

# The School of Public Health

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The mission of the Brown University School of Public Health is to serve the community, the nation, and the world by training future public health leaders and discovering and communicating innovative approaches to address public health challenges and to enhance population health and well-being. The School of Public Health pursues this mission by working with the broader Public Health community to:

- advance knowledge on population health through understanding risk and protective factors throughout the lifespan,
- develop evidence about effective medical and public health interventions,
- evaluate and disseminate strategies to encourage healthy behaviors, and,
- improve healthcare by identifying effective policies and practices.

The School offers graduate programs and comprehensive course work leading to the following degrees: Master of Public Health (MPH); ScM, AM and PhD in Biostatistics; ScM and PhD in Behavioral and Social Health Sciences; ScM and the Certificate in Clinical and Translational Research; ScM in Global Public Health; ScM and PhD in Epidemiology; and PhD in Health Services Research. The School of Public Health offers two undergraduate concentrations: AB in Public Health and ScB in Statistics.

The School's faculty-to-student ratio gives students a great deal of interaction with instructors who are accessible, approachable, and encouraging of student involvement in critical projects.

For additional information regarding the School of Public Health and its programs of study and areas of research visit:

[brown.edu/academics/public-health/about](http://brown.edu/academics/public-health/about)

## Public Health Concentration Requirements

Public Health is an interdisciplinary concentration through which students examine a variety of health issues, including population health and disease, health policy, cross-cultural and international aspects of health, the organizational and social structures through which health services are delivered and received, and the public health system. Courses in the concentration allow students to explore the ways in which the social, political, behavioral and biological sciences contribute to the understanding of patterns of population distributions of health and disease. The concentration also provides students with courses in basic research methods and statistics necessary for problem solving and critical thinking in the emerging emphasis on evidence-based health care and public health.

The undergraduate component to the five-year AB/MPH differs in some ways from the Public Health concentration. Please refer to <http://brown.edu/academics/public-health/education-training/>

masters/ MPH-program-about-us/combined-programs/abmph. Meet early with a concentration adviser to discuss your plans.

### 1. Core Courses: (non-substitutable; 4 required for honors, 5 for non-honors)

PHP 0310	Health Care in the United States	1
	This course is best taken as a freshman or sophomore.	
PHP 0320	Introduction to Public Health	1
	This course is a prerequisite to the Fundamentals of Epidemiology (PHP 0850) and is best taken as a freshman or sophomore.	
PHP 0850	Fundamentals of Epidemiology	1
	This course is best taken by end of junior year before PHP 1910, Senior Seminar.	
PHP 1501	Essentials of Data Analysis	1
	This course is best taken by end of junior year before PHP 1910, Senior Seminar.	
PHP 1910	Public Health Senior Seminar	1
	This course, which is required for all non-honors students and optional for honors students, is taken as a senior. PHP 0320 and PHP 0310 are required prior to course.	

### 2. Environmental Health and Policy (Select one of the following):

PHP 1101	World of Food: Personal to Global Perspectives on Nutrition, Agriculture and Policy	1
PHP 1700	Current Topics in Environmental Health	
PHP 1710	Climate Change and Human Health	
BIOL 1820	Environmental Health and Disease	
PLCY 1702E	Environmental Law and Policy	

### 3. Health, Health Care Systems and Policy (Select one of the following):

PHP 1070	The Burden of Disease in Developing Countries	1
PHP 1100	Comparative Health Care Systems	
PHP 1500	Global Health Nutrition	
PHP 1520	Emergency Medical Systems: An Anatomy of Critical Performance	
PHP 1530	Case Studies in Public Health: The Role of Governments, Communities and Professions	
ECON 1360	Health Economics	
PLCY 1700K	Health Policy Challenges	

### 4. Social and Behavioral Science for Prevention (Select one of the following):

PHP 1010	Doctors and Patients- Clinical Communication in Medicine	1
PHP 1400	HIV/AIDS in Africa: A Multidisciplinary Approach to Support HIV/AIDS Care and Treatment Programs	
PHP 1540	Alcohol Use and Misuse	
PHP 1600	Obesity in the 21st Century: Causes, Consequences and Countermeasures	
PHP 1740	Principles of Health Behavior and Health Promotion Interventions	
PHP 1880	Meditation, Mindfulness and Health	
PHP 1920	Social Determinants of Health	
PHP 2340	Behavioral and Social Science Theory for Health Promotion	
PHP 2365	Public Health Issues in LGBT Populations	
POLS 1740	Politics of Food	

### 5. Approved General Electives (Select four electives; no more than two (2) can be Human Biology/Physiology courses):

4

The four electives may be selected from: A. the approved courses from the areas listed above or B. the approved general electives listed below. Note that ANY PHP course can be counted as a general elective.

