



Curriculum Requirements for PhD in Biomedical and Health Informatics (BHI)

Satya Sahoo, PhD, BHI PhD Program Director

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. 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 area:

- 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 five years 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 requirements plus 54 of dissertation research, all in line with CWRU PhD program requirements.

1. Required core courses (3 courses, 9 credits)
 - Introduction to Health Informatics (MPHP 532/HSMC432)
 - Computing in Biomedical and Health Informatics (PQHS 416)
 - Statistical Methods I (PQHS 431)
2. Required distribution of courses (4 courses, 12 credits), choose one course from each core
 - Statistics II (PQHS 432)
 - Biomedical and Health (select a course from 4 courses)
 - Computation and System Design (select a course from 5 courses)
 - Data Analytics (select a course from 11 courses)

3. Elective courses (4 courses, 12 credits), choose additional electives from cores or from other approved electives (14 other courses)
 - The selection of elective courses is made by student in consultation with mentoring/advising committee
4. Required research activities (3 credits)
 - Research Seminar (0 credits - must take for at least 6 semesters)
 - Research Ethics: IBMS 500 (1 credit) AND PQHS 445 (0 credits)
 - Communicating in Population Health Science Research (PQHS 444) (2 x 1 credit)
5. Required Dissertation (at least 54 credits)
 - Required to pass written/oral qualifying exam prior to dissertation credits

Total Credits - at least 90 credits

For course descriptions, please consult the CWRU Course Bulletin at <http://bulletin.case.edu/schools/>

Curriculum Details for PhD Program in Biomedical and Health Informatics

Three sample programs for PhD. (Required courses in bold)

Example One: Bioinformatics Focus

Semester 1	Courses	Title	Credits	Graded or P/F
	MPHP 532/HSMC 432	Introduction to Health Informatics	3	Graded
	PQHS 431	Statistics I	3	Graded
	EECS 433	Database Systems	3	Graded
	PQHS 501	Research Seminar	0	P/F
		Total Credits	9	
Semester 2	PQHS 416	Introduction to Computing in Biomedical Health Informatics	3	Graded
	PQHS 471	Machine Learning & Data Mining	3	Graded
	PQHS 432	Statistical Methods II	3	Graded
	PQHS 501	Research Seminar	0	P/F
	PQHS 445	Research Ethics in Population Health Sciences	0	P/F
	IBMS 500	On Being a Professional Scientist: The Responsible Conduct of Research	1	P/F
		Total Credits	10	
Semester 3	EECS 454	Analysis of Algorithms.	3	Graded
	PQHS 483	Causal Inference	3	Graded
	PQHS 444	Communicating in Population Health Science Research	1	Graded
	PQHS 501	Research Seminar	0	P/F
		Total Credits	7	
Semester 4	PQHS 453	Categorical Data Analysis	3	Graded
	EECS 493	Software Engineering	3	Graded
	EECS 494	Introduction to Information Theory	3	Graded
	PQHS 444	Communicating in Population Health Science Research	1	Graded
	PQHS 501	Research Seminar	0	P/F
		Total Credits	10	
Semester 5	PQHS 701	Dissertation Ph.D.	9	P/F
	PQHS 501	Research Seminar	0	P/F
Semester 6	PQHS 701	Dissertation Ph.D.	9	P/F
	PQHS 501	Research Seminar	0	P/F
Semester 7	PQHS 701	Dissertation Ph.D.	9	P/F
Semester 8	PQHS 701	Dissertation Ph.D.	9	P/F
Semester 9	PQHS 701	Dissertation Ph.D.	9	P/F
Semester 10	PQHS 701	Dissertation Ph.D.	9	P/F
		Total Credits for 5 year Ph.D. Program	90	

