Milken Institute School of Public Health THE GEORGE WASHINGTON UNIVERSITY	**BS/MS HDS Dual Degree** **Program 2024-2025** Note: All curriculum revisions will be updated immediately on the website http://www.publichealth.gwu.edu

Program Director	**Undergraduate Program Advisor**

BACKGROUND:

The George Washington University Milken Institute School of Public Health (SPH) offers a unique opportunity to students interested in public health and biomedical research. To further effectively train a workforce in public health and related fields with strong data science and data analytics skills, we have developed a dual degree program for students to earn both a BS and MS degree. This dual degree program is designed for undergraduates in a BS program at GWU (e.g., public health, biology, neuroscience, computer science, statistics, mathematics, bioengineering, etc.) different than the BS HDS program (for those see our BS HDS/MS HDS dual degree program) or students who have already completed some undergraduate coursework on health data science at other universities, with an interest in adding health data science expertise to their existing skillsets. This program would result in the earning of a BS degree and a MS degree in Health Data Science (BS/MS HDS program). The program is designed for George Washington University residential and non-residential undergraduates.

BS/MS HDS program

Students enrolled in any BS program at GWU (except BS HDS) or students who have already completed some undergraduate coursework on other Health Data Science programs at other universities can benefit from this opportunity to acquire a dual degree by joining the BS/MS HDS program, Bioinformatics concentration. This dual degree program strives to matriculate leaders in public health and biomedical researchers who are committed to life-long learning and to improving the health and well-being of our local, national, and international communities. This is an appropriate program for pre-professional students who are interested in public health issues and translational research.

Mission

The mission of this program is to train the next generation of leaders and practitioners in public health, medicine, and data analytics. Students in the program develop practical skills for innovative data analysis and will be trained in becoming excellent communicators of scientific findings in public health and biomedical research. The program takes advantage of the rich biostatistical and bioinformatics resources at GWU and in the Nation's Capital and is designed to prepare students to be independent practitioners and collaborators in interdisciplinary research.

Prerequisites

All applicants to the dual BS/MS HDS - Bioinformatics concentration program must have completed the following prerequisites with a grade of B or better to be considered for admission:

- a course in undergraduate statistics
- a course in undergraduate biology
- a course in undergraduate computer science

Competencies
Upon completion of the dual BS HDS/MS HDS - Bioinformatics concentration program students will possess the following competencies.

1. **Programming:** Develop skills in programming, data structures, algorithms, machine learning, high-performance computing and apply these skills to create approaches that facilitate biological data analysis.
2. **Biology:** Develop a basis of knowledge in biology and evaluate biological data generation technologies.
3. **Statistics:** Apply statistical research methods in the context of molecular biology, genomics, medical, and population genetics research.
4. **Foundational Knowledge:** Interpret and synthesize the various foundational concepts of bioinformatics, including genomics, algorithms, and other key tools used in bioinformatics.
5. **Conceptual Integration:** Integrate concepts and data across fields of computer science, statistics, data science, biology, and health sciences through bioinformatics.

BS/MS HDS GRADUATION REQUIREMENTS
1. **Total Credit Requirement**. Graduation requirements for the BS/MS HDS dual degree will follow graduation requirements in the student's corresponding BS program, with up to 9 crossover credits chosen from the MS HDS - Bioinformatics concentration program as allowed by their BS degree program and with the approval from the Program Director. Then an additional 27 graduate credits are required for the MS HDS - Bioinformatics concentration degree to graduate.
2. **Course Requirements**. Successful completion of a related undergraduate BS program (consult with advisors for the applicability of your BS program to the BS/MS HDS program) and completion of the MS HDS - Bioinformatics concentration program is required for the dual BS/MS HDS degree.
3. **Master's Thesis or Research Report**: Successful defense of a Master's Thesis or presentation of a Research Report.
4. **Grade point average**: A minimum overall grade-point average of B (3.0) for the MS HDS.
5. **Time Limit Requirement**: The degree must be completed within 10 years.
6. **Pathways to Public Health**. Must be successfully completed unless waiver received.
7. **Ethics/Professional Skills Requirement:** Participate in department-led ethical and professional skills training.
8. **Professional Enhancement requirement**: Students must participate in 8 hours per degree program of advisor pre-approved Public Health-related lectures, seminars, symposia and/or conferences related to the appropriate field of study specifically focused on research and research ethics. Students must submit documentation of Professional Enhancement activities to the SPH Office of Student Records. Instructions can be found here: https://publichealth.gwu.edu/academics/forms
9. **CITI Training requirement**: All students are required to complete training regarding human subject protection regulation and the Health Insurance Portability and Accountability Act of 1996 (HIPAA). To fulfill this requirement, you must complete the Collaborative IRB Training Initiative (CITI) Course in The Protection of Human Research Subjects.

10. **Integrity Quiz & Plagiarism Requirement**: All students are required to review the George Washington University Code of Academic Integrity and take the quiz within their first semester of study. The Code of Integrity and step-by-step instructions can be found here: http://publichealth.gwu.edu/integrity

Credit Distribution

Undergraduate courses for the BS
Follow requirements in the student's corresponding BS program

Graduate courses for the MS HDS – Bioinformatics Concentration (36 total credits including 9 crossover credits*)		
PUBH 6850	1	Introduction to SAS for Public Health Research
PUBH 6851	1	Introduction to R for Public Health Research
PUBH 6852	1	Introduction to Python for Public Health Research
PUBH 6080	0	Pathways to Public Health
PUBH 6860	3	Principles of Bioinformatics
PUBH 6854	3	Applied Computing in Health Data Science
PUBH 6859	3	High Performance and Cloud Computing
PUBH 6861	3	Public Health Genomics
PUBH 6884	3	Bioinformatics Algorithms and Data Structures
PUBH 8870	3	Statistical Inference for Public Health Research I
PUBH 8885	3	Computational Biology
PUBH 6886	3	Statistical and Machine Learning for Public Health Research
PUBH 68xx	6	Electives
PUBH 6897	2	Research in Biostatistics and Bioinformatics
PUBH 6898	1	Master of Science Thesis
Total graduate credits	**36 credits**	

*Students can take up to 9 credits of the MS courses listed below instead of the corresponding course in their BS program if approved by the HDS graduate advisor