PHP 0030	Health of Hispaniola
PHP 0050	Pain and the Human Condition: Exploring the Science, Medicine, and Culture of Pain
PHP 1680I	Pathology to Power: Disability, Health and Community
PHP 1680K	Introduction to Conducting Clinical Research
PHP 1680M	The Epidemiology of Violence and its Consequences
AFRI 1060W	Policy, Culture and Discourse that Shape Health and Access to Healthcare
AMST 1601	Health and Healing in American History
ANTH 0300	Culture and Health
ANTH 1020	AIDS in Global Perspective
ANTH 1242	Bioethics and Culture
ANTH 1300	Anthropology of Addictions and Recovery
ANTH 1310	International Health: Anthropological Perspectives
BIOL 0030	Principles of Nutrition (Human Biology/Physiology course)
BIOL 0040	Nutrition for Fitness and Physical Activity
BIOL 0140K	Conservation Medicine
BIOL 0180	The Biology of AIDS
BIOL 0190E	Botanical Roots of Modern Medicine
BIOL 0200	The Foundation of Living Systems (Human Biology/Physiology course)
BIOL 0470	Genetics (Human Biology/Physiology course)
BIOL 0530	Principles of Immunology (Human Biology/Physiology course)
BIOL 0800	Principles of Physiology (Human Biology/Physiology course)
BIOL 0860	Diet and Chronic Disease
BIOL 0920A	Controversies in Medicine (Human Biology/Physiology course)
BIOL 1920B	Health Inequality in Historical Perspective
BIOL 1920C	Social Contexts of Disease
BIOL 1920D	Race, Difference and Biomedical Research: Historical Considerations
CLPS 1783	Nudge: How to Use Social Psychology to Create Social Change
ENVS 0110	Humans, Nature, and the Environment: Addressing Environmental Change in the 21st Century
ENVS 0490	Environmental Science in a Changing World
ENVS 1580	Environmental Stewardship and Resilience in Urban Systems
ETHN 1890J	Native American Environmental Health Movements
HMAN 1970G	International Perspectives on NGOs, Public Health, and Health Care Inequalities
NEUR 0010	The Brain: An Introduction to Neuroscience (Human Biology/Physiology course)
PLCY 1700V	Nonprofit Organizations
PLCY 1802	Engaged Research Engaged Publics
SOC 0300B	Environment and Society

SOC 0300E	HIV/AIDS: Politics, Culture and Society
SOC 0300F	Unequal From Birth: Child Health From a Social Perspective
SOC 0300K	Inequalities and Health
SOC 1250	Perceptions of Mental Illness
SOC 1315	Macro-Organizational Theory: Organizations in Social Context
SOC 1410	Aging and the Quality of Life
SOC 1540	Human Needs and Social Services
SOC 1550	Sociology of Medicine
SOC 1870D	Aging and Social Policy
SOC 1871H	Social Perspectives on HIV/AIDS
SOC 1871N	Military Health: The Quest for Healthy Violence

Total Credits 12

## Honors:

An Honors track is available for students who qualify. Honors track students are also required to enroll in PHP 1980 in both semesters of their senior year to conduct research and write the honors thesis. Please visit <http://www.brown.edu/academics/public-health/education-training/undergraduate/public-health-concentration/honors-track> for details or email Barbara Dailey (Barbara\_Dailey@brown.edu) for more information.

**Study Abroad/Study Away:** Up to four courses taken elsewhere (study abroad or other transfer) may be applied to non-core courses (up to two per semester abroad). Meet with a concentration adviser to discuss; provide a syllabus for each course to be considered for transfer to your concentration plan.

