D17. Academic Public Health Doctoral Degrees

Students enrolled in the unit of accreditation's doctoral degree programs that are designed to prepare public health researchers and scholars (e.g., PhD, ScD) complete a curriculum that is based on defined competencies; engage in research appropriate to the degree program; and produce an appropriately advanced research project at or near the end of the program of study.

These students also complete coursework and other experiences, outside of the major paper or project, that substantively address scientific and analytic approaches to discovery and translation of public health knowledge.

These students complete doctoral-level, advanced coursework and other experiences that distinguish the school of study from a master's degree in the same field.

The school defines appropriate policies for advancement to candidacy, within the context of the institution.

Finally, students complete coursework that provides instruction in the foundational public health knowledge at an appropriate level of complexity. This instruction may be delivered through online, in-person or blended methodologies, but it must meet the following requirements while covering the defined content areas.

The school identifies at least one required assessment activity for each of the foundational public health learning objectives.

The school validates academic doctoral students' foundational public health knowledge through appropriate methods.

1) *List the curricular requirements for each non-DrPH public health doctoral degree in the unit of accreditation, EXCLUDING requirements associated with the final research project. The list must indicate (using shading) each required curricular element that a) is designed expressly for doctoral, rather than master's students or b) would not typically be associated with completion of a master's degree in the same area of study.*

   The school may present accompanying narrative to provide context and information that aids reviewers' understanding of the ways in which doctoral study is distinguished from master's-level study. This narrative is especially important for institutions that do not formally distinguish master's-level courses from doctoral-level courses.

   The school will present a separate list for each degree program and concentration as appropriate.

   GWSPH offers seven academic and highly specialized public health doctoral degrees:
   a. PhD in Environmental Health (48 credits)
   b. PhD in Epidemiology (48 credits)
   c. PhD in Global Public Health Sciences (48 credits)
   d. PhD in Health Data Science, Biostatistics (72 credits)
   e. PhD in Health Data Science, Bioinformatics (72 credits)
   f. PhD in Health Policy (48 credits)
   g. PhD in Social and Behavioral Sciences (48 credits)

   All PhD students take a comprehensive exam before working on their dissertation.

Courses at the 8000 level are considered doctoral courses. Some of the doctoral courses have 6000-level cross-listed courses or are preapproved electives at the master's level. Courses that are designed expressly for a doctoral degree have been shaded.

Students may transfer up to 12 or 24 graduate credits[78] toward their PhD program, assuming those credits meet the transfer criteria. For students who have earned graduate degrees, they may petition to waive and replace (or substitute) similar courses. Under this policy, the program director reviews previously taken graduate courses and determines if the student can waive the required course and replace it with another topic appropriate course. Under this waive and replace process, students complete the same number of credits. All PhD students complete the minimum number of required credits listed above to graduate. The full transfer credits and substitution policies are available in the PhD Handbook (see ERF > Criterion A > Criterion A1 > A1.3: Bylaws-Policy Documents).

Requirements for PhD in Environmental Health degree (minus dissertation coursework)		
Course number	Course name	Credits
Required courses		
PUBH 6080	Pathways to Public Health	0
PUBH 6247	Epidemiological Methods 1: Design of Health Studies	3
PUBH 6421	Responsible Conduct of Research	1
PUBH 6862	Applied Linear Regression Analysis for Public Health Research	3
PUBH 8001	PhD Seminar on Cross-Cutting Concepts in Public Health	1
PUBH 6121	Environmental and Occupational Epidemiology	3
PUBH 8123	Applied Toxicology for Public Health	3
PUBH 8126	Assessment and Control of Environmental Hazards	3
PUBH 8144	Environmental Health Data Development and Modeling	2
PUBH 8411	Advanced Topics: Principles of Human Health Risk Science	3
	Electives	12–18

Requirements for PhD in Epidemiology degree (minus dissertation coursework)		
Course number	Course name	Credits
Required courses		
PUBH 6080	Pathways to Public Health	0
PUBH 6247	Epidemiological Methods 1: Design of Health Studies	3
PUBH 6421	Responsible Conduct of Research	1
PUBH 8001	PhD Seminar on Cross-Cutting Concepts in Public Health	1
PUBH 6252	Epidemiologic Methods 2: Advanced Epidemiologic Methods	3
PUBH 6865	Applied Categorical Data Analysis for Public Health Research	3
PUBH 6866	Principles of Clinical Trials	3

---

[78] Allowable transfer credits dependent on total credits required by the program (i.e., program length).

PUBH 6868	Quantitative Methods	3
PUBH 8419	Measurement in Public Health and Health Services	3
PUBH 8877	Generalized Linear Models in Biostatistics	3
PUBH 6869	Principles of Biostatistical Consulting	1
PUBH 8283	Doctoral Biostatistics Consulting Practicum	2
	Electives	11

Requirements for PhD in Global Public Health Sciences degree (minus dissertation coursework)		
Course number	**Course name**	**Credits**
Required courses		
PUBH 6080	Pathways to Public Health	0
PUBH 6421	Responsible Conduct of Research	1
PUBH 6862	Applied Linear Regression Analysis for Public Health Research	3
PUBH 8001	PhD Seminar on Cross-Cutting Concepts in Public Health	1
PUBH 8416	Study Design and Evaluation Methods	3
PUBH 6850 Or PUBH 6851 Or PUBH 6852	Introduction to SAS for Public Health Research Or Introduction to R for Public Health Research Or Introduction to Python for Public Health Research	1
PUBH 6865	Applied Categorical Data Analysis for Public Health Research	3
PUBH 8406	Advanced Topics in Global Health Doctoral Seminar 1	2
PUBH 8407	Advanced Topics in Global Health Doctoral Seminar 2	2
PUBH 8470	Global Health Demographic Methods	3
PUBH 8475	Research Ethics and Integrity in Domestic and International Research	2
	Electives	13