Example Two: Clinical Informatics Focus

Semester 1	Courses	Title	Credits	Graded or P/F
	MPHP 532/HSMC 432	Introduction to Health Informatics	3	Graded
	PQHS 431	Statistics I	3	Graded
	PQHS 440	Introduction to Population Health	3	Graded
	PQHS 501	Research Seminar	0	P/F
		Total Credits	9	
Semester 2	New Course	Foundations of Computing in Biomedical Informatics	3	Graded
	PQHS 432	Statistics II	3	Graded
	EECS 433	Database Systems	3	Graded
	PQHS 501	Research Seminar	0	P/F
	PQHS 445	Research Ethics in Population Health Sciences	0	P/F
	IBMS 500	On Being a Professional Scientist: The Responsible Conduct of Research	1	P/F
		Total Credits	10	
Semester 3	PQHS 515	Secondary Analysis of Large Health Care Data Sets	3	Graded
	HSMC 420	Health Finance	3	Graded
	PQHS 468	The Continual Improvement of Healthcare	3	Graded
	PQHS 444	Communicating in Population Health Science Research	1	Graded
	PQHS 501	Research Seminar	0	P/F
		Total Credits	10	
Semester 4	PQHS 467	Comparative and Cost Effectiveness Research	3	Graded
	PQHS 459	Longitudinal Data Analysis	3	Graded
	PQHS 444	Communicating in Population Health Science Research	1	Graded
	PQHS 501	Research Seminar	0	P/F
		Total Credits	7	
Semester 5	PQHS 701	Dissertation Ph.D.	9	P/F
	PQHS 501	Research Seminar	0	P/F
Semester 6	PQHS 701	Dissertation Ph.D.	9	P/F
	PQHS 501	Research Seminar	0	P/F
Semester 7	PQHS 701	Dissertation Ph.D.	9	P/F
Semester 8	PQHS 701	Dissertation Ph.D.	9	P/F
Semester 9	PQHS 701	Dissertation Ph.D.	9	P/F
Semester 10	PQHS 701	Dissertation Ph.D.	9	P/F
		Total Credits for 5 year Ph.D. Program	90	

Example Three: Public Health/Analytics Focus

Semester 1	Courses	Title	Credits	Graded or P/F
	MPHP 532/HSMC 432	Introduction to Health Informatics	3	Graded
	PQHS 431	Statistics I	3	Graded
	PQHS 490	Epidemiology: Introduction to Theory and Methods	3	Graded
	PQHS 501	Research Seminar	0	P/F
		Total Credits	9	
Semester 2	New Course	Foundations of Computing in Biomedical Informatics	3	Graded
	PQHS 432	Statistics II	3	Graded
	PQHS 465	Design and Measurement in Population Health Sciences	3	Graded
	PQHS 501	Research Seminar	0	P/F
	PQHS 445	Research Ethics in Population Health Sciences	0	P/F
	IBMS 500	On Being a Professional Scientist: The Responsible Conduct of Research	1	P/F
		Total Credits	10	
Semester 3	MPHP 406	History and Philosophy of Public Health	3	Graded
	PQHS 515	Secondary Analysis of Large Health Care Data Sets	3	Graded
	PQHS 440	Introduction to Population Health	3	Graded
	PQHS 444	Communicating in Population Health Science Research	1	Graded
	PQHS 501	Research Seminar	0	P/F
		Total Credits	10	
Semester 4	PQHS 459	Longitudinal Data Analysis	3	Graded
	PQHS 471	Machine Learning & Data Mining	3	Graded
	PQHS 444	Communicating in Population Health Science Research	1	Graded
	PQHS 501	Research Seminar	0	P/F
		Total Credits	7	
Semester 5	PQHS 701	Dissertation Ph.D.	9	P/F
	PQHS 501	Research Seminar	0	P/F
Semester 6	PQHS 701	Dissertation Ph.D.	9	P/F
	PQHS 501	Research Seminar	0	P/F
Semester 7	PQHS 701	Dissertation Ph.D.	9	P/F
Semester 8	PQHS 701	Dissertation Ph.D.	9	P/F
Semester 9	PQHS 701	Dissertation Ph.D.	9	P/F
Semester 10	PQHS 701	Dissertation Ph.D.	9	P/F
		Total Credits for 5 year Ph.D. Program	90	