## Statistics Concentration Requirements

The Bachelor of Science degree in Statistics is designed to provide foundations that include basic statistical concepts and methodologies, and to expose students to the role of statistical thinking and analysis in interdisciplinary research and in the public sphere. To ensure deep rigorous understanding of the foundations and main methods of analysis in statistics, the program is composed of three parts: a) foundations in mathematics and computing, combined with an introduction to statistical thinking and practice; b) four core courses on the fundamentals of statistical theory and data analysis; and c) more advanced material covering important areas of statistical methodology. A capstone project involving substantial data analysis or focused on methodology/theory is required. Students also have opportunities to acquire practical experience in study design, data management, and statistical analysis by working as undergraduate research assistants in projects in one of the participating academic departments or Research Centers at Brown.

The Concentration is based on several premises: that statistics is a scientific discipline in its own right, with specialized methodologies and body of knowledge; that it is essentially concerned with the art and science of data analysis; and that it is best taught in conjunction with specific, substantive applications. To this end, the Concentration is designed to provide foundations that include basic statistical concepts and methodologies, and to expose students to the role of statistical thinking and analysis in interdisciplinary research and in the public sphere. The Concentration prepares students for careers in industry and government, for graduate study in statistics or biostatistics and other sciences, as well as for professional study in law, medicine, business, or public administration. The undergraduate concentration guide is available here (<https://www.brown.edu/academics/public-health/biostatistics/undergraduate-statistics-concentration>).

The Undergraduate Concentration in Statistics is administered by the Department of Biostatistics and leads to a Sc.B. degree. To ensure deep rigorous understanding of the foundations and main methods of analysis in statistics, the program is composed of three parts. The first part entails foundations in mathematics and computing, combined with an introduction to statistical thinking and practice. The second part includes four core courses that provide a comprehensive account of the fundamentals of statistical theory and data analysis. The third part

delves into more advanced material covering important areas of statistical methodology. In addition to the formal coursework, students are required to complete a capstone project that involves a substantial data analysis or a methodological/theoretical project. Students also have opportunities to acquire practical experience in study design, data management, and statistical analysis by working as undergraduate research assistants in projects in one of the participating academic Departments or Research Centers at Brown. **Please note that only the required Calculus courses may be accepted with P/F grades. All other required courses must be taken for a grade.**

The program requires **thirteen** one-semester courses. The required courses are as follows:

<b>LEVEL I: Foundations in Mathematics - Calculus</b>	2
MATH 0100	Introductory Calculus, Part II
MATH 0180	Intermediate Calculus
<b>LEVEL I - Foundations in Mathematics - Linear Algebra</b>	1
MATH 0520	Linear Algebra
<b>Computing</b>	1
APMA 0160	Introduction to Scientific Computing
or CSCI 0040	Introduction to Scientific Computing and Problem Solving
<b>Introduction to Statistical Thinking and Practice</b>	1
PHP 1501	Essentials of Data Analysis
<b>With the approval of the Director of the Statistics Concentration, one of the following courses may serve as replacement:</b>	
SOC 1100	Introductory Statistics for Social Research
ECON 1620	Introduction to Econometrics
APMA 0650	Essential Statistics
BIOL 0495	Statistical Analysis of Biological Data
EDUC 1110	Introductory Statistics for Education Research and Policy Analysis
CLPS 0900	Statistical Methods
<b>LEVEL II - Core Courses in Theory and Data Analysis</b>	2
APMA 1650	Statistical Inference I
or APMA 1655	Statistical Inference I
APMA 1660	Statistical Inference II
<b>OR</b>	
MATH 1610	Probability
MATH 1620	Mathematical Statistics
<b>Introduction to Biostatistics</b>	1
PHP 1510	Principles of Biostatistics and Data Analysis
<b>OR</b>	
PHP 2510	Principles of Biostatistics and Data Analysis
<b>LEVEL III: Advanced Courses in Statistical Methods</b>	2
PHP 1560	Statistical Computing 1
<b>OR</b>	
PHP 2560	Statistical Programming with R
<b>AND</b>	
PHP 2511	Applied Regression Analysis
<b>OR</b>	
PHP 2511	Applied Regression Analysis
<b>Capstone Project</b>	1
PHP 1970	Independent Study
<b>Electives in Social Science and Biostatistics (Students must choose 2)</b>	2
SOC 1120	Market and Social Surveys
SOC 1340	Principles and Methods of Geographic Information Systems
SOC 2230	Techniques of Demographic Analysis