Requirements for PhD in Health Data Science, Bioinformatics degree (minus dissertation coursework)		
Course number	**Course name**	**Credits**
Required courses		
PUBH 6080	Pathways to Public Health	0
PUBH 6421	Responsible Conduct of Research	1
PUBH 6850	Introduction to SAS for Public Health Research	1
PUBH 6851	Introduction to R for Public Health Research	1
PUBH 6852	Introduction to Python for Public Health Research	1
PUBH 6860	Principles of Bioinformatics	3
PUBH 6886	Statistical and Machine Learning for Public Health Research	3

PUBH 8001	PhD Seminar on Cross-Cutting Concepts in Public Health	1
PUBH 8870	Statistical Inference for Public Health Research 1	3
PUBH 6854	Applied Computing in Health Data Science	3
PUBH 6859	High Performance and Cloud Computing	3
PUBH 6861	Public Health Genomics	3
PUBH 6884	Bioinformatics Algorithms and Data Structures	3
PUBH 8885	Computational Biology	3
GTAP	GradTeachingAsst Certification	0
PUBH 8413	Research Leadership[79]	1
	Electives	18 minimum

Requirements for PhD in Health Data Science, Biostatistics degree (minus dissertation coursework)		
Course number	**Course name**	**Credits**
Required courses		
PUBH 6080	Pathways to Public Health	0
PUBH 6421	Responsible Conduct of Research	1
PUBH 6850	Introduction to SAS for Public Health Research	1
PUBH 6851	Introduction to R for Public Health Research	1
PUBH 6852	Introduction to Python for Public Health Research	1
PUBH 6860	Principles of Bioinformatics	3
PUBH 6886	Statistical and Machine Learning for Public Health Research	3
PUBH 8001	PhD Seminar on Cross-Cutting Concepts in Public Health	1
PUBH 8870	Statistical Inference for Public Health Research 1	3
PUBH 6866	Principles of Clinical Trials	3
PUBH 6869	Principles of Biostatistical Consulting	1
PUBH 8879	An Introduction to Causal Inference for Public Health Research	3
PUBH 6887	Applied Longitudinal Data Analysis for Public Health Research	3
PUBH 8871	Statistical Inference for Public Health Research 2	3
PUBH 8875	Linear Models in Biostatistics	3
PUBH 8877	Generalized Linear Models in Biostatistics	3
PUBH 8878	Statistical Genetics	3
PUBH 8880	Statistical Computing for Public Health Research	3
STAT 6227	Survival Analysis	3
GTAP	GradTeachingAsst Certification	0
PUBH 8283	Doctoral Biostatistics Consulting Practicum	2

---

[79] Independent research course

PUBH 8413	Research Leadership[80]	1
	Electives	12 minimum

Requirements for PhD in Health Policy degree (minus dissertation coursework)		
Course number	**Course name**	**Credits**
Required courses		
PUBH 6080	Pathways to Public Health	0
PUBH 6421 Or PUBH 8099	Responsible Conduct of Research Or Ethics in Domestic and International Research *requires waive and replace petition*	1
PUBH 8416 Or PUBH 6495	Study Design and Evaluation Methods Or Field Trial Methods and Applications + 1 cr elective *requires waive and replace petition*	3
PUBH 8418	Applied Statistical Analysis	3
PUBH 8001	PhD Seminar on Cross-Cutting Concepts in Public Health	1
PUBH 8620	Foundations of US Health Policy	2
PUBH 6340	Health Economics and Finance	3
PUBH 8404	Advanced Topics: Health Systems and Health Policy Research	3
PUBH 8405	Advanced Topics: Health Economics Research	3
PUBH 8417 Or PPPA 8023	Qualitative Research Methods and Analysis Or Mixed Methods in Research Design	3
PUBH 8622	Healthcare Payments, Systems and Delivery Models	3
PPPA 8022	Econometrics for Policy Research	3
	Electives	10 minimum

Requirements for PhD in Social and Behavioral Sciences degree (minus dissertation coursework)		
Course number	**Course name**	**Credits**
Required courses		
PUBH 6080	Pathways to Public Health	0
PUBH 6421	Responsible Conduct of Research	1
PUBH 8416	Study Design and Evaluation Methods	3
PUBH 8418 Or PUBH 6862	Applied Statistical Analysis Or Applied Linear Regression Analysis for Public Health Research	3
PUBH 8001	PhD Seminar on Cross-Cutting Concepts in Public Health	1
PUBH 8417	Qualitative Research Methods and Analysis	3

---

[80] Independent research course

PUBH 8419	Measurement in Public Health and Health Services	3
PUBH 8525	Advanced Topics in Social and Behavioral Sciences	1
PUBH 8526	Application of Structural Equation Modeling to Public Health Research	3
PUBH 8528	Advanced Topics in Critical Review of Social-Behavioral Theory and its Application in Public Health	3
PUBH 8534	Multi-Level Interventions for Health Promotion	3
	Electives	15 minimum

2) *Provide a matrix, in the format of Template D17-1, that indicates the required assessment opportunities for each of the defined foundational public health learning objectives (1–12). Typically, the school will present a separate matrix for each degree program, but matrices may be combined if requirements are identical.*

