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|  **Program in Public Health****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 |
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| **Concentration Competencies** | **Concentration Courses** |
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| 1. **Analytical Thinking:** Applying analytical and conceptual models for public health
 | **HPH 534** | **HPH 559** | **HPH 560** |
| **Learning Experiences:** |
| 1. Describe theory using path diagrams or other models.
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| 1. Identify independent variables (including mediating and moderating variables) and dependent variables, causal mechanisms, and direction of relationship.
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| 1. Interpret results and be able to communicate the study’s findings, strengths, and weaknesses.
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| 1. Discuss cartographic choices involved in map-making.
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| 1. Compare benefits and limitations of using individual point locations compared with data aggregated within regions.
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| 1. **Synthesis:** Assess current evidence base on a topic through a literature review, synthesizing information, identifying gaps, and critiquing study limitations.
 | **HPH 534** | **HPH 559** | **HPH 560** |
| **Learning Experiences:** |
| 1. Summarize the published literature related to a research question using the recognized sources of population health literature including PubMed and the Cochrane Collaboration.
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| 1. Apply new knowledge base to critique existing literature on spatial analysis of public health data.
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| 1. Evaluate appropriateness of statistical methods used in public health studies.
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| 1. **Posing a Question**: Formulate a scientific question based on review of scientific literature.
 | **HPH 534** | **HPH 559** | **HPH 560** |
| **Learning Experiences:** |
| 1. Formulate a quantitative research question to address a gap identified in existing literature.
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| 1. Develop a research proposal to answer the research question.
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| 1. **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:** |
| 1. Become familiar with and be able to download and utilize publicly available secondary datasets (eg, NHANES, NHIS, DHS, Add Health, etc.)
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| 1. Become familiar with software used for quantitative analysis (e.g., SAS, Stata).
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| 1. Become familiar with types of health data appropriate for spatial analyses.
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| 1. Become familiar with software used for spatial analysis (e.g., SaTScan, ArcGIS)
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| 1. **Methods:** Utilize a suite of methods appropriate for analyzing public health data.
 | **HPH 534** | **HPH 559** | **HPH 560** |
| **Learning Experiences:** |
| 1. Identify differences between descriptive versus causal research, correlation versus causation, the scientific method, and the need for data to confirm theory.
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| 1. Describe different sampling techniques and implications for methodological approach and analysis.
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| 1. Apply bivariate and multivariate methods, including linear and logistic regression methods and survival analysis.
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| 1. Articulate limitations of statistical approach, including but not limited to sample utilized, unobserved confounders, generalizability, correlation v. causation, and statistically v. practically significant results.
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| 1. Discuss and apply methods of spatial analysis including smoothing, cluster analysis, and spatial regression.
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| 6. **Project:** Conduct a research project related to population health. | **HPH 534** | **HPH 559** | **HPH 560** |
| **Learning Experiences:** |
| 1. Identify a testable population health-related research question that has not been previously asked or fully developed.
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| 1. Develop an analysis plan to answer a research question.
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| 1. Clean, manage, and prepare data for analysis related to a research question.
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| 1. Apply appropriate statistical methods based on data available.
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| 7. **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:** |
| 1. Develop written reports based on statistical analyses for class.
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| 1. Orally present work based on statistical analyses to classmates.
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| 1. Present results from statistical analyses in the form of a poster or oral presentation to the public.
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