CSCI 1420	Machine Learning
CSCI 1810	Computational Molecular Biology
CSCI 1820	Algorithmic Foundations of Computational Biology
CSCI 1951A	Data Science
PHP 0850	Fundamentals of Epidemiology
PHP 2030	Clinical Trials Methodology
PHP 2120	Introduction to Methods in Epidemiologic Research
PHP 2200	Intermediate Methods in Epidemiologic Research
PHP 2515	Fundamentals of Probability and Statistical Inference
PHP 2520	Statistical Inference I
PHP 2530	Bayesian Statistical Methods
PHP 2550	Practical Data Analysis
PHP 2580	Statistical Inference II
PHP 2602	Analysis of Lifetime Data
PHP 2601	Linear Models
PHP 2604	Statistical Methods for Spatial Data
PHP 2610	Causal Inference and Missing Data
PHP 2620	Statistical Methods in Bioinformatics, I
APMA 1070	Quantitative Models of Biological Systems
APMA 1080	Inference in Genomics and Molecular Biology
APMA 1200	Operations Research: Probabilistic Models
APMA 1690	Computational Probability and Statistics
APMA 1710	Information Theory
APMA 1740	Recent Applications of Probability and Statistics
APMA 1860	Graphs and Networks
APMA 2610	Recent Applications of Probability and Statistics
ENGN 2520	Pattern Recognition and Machine Learning
CLPS 1292	Introduction to Programming for the Mind, Brain and Behavior
CLPS 1492	Computational Cognitive Neuroscience
ECON 1360	Health Economics
ECON 1630	Econometrics I
ECON 1640	Econometrics II
ECON 1660	Big Data
MATH 1810A	Applied Algebraic Topology
Other Analytical/Computational/ Statistical courses with the approval of the Director of the Statistics Concentration	

Total Credits	13
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Prospective students will be able to obtain Advanced Placement credit for the requirements in mathematics. Students who have already completed an introductory course in statistics will be granted permission to proceed to Level II core courses if they meet the prerequisites in mathematics and computing.

**Senior Thesis:** A senior honors thesis is not a requirement for graduation, but concentrators who choose to write one are required to write a manuscript that describes a major project of statistical data analysis that they performed or a simulation study to evaluate the performance of a statistical method. Students that decide to write an honor thesis will generally integrate their capstone project into their thesis. Generally, writing a senior thesis includes two semesters of independent study (PHP 1980), the capstone project may serve as one of those.

**Honors:** Statistics requires the completion of a senior thesis and a superior record in the program.

**Study Abroad/Study Away:** Up to two courses taken elsewhere (study abroad or other transfer) may be applied to required courses. Meet with a concentration adviser to discuss; provide a syllabus for each course to be considered for transfer to your concentration plan.

The program is administered by the Department of Biostatistics, located at 121 South Main Street, 7th floor.

For additional information please contact: Roe Gutman, Box G-S-121-7; Telephone: 401-863-2682; Fax: 401-863-9182; e-mail: Roe Gutman (rgutman@stat.brown.edu)

## Master of Public Health Graduate Program

The Master of Public Health (MPH) degree is dedicated to developing skilled professionals who are committed to improving the health of communities by translating rigorous scientific research into sound, evidence-based public health policy and practice.

For further information on admission and program requirements, please visit: <http://www.brown.edu/academics/gradschool/programs/biomed-public-health>

### MPH Core Course Requirements For Students Who Matriculated Prior to Fall 2018

#### MPH Course Requirements (For students who started prior to Fall 2018)

Biostatistics and Applied Data Analysis (Students must complete one of the following 2 course sequences)

Sequence 1 (Students complete both of the following courses)

PHP 2507	Biostatistics and Applied Data Analysis I
PHP 2508	BioStatistics and Data Analysis II

Sequence 2 (Students must complete both of the following courses)

PHP 2510	Principles of Biostatistics and Data Analysis
PHP 2511	Applied Regression Analysis

Epidemiology (Students must complete one of the following courses)

PHP 2120	Introduction to Methods in Epidemiologic Research
PHP 2150	Foundations in Epidemiologic Research Methods

Environmental Health Courses (Students must complete one of the following)