Template D17-1

Content Coverage for Academic Doctoral Degree in a Public Health Field		
Content	**Course**	**Describe specific assessment opportunity**
1. Explain public health history, philosophy, and values.	PUBH 6080 Pathways to Public Health	Week 2 Quiz. See ERF.
2. Identify the core functions of public health and the 10 Essential Services.	PUBH 6080 Pathways to Public Health	Week 3 Quiz. See ERF.
3. Explain the role of quantitative and qualitative methods and sciences in describing and assessing a population's health.	PUBH 6080 Pathways to Public Health	Week 4 Quiz. See ERF.
4. List major causes and trends of morbidity and mortality in the US or other community relevant to the school or program.	PUBH 6080 Pathways to Public Health	Week 6 Quiz. See ERF.
5. Discuss the science of primary, secondary, and tertiary prevention in population health, including health promotion, screening, etc.	PUBH 6080 Pathways to Public Health	Week 7 Quiz. See ERF.
6. Explain the critical importance of evidence in advancing public health knowledge.	PUBH 6080 Pathways to Public Health	Week 5 Quiz. See ERF.
7. Explain effects of environmental factors on a population's health.	PUBH 6080 Pathways to Public Health	Week 9 Quiz. See ERF.
8. Explain biological and genetic factors that affect a population's health.	PUBH 6080 Pathways to Public Health	Week 8 Quiz. See ERF.
9. Explain behavioral and psychological factors that affect a population's health.	PUBH 6080 Pathways to Public Health	Week 13 Quiz. See ERF.
10. Explain the social, political, and economic determinants of health and how they contribute to population health and health inequities.	PUBH 6080 Pathways to Public Health	Week 12 Quiz. See ERF.
11. Explain how globalization affects global burdens of disease.	PUBH 6080 Pathways to Public Health	Week 11 Quiz. See ERF.
12. Explain an ecological perspective on the connections among human health, animal health and ecosystem health (e.g., One Health).	PUBH 6080 Pathways to Public Health	Week 10 Quiz. See ERF.

3) *Provide supporting documentation for each assessment activity listed in Template D17-1. Documentation should include the following, as relevant, for each listed assessment:*

- *assignment instructions or guidelines as provided to students*
- *writing prompts provided to students*
- *sample exam question(s)*

See ERF > Criterion D > Criterion D17 > D17.3: Temp D17-1.

4) *Provide a matrix, in the format of Template D17–2, that lists competencies for each relevant degree and concentration. The matrix indicates how each competency is covered in the curriculum. Typically, the school will present a separate matrix for each concentration. Note: these competencies are defined by the school and are distinct from the introductory public health learning objectives defined in this criterion.*

Template D17–2

Competencies for PhD, Environmental Health		
Competency	**Course**	**Describe specific assessment opportunity**
Plan and design assessments of environmental and/or occupational exposure prioritizing fate and transport phenomena.	PUBH 8126 Assessment and Control of Environmental Hazards	PUBH 8126—In the Project, students plan and design assessments of environmental and/or occupational exposure in the form of a literature review, computational model or the measurement of environmental hazards. The paper and accompanying presentation also incorporate the human health risk paradigm/framework, describing how fate and transport and principles of risk science are connected to your chosen hazard and exposure estimates. See ERF.
Examine biological mechanisms involved in responding to environmental agents and factors that affect susceptibility to adverse effects.	PUBH 8123 Applied Toxicology for Public Health	PUBH 8123—Students conduct a sensitivity analysis to identify and quantify the influence of key input variables. Using a preestablished Monte Carlo simulation, students examine the risk of chronic toxicity associated with exposure to Diisononyl Phthalate (DINP) in children's products. Specifically, the biological mechanisms of children are examined. See ERF.
Critique epidemiologic research investigating the relationship between environmental or occupational exposures and health, including summarizing methods and results and assessing biases.	PUBH 6121 Environmental and Occupational Epidemiology	PUBH 6121—In Homework #2, students collaborate with teammates to critique two peer-reviewed publications and present their findings to the class using a critique framework. Students are individually assessed during their presentation and via peer evaluation. See ERF.
Apply principles of risk science and risk frameworks to environmental health issues, including recognizing strengths and weaknesses of risk management decision-making.	PUBH 8411 Advanced Topics: Principles of Human Health Risk Science	PUBH 8411—In the final paper, student determine the risk science principles, frameworks and applications of sciences used in an environmental health issue, noting the strengths and weaknesses of the scientific basis for risk management decision-making. See ERF.
Generate computational models applied to environmental and/or occupational health issues.	PUBH 8144 Environmental Health Data Development and Modeling	PUBH 8144—In the Project Presentation, students generate computational model(s) that address issues in exposure science or environmental health and present them to the class. This is an individual presentation. See ERF.

Competencies for PhD, Epidemiology		
Competency	**Course**	**Describe specific assessment opportunity**
Demonstrate knowledge of advanced epidemiologic concepts including assessment of bias, confounding, issues with measurement, and modeling.	PUBH 6252 Epidemiologic Methods 2: Advanced Epidemiologic Methods PUBH 8419 Measurement in Public Health and Health Services	PUBH 6252—In the Threats to Validity Assignment, students identify and assess various sources and types of bias. See ERF. PUBH 8419—Students complete a series of exercises and writing assignments demonstrating their ability to conduct advanced epidemiologic analyses and discuss advanced epidemiologic concepts. See ERF.
Design epidemiological research studies including identification and development of data sources and data collection instruments and recognition of measurement issues.	PUBH 6247 Design of Health Studies PUBH 8419 Measurement in Public Health and Health Services	PUBH 6247—In the Research Proposal, students plan and design an observational study. Students write a background on the topic, develop study aims, identify a study population and provide an overview of the study design and sample size. They define measures of key variables, provide an analysis timeline and develop shell tables based on proposed analyses. See ERF. PUBH 8419—In a series of writing assignments, students address measurement of a selected public health issue. See ERF
Evaluate published epidemiologic and biomedical research and identify gaps and/or limitations of the research.	PUBH 6252 Epidemiologic Methods 2: Advanced Epidemiologic Methods	PUBH 6252—In the Threats to Validity Assignment, students identify and assess various sources and types of bias. See ERF.

