications I
STAT 4190	Mathematical Probability and Applications II
STAT 4197	Fundamentals of SAS Programming for Data Management