

# DOCTOR OF PHILOSOPHY IN THE FIELD OF GENOMICS AND BIOINFORMATICS

The PhD in genomics and bioinformatics program is designed to develop research scientists in areas where the principles and methods of cell and systems biology, biochemistry and genetics are applied to the study of human diseases.

Investigators in the program use the latest technologies in genomics, proteomics, high-resolution imaging, bioinformatics and pre-clinical (murine) trials. The training program includes research opportunities in autism spectrum disorders, muscular dystrophies, biomarkers, asthma, airway diseases, brain tumors, microRNA processing, dysregulation of mitochondrial functions and protein trafficking.

The program begins with interdisciplinary coursework in genes, cells and systems in biomedical sciences, professional development in scientific communication and science careers, and laboratory rotations offered through GW's Institute for Biomedical Sciences. After the first year of study, students work with their research advisor to complete remaining degree requirements, including the dissertation.

Program faculty are drawn largely from the GW School of Medicine and Health Sciences, including scientists from Children's Research Institute of Children's National Health System.

Students have access to extensive research facilities and libraries on campus and in the greater Washington, DC. This include the School of Medical and Health Sciences, GW's Gelman Library and Himmelfarb Health Sciences Library, Children's Research Institute, the National Institutes of Health, and numerous other research institutions.

This is a STEM-designated program.

Visit the program website (<https://smhs.gwu.edu/ibs/phd-programs-ibs/genomics-bioinformatics-phd-program/>) for additional information.

## ADMISSIONS

Admission Fall - December 1 deadlines:

Standardized test scores: The GRE general exam is not required.

The Test of English as a Foreign Language (TOEFL), the academic International English Language Testing System (IELTS), or the PTE Academic is required of all applicants except those who hold a bachelor's, master's, or doctoral degree from a college or university in the United States or from an institution located in a country in which English is the official language, provided English was the language of instruction.

Minimum scores for the program are:

- Academic IELTS: an overall band score of 7.0 with no individual score below 6.0; or

- TOEFL: 600 on paper-based or 100 on Internet-based; or

- PTE Academic: 68;

Recommendations: Three (3) recommendations required:

Prior academic records: Transcripts are required from all colleges and universities attended, whether or not credit was earned, the program was completed, or the credit appears as transfer credit on another transcript. Unofficial transcripts from all colleges and universities attended must be uploaded to your online application. Official transcripts are required only of applicants who are offered admission. If transcripts are in a language other than English, English language translations must be provided. The English translation alone should be uploaded into your application.

Prerequisite: A bachelor's degree in biological sciences, chemistry, or a related field.

Statement of purpose: In an essay of 250 - 500 words, state your purpose in undertaking graduate study in your chosen field. Include your academic objectives, research interests, and career plans. Also discuss your related qualifications, including collegiate, professional, and community activities, and any other substantial accomplishments not already mentioned on the application.

Interview: An interview is required.

Additional requirements: A Curriculum Vitae is required.

International applicants only: Please follow this link - <https://columbian.gwu.edu/international-graduate-applicants> (<https://columbian.gwu.edu/international-graduate-applicants/>) - to review the International Applicant Information carefully for details on required documents and English language requirements.

**For more information on the admission process**, please visit the Columbian College of Arts and Sciences Frequently Asked Questions (<http://columbian.gwu.edu/graduate/admissions/faqs/>) page.

## Supporting documents not submitted online should be mailed to:

Columbian College of Arts and Sciences - Graduate Admissions Office  
The George Washington University  
801 22nd Street NW, Phillips Hall 215  
Washington DC 20052

### Contact for questions:

askccas@gwu.edu ~ 202-994-6210 (phone) ~ 202-994-6213 (fax)  
8:30 am - 5:30 pm, Monday through Friday

## REQUIREMENTS

The following requirements must be fulfilled:

The general requirements stated under Columbian College of Arts and Sciences, Graduate Programs (<http://bulletin.gwu.edu/arts-sciences/#degreeregulationstext>).

The requirements for the doctor of Philosophy Program (<http://bulletin.gwu.edu/arts-sciences/#doctoralstext>).