Conduct, evaluate, and interpret statistical analysis and assess data collection instruments.	PUBH 6252 Epidemiologic Methods 2: Advanced Epidemiologic Methods PUBH 8419 Measurement in Public Health and Health Services	PUBH 6252—In the Threats to Validity Assignment (Part 2), students design a new study to overcome potential threats to validity. Students write a brief paper outlining the recruitment and data collection procedures. See ERF. PUBH 8419—Students complete a series of exercises demonstrating their ability to conduct and evaluate statistical analyses. See ERF.
Disseminate and communicate epidemiological research findings.	PUBH 6252 Epidemiologic Methods 2: Advanced Epidemiologic Methods PUBH 6866 Principles of Clinical Trials	PUBH 6252—In the Quantitative Methods Assignment, students present and interpret the results of a data analysis using appropriate tables and write-ups. These tables and write-up should be structured as seen in a peer-reviewed publication. See ERF. PUBH 6866—In the Concept Proposal assignment, groups of students develop and write a concept proposal describing the essential elements of a clinical trial. In addition to a paper, students communicate their proposal via PowerPoint presentation, during which all members of the team present. Students are assessed individually during the presentation and Q&A session. See ERF.

Competencies for PhD, Health Data Science, Biostatistics		
Competency	**Course**	**Describe specific assessment opportunity**
Biostatistical Methodology: Develop and implement innovative biostatistical methodologies that can be utilized to solve complex problems in and improve efficiency of biomedical and public health research.	PUBH 8871 Statistical Inference for Public Health Research 2	PUBH 8871—In the Midterm and Final Exams, students develop and implement innovative biostatistical methodologies that can be utilized to solve complex problems and improve efficiency of biomedical and public health research. See ERF.

Advanced Statistics and Computation: Implement fundamental and advanced statistical methods and associated computing to effectively and accurately analyze complex public health and medical data.	PUBH 6866 Principles of Clinical Trials PUBH 8880 Statistical Computing for Public Health Research	PUBH 6866—In small groups, students develop a concept proposal describing a clinical trial. They apply fundamental and advanced statistical methods, such as randomization, blinding, control groups, endpoints, design configuration, inclusion/exclusion criteria, sample size calculation, and data analysis issues. In the final class, groups present their proposal. Students are individually assessed during the presentation as every member must present and answer questions during the Q&A session. See ERF. PUBH 8880—In the Final Project, students select one of the recently published papers in biostatistical journals chosen by the instructor and reproduce all the simulation results from the paper. Students are expected to understand the statistical methodologies in the paper and implement them in a computer program using R, C, Python or other language. Students give a presentation on the final project. See ERF.
Communication: Communicate and consult with scientific colleagues via effective listening, critical questioning, clear written documentation, and oral presentation skills.	PUBH 6866 Principles of Clinical Trials PUBH 6869 Principles of Biostatistical Consulting	PUBH 6866—In the Concept Proposal assignment, groups of students (scientific colleagues) collaborate and communicate regarding the appropriate statistical theories and study designs. The exchange of concepts and ideas with others on the team and iterative presentations to the class on the trial are part of the course requirement. Through this teamwork, students learn how members of a team interact with one another, the accepted behaviors of a team (such as expressing ideas, voicing opinions and concerns, offering help, and resolving conflict) and using various methods of communication. Groups present their proposal in a group presentation. Students are individually assessed in the presentation as each is required to present. See ERF. PUBH 6869—Students learn the principles of biostatistical consulting and communication in sessions 1 through 5. In the Online Quiz, students identify and communicate potential concerns to the lead physician in a described scenario in written format. See ERF.

Leadership: Provide biostatistical leadership in the design, conduct, analysis, and reporting of collaborative research studies.	PUBH 6866 Principles of Clinical Trials PUBH 6869 Principles of Biostatistical Consulting PUBH 8283 Doctoral Biostatistics Consulting Practicum	PUBH 6866—In the Concept Proposal assignment groups learn about biostatistical leadership in the design, conduct, analysis and reporting of collaborative research studies. Through this team assignment, students develop skills to increase engagement, influence team members, foster team cohesion and apply leadership skills. Students discuss trial monitoring and publishing of trial results, both of which are biostatistical leadership activities. See ERF. PUBH 6869—Students learn the principles of biostatistical consulting and leadership skills in sessions 1 through 5. In the Online Quiz, students apply leadership skills when discussing potential concerns in a described scenario. See ERF. PUBH 8283—Students, under the supervision of a faculty advisor, take the lead consulting position and work with clients by providing biostatistical support.
Teaching: Educate health professionals, research scientists, or students using effective didactic and instructive methodologies to relay complicated mathematical and statistical analyses.	PUBH 6869 Principles of Biostatistical Consulting PUBH 8283 Doctoral Biostatistics Consulting Practicum	PUBH 6869—In the Online Quiz, students are presented with a scenario where they consult with and educate a physician regarding appropriate tests, data findings and concerns. In the Sample Size Assignment, students write two reports, similar to what might be included in grant applications. The language used must effectively communicate complicated mathematical and statistical analyses. See ERF. PUBH 8283—Under the supervision of an assigned faculty advisor, students work with clients who need some type of biostatistical support. The faculty advisor reviews methods for explaining the approach to the client and practices to verify that the client understands the essence of the proposed method. Students educate their clients and provide evidence of good communication with regard to statistical theory and study design.

