PROGRAM IN PUBLIC HEALTH

Public Health Analytics Concentration Competencies

Course Key

HPH 534: Spatial Analysis: Health Applications
HPH 559: Advanced Research Methods
HPH 560: Advanced Biostatistics

Legend		Primary Source of Learning Experience		Secondary Source of Learning Experience

Concentration Competencies	**Concentration Courses**		
1. **Foundation**: Understand processes and theoretical frameworks of population health and well-being.	**HPH 534**	**HPH 559**	**HPH 560**
Learning Experiences:			
a. Describe theory using path diagrams or other models.			
b. Understand independent variables (including mediating and moderating variables) and dependent variables, causal mechanisms, and direction of relationship.			
c. Discuss cartographic choices involved in map-making.			
d. Compare benefits and limitations of using individual point locations compared with data aggregated within regions.			
2. **Analytical Thinking:** Understand and critique a diversity of public health scientific articles.	**HPH 534**	**HPH 559**	**HPH 560**
Learning Experiences:			
a. Identify research question, hypothesis, and methodology, including sampling and approach utilized.			
b. Assess appropriateness of sampling and methodological approach.			
c. Interpret results and be able to communicate the study's findings, strengths, and weaknesses.			
3. **Synthesis:** Assess current knowledge on a topic through a literature review, synthesizing information, identifying gaps, and critiquing study limitations.	**HPH 534**	**HPH 559**	**HPH 560**
Learning Experiences:			
a. Summarize the published literature related to a research question using the recognized sources of population health literature including PubMed and the Cochrane Collaboration.			
b. Apply new knowledge base to critique existing literature on spatial analysis of public health data.			
c. Evaluate appropriateness of statistical methods used in public health studies.			

4. **Posing a Question**: Formulate a scientific question based on review of scientific literature.	**HPH 534**	**HPH 559**	**HPH 560**
Learning Experiences:			
a. Formulate a quantitative research question to address a gap identified in existing literature.			
b. Develop a research proposal to answer the research question.			
5. **Data and Software:** Identify and use data sources to analyze population health and well-being and become familiar with emerging and widely-used software and technologies to analyze data sets.	**HPH 534**	**HPH 559**	**HPH 560**
Learning Experiences:			
a. Become familiar with and be able to download and utilize publicly available secondary datasets (eg, NHANES, NHIS, DHS, Add Health, etc.)			
b. Become familiar with software used for quantitative analysis (e.g., SAS, Stata).			
c. Become familiar with types of health data appropriate for spatial analyses.			
d. Become familiar with software used for spatial analysis (e.g., SaTScan, ArcGIS).			
6. **Methods:** Utilize a suite of methods appropriate for analyzing public health data.	**HPH 534**	**HPH 559**	**HPH 560**
Learning Experiences:			
a. Understand differences between descriptive versus causal research: understand correlation versus causation, the scientific method, and the need for data to confirm theory.			
b. Describe different sampling techniques and implications for methodological approach and analysis.			
c. Understand and perform bivariate and multivariate methods, including linear and logistic regression methods and survival analysis.			
d. Understand and articulate limitations of statistical approach, including but not limited to sample utilized, unobserved confounders, generalizability, correlation v. causation, and statistically v. practically significant results.			
e. Discuss and apply methods of spatial analysis including smoothing, cluster analysis, and spatial regression.			
7. **Project:** Understand and conduct a research project related to population health.	**HPH 534**	**HPH 559**	**HPH 560**
Learning Experiences:			
a. Identify a testable population health-related research question that has not been previously asked or fully developed.			
b. Develop an analysis plan to answer a research question.			
c. Clean, manage, and prepare data for analysis related to a research question.			

d. Apply appropriate statistical methods based on data available.			
8. **Present Findings:** Develop written and oral presentations based on statistical analyses for both public health professionals and educated lay audiences.	**HPH 534**	**HPH 559**	**HPH 560**
Learning Experiences:			
a. Develop written reports based on statistical analyses for class.			
b. Orally present work based on statistical analyses to classmates.			
c. Present results from statistical analyses in the form of a poster or oral presentation to the public.			