72 credits, including required core and elective courses. Successful completion of a grant-style qualifier examination is required for advancement to candidacy. In addition, students perform full-time research in faculty laboratories for the duration of their program. In GW laboratories, they are hired as paid research assistants/associates in the third year and beyond of the program.

Students are advised to complete up to 45 credits comprising required interdisciplinary core courses, required genomics core courses, electives, and advanced readings and research in the first two years of PhD study. Upon successful completion of a grant-style qualifier, students register for up to 24 credits of dissertation research through completion and successful oral defense of a written dissertation.

The following requirements must be fulfilled: 72 credits, including required core and elective courses. Successful completion of a grant-style qualifier examination is required for advancement to candidacy. In addition, students perform full-time research in faculty laboratories for the duration of their program.

Students are advised to complete 45 credits in the first two years of PhD study comprising required interdisciplinary core courses, required genomics core courses, electives, and advanced readings and research. Upon successful completion of a grant-style qualifier, students register for up to 27 credits of dissertation research through completion and successful oral defense of a written dissertation.

Code	Title	Credits
<b>Required interdisciplinary core*</b>		
BMSC 8210	Genes to Cells	
BMSC 8212	Systems Physiology	
BMSC 8215	Lab Rotations (Taken three times for a total of six credits)	
BMSC 8216	Scientific Writing, Presentation Skills, and Seminar Planning	
BMSC 8217	Ethics and Grant Writing	
BMSC 8218	Career Options in the Biomedical Sciences	
BMSC 8230	Molecular Basis of Human Disease	
BMSC 8235	Applied Biostatistics for Basic Research	
<b>Required genomics core*</b>		
GENO 8231	Introduction to Genomics, Proteomics, and Bioinformatics	
GENO 8234	Genomics and Precision Medicine Seminar (Taken two times for a total of two credits)	
<b>Electives</b>		
20 credits elective courses selected in consultation with graduate program advisor:		
ANAT 6130	Clinically Oriented Human Embryology	
ANAT 6150	Clinically Oriented Human Microscopic Anatomy	
ANAT 6160	Human Clinical Neuroanatomy	
ANAT 6182	Fundamentals of Translational Science	
ANAT 6275	Advanced Studies in Translational Sciences	
ANAT 6292	Projects in Anatomical Sciences: Introduction to Neuroradiology	
BIOC 6240	Next Generation Sequencing	
BIOC 6242	Bioscience Big Data Statistics	
BIOC 6281	Topics	
BIOC 8225	Metabolism	
BIOC 8232	Molecular and Cellular Signaling	
BMSC 8219	Writing the Grant-Style Qualifier	

BMSC 8220	IBS Research Practicum
CANC 8221	The Basic Science of Oncology
CANC 8222	Molecular Oncology and Cancer Epigenetics
CANC 8223	Immunology and Immunotherapy of Cancer
GENO 6223	Bioinformatics
GENO 6236	Medical Genomics
GENO 6237	Proteomics and Biomarkers
GENO 8232	Computational Biology and Bioinformatics: Principles and Practices
GENO 8998	Advanced Readings and Research
MICR 6292	Tropical Infectious Diseases
MICR 8210	Infection and Immunity
MICR 8230	Molecular and Cellular Immunology
MICR 8270	Advanced Topics in Immunology
NRSC 8284	Foundations of Experimental Neuroscience I
NRSC 8285	Foundations of Experimental Neuroscience II
PHAR 6116	Pharmacogenomics and Personalized Medicine
PHAR 6205	Pharmacology
PHAR 6206	Advanced Pharmacology
PHAR 6322	Advanced Professional and Communication Skills
PHAR 8211	Physiology
PHAR 8281	Molecular Pharmacology and Neurobiology of Excitable Tissues
PUBH 6276	Public Health Microbiology
PUBH 6278	Public Health Virology
PUBH 6861	Public Health Genomics
<b>Dissertation research (6-27 credits)</b>	
GENO 8999	Dissertation Research

\*Required courses may be waived at the discretion of the graduate program director based on written documentation of prior equivalent coursework. Any waiver increases the number of electives required, by the number of credits waived.