Competencies for PhD, Health Data Science, Bioinformatics		
Competency	**Course**	**Describe specific assessment opportunity**
Computation: Apply skills in software design and programming to create algorithms for biological data analyses.	PUBH 6854 Applied Computing in Health Data Science	PUBH 6854—In Lab 3, students manipulate spectral data from multiple files; merge, analyze and modify script where students run a script to merge spectra tables; add code to allow user input; and modify script to limit downstream analyses to a subset of the data. See ERF.
Biology: Apply knowledge of molecular biology, genomics, genetics, evolution, and systems biology through statistics and computation to address novel research questions.	PUBH 6861 Public Health Genomics PUBH 8885 Computational Biology	PUBH 6861—In Problem set 6, students integrate and visualize multiple Omic and genetic datasets onto the KEGG database using a systems biology approach (PaintOmics) to statistically unravel and compare differentially expressed and regulated metabolic pathways and genes in the house mouse. See ERF. PUBH 8885—In Assignment 2, (Problems 1 and 2), students describe five rare diseases caused by gene mutations, identify the chromosomal location of the genes using the integrative genome viewer at the Broad Institute, calculate the percentage of the human genome composed of genes, and then compare coding sequences in the human genome to bacterial genomes. See ERF.
Statistics: Create modeling and data analyses using statistical and mathematical applications.	PUBH 8885 Computational Biology	PUBH 8885—In Assignment 5 students create modeling and data analyses using a provided dataset and R. See ERF.
Conceptual Integration and Application in Bioinformatics: Apply integrated concepts and data across fields of computer science, statistics, data science, biology and health sciences through bioinformatics.	PUBH 8885 Computational Biology	PUBH 8885—In Assignment 2, students apply integrated concepts to compare similarity versus alignment, calculate and compare multiple distances measure from the ape package in R, explore and describe features, and implement computational tools for visualization of sequence alignments. See ERF.

Independent Research: Plan and conduct original, independent research through application and integration of skills and knowledge developed through the preliminary phase of the PhD program.	PUBH 6859 High Performance and Cloud Computing PUBH 6861 Public Health Genomics	PUBH 6859—In Projects, students choose among 12 topics ranging from scalable and automated QC of data for phylogenetic tree reconstruction to security and storage of electronic medical records on HPC and cloud computing. Students investigate and reproduce the results of a study on the topic, introduce computational tools and biological questions, apply techniques learned in class on the published data, and present their finding both as an oral presentation (5–10 minutes) and a computational demonstration of methods (10–15 minutes). See ERF. PUBH 6861—In the Short Scientific Report, students investigate an original health-related question by reviewing the topic, applying bioinformatic and statistical tools to the analysis of genomic and demographic data, and summarizing the outcome on a peer-review report written in the form of a scientific paper (pp. 3–4).

Competencies for PhD, Health Policy		
Competency	**Course**	**Describe specific assessment opportunity**
Critically assess pertinent policy, legal, regulatory, economic, and social frameworks of U.S. health and public health policy and reforms, and apply that understanding to analyze current issues.	PUBH 8404 Advanced Topics: Health Systems and Health Policy Research PUBH 8405 Advanced Topics: Health Economics Research	PUBH 8404–In Week 4, students discuss several frameworks that address policy, legal, regulatory, economic and social constructs. In Paper #1, students select a topic of their choice, develop a research question within this area of interest, select an appropriate framework and apply it to their research question. The goal of the assignment is to critically assess the health policy research question within the scope of the framework. Students are assigned three of their peers' papers to peer review. Students critically assess each paper based on criteria identified by the instructor and report their feedback in an oral presentation. See ERF. PUBH 8405–In the Critique of Economics and Health Services Research, students present their critique of current public health policy and its effects on health outcomes, such as utilization, quality, economic, behavioral and clinical outcomes (p. 3; see ERF).
Apply theories and conceptual models to help develop testable hypotheses in health policy research, select appropriate research designs and methods, and apply pertinent quantitative and qualitative methods to conduct health policy research, using responsible research methods.	PUBH 8418 Applied Statistical Analysis (Quant) PUBH 8417 Qualitative Research Methods and Analysis (Qual) Or PPPA 8023 Mixed Methods in Research Design (Qual)	PUBH 8418–In the Final Project, students identify an available dataset and a health policy research question that can be analyzed using the dataset. After developing a testable hypothesis, students design an appropriate quantitative analysis and conduct the analysis using STATA. Students write a research paper, appropriate for a peer-reviewed journal, and present their research in a 10- to 15-minute presentation (pp. 3–4). PUBH 8417–In the Final Project, groups of students conduct a qualitative research project, including conceptualization, implementation, analysis and interpretation. Students write a research paper, appropriate for submission to a peer-reviewed journal. Students are individually assessed through a peer evaluation process. See ERF. Or PPPA 8023–In the Final Project, students write a mixed methods research proposal including developing the protocol for a mixed methods study using an embedded design and experiments. Students work with the instructor to develop the mixed methods study proposal (p. 2; see ERF).

