

BIOMEDICAL AND HEALTH INFORMATICS, PHD

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Degree: Doctor of Philosophy (PhD)
Field of Study: Biomedical and Health Informatics

Program Overview

The PQHS faculty team is dedicated to mentoring PhD students in developing a career grounded in research that can be applied across many areas of biomedical, clinical and population health, and bioinformatics. We take time getting to know candidates and in cultivating junior colleagues who can expect that our interdisciplinary approach will offer a solid intellectual grounding for a future career.

The PhD BHI program builds on the BHI Master's – or Master's programs from other institutions – and offers a focus on core domain areas:

- Data analytics
- Biomedical, clinical and/or population health research
- Computational and system research design

The PhD program is a full-time, research oriented program, based in Cleveland, that typically takes four years (post-Master's) to complete. PhD candidates take core requirements intended to support capabilities essential to the interdisciplinary research that this program advances. Additionally, there are courses at the 400-level and higher across these domain areas available for a tailored program, based on recommendations from the student's mentorship/advisory committee and the student's areas of interest. In total, there are 36 credit hours of coursework plus 18 credit hours of dissertation research, all in line with CWRU PhD program requirements.

All first-year full-time students in the PhD program are fully funded by the School of Medicine (Stipend, Tuition, and Health Insurance are included). After the conclusion of their first year, students will be supported by grants (research and training) held by their research mentor.

In addition to coursework in their first year, all students will do three research rotations chosen from an approved list of potential mentors. The purpose of a rotation is to provide students with exposure to the laboratory/scientific culture pervasive in that discipline and research group and to determine if the student-mentor fit is appropriate. Faculty members conduct their independent research and run their laboratories using a variety of styles. The rotation gives the student and faculty member an opportunity to determine if they have similar work styles and if the scientific culture and training will lead to successful training of the student. By the end of the first year, all students will choose a mentor and a lab in which to do their dissertation work.

Students will master the rigorous scientific and analytic methods necessary to be at the forefront of efforts to not only describe but also effectively evaluate and improve health. Exposure to cutting edge research will be facilitated by our department-wide seminar that includes

talks by world-leading experts both from off- and on-campus. As part of their training, all students will participate in these seminars, including as speakers. This will help develop the necessary communication skills that are expected of successful researchers.

The PhD in Biomedical Health Informatics welcomes applicants from a diverse field of backgrounds and training experiences. Graduates from accredited universities and colleges will be considered for admission to the department. Applicants may apply straight from baccalaureate training, from advanced degree programs (MS, MPH, MD), or from the professional field. All applicants must satisfy both CWRU and department requirements for graduate admission.

Important Note: The program information contained on this page is current as of May 1st, 2024. For the most current information, we advise you to review the PhD in Biomedical and Health Informatics program handbook. You can find the most recent Program Handbook here.

PhD Policies

For PhD policies and procedures, please review the School of Graduate Studies section of the General Bulletin.

Program Requirements

Core Curriculum

All incoming PhD students take a required curriculum supplemented by additional coursework as determined by their mentoring or dissertation committees. The required curriculum contains courses that expose students to each of the required domains.

Code	Title	Credit Hours
Required Courses:		15
PQHS 413	Introduction to Data Structures and Algorithms in Python	
PQHS 416	AI in medicine: knowledge representation and deep learning	
PQHS 431	Statistical Methods I	
PQHS 432	Statistical Methods II	
PQHS 490	Epidemiology: Introduction to Theory and Methods	
Biomedical and Health Domain Courses:		
EBME 410	Medical Imaging Fundamentals	
MPHP 406	History and Philosophy of Public Health	
PQHS 440	Introduction to Population Health	
PQHS 451	A Data-Driven Introduction to Genomics and Human Health	
PQHS 465	Design and Measurement in Population Health Sciences	
PQHS 490	Epidemiology: Introduction to Theory and Methods	
Computation and System Design Domain Courses:		
CSDS 410	Analysis of Algorithms	
PQHS 413	Introduction to Data Structures and Algorithms in Python	
CSDS 433	Database Systems	
CSDS 458	Introduction to Bioinformatics	
CSDS 477	Advanced Algorithms	
CSDS 493	Software Engineering	
PQHS 471	Machine Learning & Data Mining	

PQHS 427	Geospatial Analytics for Biomedical Health Applications	
Data Analytics Domain Courses:		
EBME 419	Applied Probability and Stochastic Processes for Biology	
PQHS 453	Categorical Data Analysis	
PQHS 459	Longitudinal Data Analysis	
PQHS 467	Comparative and Cost Effectiveness Research	
PQHS 515	Secondary Analysis of Large Health Care Databases	
PQHS 426	An Introduction to GIS for Health and Social Sciences	
Required Research Courses:		2
IBMS 500	On Being a Professional Scientist: The Responsible Conduct of Research	
IBMS 501	Responsible Conduct of Research for Advanced Trainees ^a	
PQHS 444	Communicating in Population Health Science Research	
PQHS 445	Research Ethics in Population Health Sciences	
PQHS 501	Research Seminar ^b	
Electives ^c		13
Dissertation^d		18
PQHS 701	Dissertation Ph.D.	

a The SOM requires that PhD students who are 4 years beyond their initial RCR training in IBMS 500, register for IBMS 501.

b Must take for at least six semesters.

c Electives are chosen in consultation with the student's mentor and mentoring committee.

d PhD students can take between 1-9 credit hours of PQHS 701 per semester.

Sample Plan of Study

First Year

Fall		Credit Hours
PQHS 413	Introduction to Data Structures and Algorithms in Python	3
PQHS 431	Statistical Methods I	3
PQHS 490	Epidemiology: Introduction to Theory and Methods	3
PQHS 501	Research Seminar	0
Credit Hours		9

Spring

PQHS 416	AI in medicine: knowledge representation and deep learning	3
PQHS 432	Statistical Methods II	3
PQHS 501	Research Seminar	0
Domain Area Course or Elective		3
Credit Hours		9

Second Year

Fall		Credit Hours
PQHS 444	Communicating in Population Health Science Research	1

PQHS 501	Research Seminar	0
Domain Area Course or Elective		3
Elective		4
Elective		4
Credit Hours		12

Spring

IBMS 500	On Being a Professional Scientist: The Responsible Conduct of Research	1
PQHS 501	Research Seminar	0
Domain Area Course or Elective		3
Elective		4
Elective		4
PQHS 445	Research Ethics in Population Health Sciences	0
Credit Hours		12

Third Year

Fall		Credit Hours
PQHS 501	Research Seminar	0
PQHS 701	Dissertation Ph.D.	1-9
Elective		1
Credit Hours		2-10

Spring

PQHS 501	Research Seminar	0
PQHS 701	Dissertation Ph.D.	1-9
Credit Hours		1-9

Fourth Year

Fall		Credit Hours
PQHS 501	Research Seminar	0
PQHS 701	Dissertation Ph.D.	1-9
Credit Hours		1-9

Spring

PQHS 501	Research Seminar	0
PQHS 701	Dissertation Ph.D.	1-9
Credit Hours		1-9
Total Credit Hours		47-79