Analyze health system features, such as payment and delivery system characteristics, and assess their relationship with and effects on health outcomes, such as utilization, costs, behaviors and clinical outcomes.	PUBH 8405 Advanced Topics: Health Economics Research	PUBH 8405—Students complete five problem sets designed to enhance understanding of important economic concepts, including health insurance premium variances and risk pooling, health care market merger, cost-shifting and segmented markets, physician markets and cost effectiveness analysis. Students analyze health system features, such as payment and delivery system characteristics, and assess their relationship with and effects on health outcomes, such as utilization, costs, behaviors and clinical outcomes (p. 3; see ERF).
Identify and select datasets related to health policy, outcomes, management and markets and utilize them to assess public policies.	PUBH 8418 Applied Statistical Analysis	PUBH 8418—In the Final Project, students identify and select an appropriate quantitative dataset that they will use to conduct an independent statistical analysis. Students discuss their research question and proposed dataset in the Checkpoint #2 assignment before moving forward with the analysis (p. 4).
Produce descriptive and analytical written papers and oral presentations that apply core elements of policy analysis and research to key issues in health policy, including health services and public health policy.	PUBH 8620 Foundations of US Health Policy (descriptive) PUBH 8418 Applied Statistical Analysis (analytical)	PUBH 8620—In Paper #1, students write a paper on a current health policy topic geared toward a specific lay audience. In 2022, the topic was the Dobbs Supreme Court case. In 2023, the topic is on race-conscious admissions policies in the health professions. Students present their policy analyses through weekly in-class discussions (p. 4; see ERF). PUBH 8418—In the Final Project, students develop a testable hypothesis, design an appropriate quantitative analysis using an identified dataset and conduct the analysis using STATA. Students write an analytical research paper, appropriate for a peer-reviewed journal, and present their research in a 10- to 15-minute presentation (p. 4).

Competencies for PhD, Global Public Health Sciences		
Competency	Course	Describe specific assessment opportunity
Critique and analyze specialized concepts in global health research.	PUBH 8406 Advanced Topics in Global Health Doctoral Seminar 1	PUBH 8406—In the commentary paper, students discuss a contemporary debate in global health research and assess available theory and evidence on the topic (pp. 2–3; see ERF).
Apply rigorous quantitative methodologies to global health research.	PUBH 8470 Global Health Demographic Methods	PUBH 8470—In Assignment 2, students construct both single and multiple decrement lifetables using both tabular and regression methods. Additional assignments require students to conduct other quantitative methodologies using global health data. See ERF.

Conduct independent global health research and disseminate research findings to scientific or lay audience.	PUBH 8406 Advanced Topics in Global Health Doctoral Seminar 1	PUBH 8406–In the commentary paper, students discuss a contemporary debate in global health research by conducting independent research. The audience of these papers is a scientific audience and language used is expected to reflect this. In a blog, students conduct a rapid scoping of a specific topic or debate and apply multidisciplinary perspectives to analyze it. The resulting blog is geared toward a lay audience (pp. 2–3; see ERF).
Integrate ethical guidelines in the conduct of global health research.	PUBH 8475 Research Ethics and Integrity in Domestic and International Research	PUBH 8475–In the Case Study Write-Up and Analysis, students integrate ethical principles, theories, and guidelines in the conduct of global health research by focusing on a global health research case study. Students write a detailed ethical analysis of the case study and ethical dilemma(s) (p. 2).
Illustrate the ability to conduct global health research in multidisciplinary settings.	PUBH 8406 Advanced Topics in Global Health Doctoral Seminar 1	PUBH 8406–In the commentary and analysis paper, students write about a contemporary debate in global health. They are required to apply multidisciplinary perspectives to analyze the specific topic (pp. 2–3; see ERF).

Competencies for PhD, Social and Behavioral Sciences		
Competency	**Course**	**Describe specific assessment opportunity**
Synthesize the research literature in public health in a given topical domain, including the social and behavioral theoretical literature.	PUBH 8525 Advanced Topics in Social and Behavioral Sciences	PUBH 8525–Students demonstrate the competency in the final paper. See ERF.

Examine and employ distinct theories or a combination of theories at multiple levels to study health outcomes.	PUBH 8525 Advanced Topics in Social and Behavioral Sciences PUBH 8534 Multi-Level Interventions for Health Promotion	PUBH 8525–Students demonstrate the competency in the final paper. See ERF. PUBH 8534–Students develop a protocol paper for a clinical trial of an intervention of their design. The paper takes the format of a formal protocol that might be published in a scientific journal (e.g., JIMR-Protocols). Papers include: (a) a background section outlining the rationale/need for the intervention, (b) a description of the trial aims, (c) a detailed description of the intervention to be tested (including the theoretical foundation of the intervention, and the specific intervention activities and mechanisms of change associated with them), (d) a description of the study design and trial methods, (e) the primary outcome measures and intervention mediators to be assessed, and (f) a description of the expected outcomes of the trial and the implications for research and public health practice (p. 3).
Demonstrate advanced knowledge in the principles of evaluation and study design and data analysis as well as develop evidence-based questions.	PUBH 8417 Qualitative Research Methods and Analysis	PUBH 8417–In the Concept Paper and Final Paper, students demonstrate advanced knowledge in evaluation, study design and data analysis to first propose and then implement and write a qualitative research paper. See ERF.
Apply scientific knowledge to develop new conceptual models and/or research predictions, including justifying new questions with existing literature, selecting appropriate research models to study those questions, and indicating the potential contributions of the proposed research.	PUBH 8417 Qualitative Research Methods and Analysis	PUBH 8417–In the Concept Paper and Final Paper, students develop new conceptual models or research predictions as part of a qualitative research project. See ERF.
Demonstrate substantive knowledge within an area of social and behavioral sciences and display competency in communicating research ideas and findings to the larger scientific community.	PUBH 8528 Advanced Topics in Critical Review of Social-Behavioral Theory and Its Application in Public Health	PUBH 8528–Students present two PowerPoint presentations, which focus on measures/tools that have been used in the literature to assess change in relation to one of the theoretical perspectives examined in class lecture. For each presentation, students research articles referring to different populations and health behaviors (so that analysis of theory use and measures is not skewed) and critique three of those articles. Each presentation is 15–20 minutes, followed by a Q&A session. The presentation is geared toward the scientific community and is given to other doctoral students in the program (p. 3).

5) *Provide supporting documentation that clearly identifies how the school or program ensures that students complete a curriculum based on defined competencies. Documentation may include detailed course schedules or outlines to selected modules from the learning management system that identify the relevant assigned readings, lecture topics, class activities, etc.)*

For joint courses that contain both master's and doctoral students (e.g., PUBH 6885/8885), instructors are responsible for ensuring that doctoral students learn and complete doctoral-level work and are given assignments that go beyond the master's level assignments. The doctoral-level assignments are developed with doctoral competencies in mind and may include a more in-depth review of the literature and/or an analysis that involves more sophisticated and formalized techniques. Doctoral students in these classes may also have separate breakout sections from the master's level students and/or would be required to meet one-on-one with the professor to explore topics in greater depth.

See ERF > Criterion D > Criterion D17 > D17.5: PhD_Syllabi.

6) *Briefly explain how the school ensures that the instruction and assessment in introductory public health knowledge is generally equivalent to the instruction and assessment typically associated with a three-semester-credit course.*

The instruction and assessment in basic public health knowledge is achieved through one of two mechanisms:
- Students must have graduated with a public health degree from a CEPH-accredited school or program; or
- Students must successfully pass PUBH 6080 Pathways to Public Health, PUBH 8001 PhD Seminar on Cross-Cutting Concepts in Public Health and PUBH 6421 Responsible Conduct of Research. The online PUBH 6080 Pathways to Public Health requires students to view asynchronous lecture content, engage with assigned readings and complete short activities and assessments. Students must earn at least 80% on all 12 quizzes to pass the class; quizzes may be repeated at a later time until a passing grade of 80% is obtained. PUBH 8001 PhD Seminar on Cross-Cutting Concepts in Public Health (1 credit) and PUBH 6421 Responsible Conduct of Research (1 credit) provide additional didactics and application of the introductory public health knowledge learned. PUBH 6080 content is embedded in PUBH 8001 to encourage students to complete all requirements together. During the three courses, students engage in instruction and assessment typically associated with a three-semester-credit course.

7) *Identify required coursework and other experiences that address the variety of public health research methods employed in the context of a population health framework to foster discovery and translation of public health knowledge and a brief narrative that explains how the instruction and assessment is equivalent to that typically associated with a three-semester-credit course.*

Typically, the school or program will present a separate list and explanation for each degree program, but these may be combined if requirements are identical.

Students in the PhD in Environmental Health enroll in PUBH 6247 Epidemiologic Methods 1: Design of Health Studies (3 credits), PUBH 6421 Responsible Conduct of Research (1 credit), PUBH 6862 Applied Linear Regression Analysis for Public Health Research (3 credits) and PUBH 6121 Environmental and Occupational Epidemiology (3 credits), which cover public health research methodologies, statistics and environmental epidemiology research. Additional public health research courses may be taken as electives.

In addition to epidemiology classes, students in the PhD in Epidemiology enroll in a number of research classes including, but not limited to PUBH 6421 Responsible Conduct of Research (1 credit), PUBH 6866 Principles of Clinical Trials (3 credits), PUBH 6868 Quantitative Methods (3 credits) and PUBH 8419 Measurement in Public Health and Health Services (3 credits).

Students in the PhD in Global Public Health Sciences enroll in PUBH 6421 Responsible Conduct of Research (1 credit), PUBH 6862 Applied Linear Regression Analysis for Public Health Research (3 credits), PUBH 8416 Study Design and Evaluation Methods (3 credits), PUBH 8475 Research Ethics and Integrity in Domestic and International Research (2 credits) and PUBH 8470 Global Health Demographic Methods (3 credits). These students also take a number of statistics courses.

Students in the PhD in Health Data Science, regardless of concentration, enroll in a number of research classes including PUBH 6421 Responsible Conduct of Research (1 credit), PUBH 6850 Introduction to SAS for Public Health Research (1 credit), PUBH 6851 Introduction to R for Public Health Research (1 credit), PUBH 6852 Introduction to Python for Public Health Research (1 credit), PUBH 8870 Statistical Inference for Public Health Research 1 (3 credits) and PUBH 8413 Research Leadership (1 credit). Students in each concentration take additional research courses, specific to their concentration.

Students in the PhD in Health Policy are required to enroll in PUBH 8404 Advanced Topics: Health Systems and Health Policy Research (3 credits), PUBH 8405 Advanced Topics: Health Economics Research (3 credits) and PPA 8022 Econometrics for Policy Research (3 credits). They also take additional research methods courses but have several options such as deciding between a qualitative or mixed methods research course.

In addition to a statistics course, students in the PhD in Social and Behavioral Sciences enroll in PUBH 6421 Responsible Conduct of Research (1 credit), PUBH 8416 Study Design and Evaluation Methods (3 credits), PUBH 8417 Qualitative Research Methods and Analysis (3 credits), PUBH 8419 Measurement in Public Health and Health Services (3 credits) and PUBH 8526 Application of Structural Equation Modeling to Public Health Research (3 credits).

8) *Briefly summarize policies and procedures relating to production and assessment of the final research project or paper.*

All PhD students are required to write and successfully defend a dissertation to earn their doctoral degree. All programs require students to enroll in at least 8 credits of dissertation coursework, which may include a separate 2-credit proposal development course (PUBH 8435). Regardless of the program, all PhD students follow the dissertation guidelines outlined in the PhD Handbook. Dissertations are expected to:
- Use appropriate and scientifically rigorous methods
- Propose new research and result in new knowledge acquisition
- Advance public health knowledge and/or contribute to public health policy and practice, either domestically or internationally

Once students pass their comprehensive exams, they enter the candidacy phase and begin working on their dissertations. Students identify a topic and write a proposal outlining the research plan. Additionally, students identify a dissertation chair and committee members, who provide guidance through the proposal development and defense and ultimately the dissertation development and defense.

With approval from their Dissertation Committee Chair, students enroll in PUBH 8999 Dissertation Research for the required number of credits (program-specific). Generally, this research takes two to three years. It is during this phase that each program provides additional guidance and requirements specific to their degree program. Periodic check-ins with committee members and program leadership are required.

Upon approval by their dissertation committee members, students orally defend their dissertation and submit a final written dissertation. The oral defense includes a public forum where students present their research and answer questions, followed by a closed-door session for committee members to examine the work in greater detail. The committee makes one of three recommendations: pass with no revisions, conditional pass (which requires the student to make edits before submission) and fail (which results in the student's having to repeat, at a minimum, the oral defense).

9) *Provide links to handbooks or webpages that contain the full list of policies and procedures governing production and assessment of the final research project or paper for each degree program.*

See ERF > Criterion D > Criterion D17 > D17.9: PhD Final Rsrch_Policies.

The PhD in Health Policy was originally under the management of the Trachtenberg School of Public Policy and Public Administration. Most of the provided samples are from students who started their program while it was at Trachtenberg. As a result, the Trachtenberg doctoral dissertation handbook is also available in the ERF.

10) *Include completed, graded samples of deliverables associated with the advanced research project. The school must provide at least 10% of the number produced in the last three years or five examples, whichever is greater.*

See ERF > Criterion D > Criterion D17 > D17.10: PhD Final Rsrch_Samples.

There are no sample dissertations for the following programs as they are newer, and students haven't yet made it to the dissertation phase.
- PhD in Global Public Health Sciences
- PhD in Health Data Science, Biostatistics
- PhD in Health Data Science, Bioinformatics

The PhD in Environmental and Occupational Health is only four years old, and only two students have defended their dissertations. Those students' dissertations are included in the ERF.

11) *If applicable, assess strengths and weaknesses related to this criterion and plans for improvement in this area.*

Strengths
- GWSPH experienced tremendous growth in PhD offerings and number of PhD students since 2019, meeting and exceeding our objectives in this area.
- All PhD programs are under the leadership of the Associate Dean for PhD and MS Programs, with oversight by the Senior Associate Dean for Research and Innovation. This ensures that these programs receive centralized resources and follow consistent guidelines about dissertations and theses/final projects. The Office of PhD and MS Programs implemented several efforts to improve communications (e.g., monthly newsletters to students with updates, lectures and seminar information and opportunities for research and professional development). They also evaluate student

satisfaction (e.g., annual PhD survey, annual student progress review) and assess programmatic needs (e.g., annual PhD Directors retreat, universal core classes). Additional initiatives, such as a doctoral journal club and database of PhD teaching opportunities, are planned.

- Qualitative coursework was integrated into the required core PhD in Health Policy and PhD in Social and Behavioral Sciences programs. As a result of this change, more students are starting to develop qualitative (or entirely qualitative) components to their dissertations.
- Every department at GWSPH submitted T32 grants to fund PhD students.
- GWSPH funded its first successful T32 grant to train PhD students. It also created its first endowment to support PhD candidates. In some cases, departments are succeeding in garnering support for PhD students via research grants.

Challenges
- Some of the courses taught in the PhD programs require specialized faculty. It's been a challenge to find competent faculty to teach these courses as well as find faculty to take on new teaching needs.
- Securing substantial funding for PhD students remains an important goal for GWSPH. With a growing student body, there is an increased need for offering competitive financial aid packages to applicants to ensure matriculation.
- As the PhD programs' enrollment grows, administrative capacities, such as those in financial aid, must keep pace with the needs of the growing student body.

Future Plans
- GWSPH continues to grow our PhD programs and ensure each PhD student is well supported and engages in meaningful research experiences and that all research faculty have access to PhD students as needed.
- GWSPH plans to continue to matriculate a diverse group of students, domestically and internationally, to the PhD programs.
- GWSPH continues to monitor faculty and student feedback on the programs and make improvements on an ongoing basis. For example, a doctoral-level mixed methods course is currently being developed with a launch date scheduled for 2024–2025.
- The Office of PhD and MS Programs is looking at opportunities for GWSPH students to enroll in additional research methods and doctoral-level electives at other schools or institutions.
- The Office of PhD and MS Programs plans to review PhD program requirements and number of program credits.
- GWSPH will continue to support departments in the submission of T32 grants.