PHP 2220E	Topics in Environmental and Occupational Epidemiology
PHP 1700	Current Topics in Environmental Health
PHP 1710	Climate Change and Human Health

Social and Behavioral Health Courses (Students must complete one of the following courses)

PHP 1740	Principles of Health Behavior and Health Promotion Interventions
PHP 2360	Designing and Evaluating Public Health Interventions
PHP 2380	Health Communication

Health Services Courses (Students must complete one of the following courses)

PHP 1100	Comparative Health Care Systems
PHP 2400	The U.S. Health Care System: Case Studies in Financing, Delivery, Regulation and Public Health

Internship (All students must complete this course)

PHP 2070	Public Health/Community Service Internship
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Research Methods (Students must complete one of the following courses)

PHP 2030	Clinical Trials Methodology
PHP 2040	Survey Research Methods
PHP 2060	Qualitative Methods in Health Research
PHP 2300	Research Methods in Behavioral Science
PHP 2415	Introduction to Evidence-based Medicine
GEOL 1320	Introduction to Geographic Information Systems for Environmental Applications
SOC 2612	Geographic Information Systems and Spatial Analysis for the Social Sciences

The MPH Program has a 13 course requirement. In addition to the 8 core courses, students must complete 5 additional concentration and/or elective courses. See MPH website for details: <https://www.brown.edu/academics/public-health/education-training/masters/master-public-health>

### MPH Program Core Course Requirements for Students Starting Fall 2018 or Later

#### MPH Core Course Requirements (For students who matriculated in Fall 2018 or later)

Students must complete one of the following 2 course sequences in Biostatistics and Applied Data Analysis:

Sequence 1:

PHP 2507	Biostatistics and Applied Data Analysis I
PHP 2508	BioStatistics and Data Analysis II

Sequence 2:

PHP 2510	Principles of Biostatistics and Data Analysis
PHP 2511	Applied Regression Analysis

Students must complete one of the following Epidemiology courses:

PHP 2120	Introduction to Methods in Epidemiologic Research
PHP 2150	Foundations in Epidemiologic Research Methods

Students must complete the following course:

PHP 2360	Designing and Evaluating Public Health Interventions
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Students must complete the following two half credit courses:

PHP 2071	Applied Public Health: Systems and Practice (Half credit)
PHP 2072	Applied Public Health: Policy, Leadership, and Communication (half credit)

The MPH Program has a 14 course requirement (12 standard courses and 2 half courses). In addition to the core courses listed above (4 standard and 2 half courses), MPH students must complete 5 concentration courses and 3 general MPH electives. See MPH website for details, <https://www.brown.edu/academics/public-health/education-training/masters/master-public-health/concentrations>

### Dual Degree Program: Master of Public Health (MPH) and Master of Public Affairs (MPA)

The School of Public Health and the Watson Institute for International and Public Affairs also offer a dual-degree Master of Public Health (MPH) and Master of Public Affairs (MPA) program. Emphasizing a learning by doing approach, this rigorous, program will offer highly qualified applicants the opportunity to gain training in public health and public policy to prepare them to address the critical health policy issues in the United States and throughout the world. The dual-degree degree program includes 19 courses as well as a Masters level thesis. Students will benefit from the rich academic resources at the Watson Institute and the School of Public



Health, as well as their extensive applied learning programs in Rhode Island, as well as throughout the United States and the world.

Program and admissions information can be found here: <https://www.brown.edu/academics/public-health/education-training/masters/mpa-and-mpa-dual-degree>

## Biostatistics Graduate Program

The graduate programs in Biostatistics offers comprehensive course work leading to a Master of Science (Sc.M.); a Master of Arts (A.M.); and the Doctor of Philosophy (Ph.D.) degrees. The graduate programs in Biostatistics are designed to provide training in theory, methodology, and practice of statistics in biology, public health, and medical science. The programs provide comprehensive training in theory and methods of biostatistics, but is highly interdisciplinary and requires students to acquire expertise in a field of application. The Ph.D. program is intended to enable graduates to pursue independent programs of research.

Full details for the Biostatistics Doctoral Program can be found at <https://brown.edu/biostatistics/biostatistics-graduate-programs/biostatistics-doctoral-program-0>.

The Sc.M. and A.M. programs provide training for application of advanced methodology in professional and academic settings. The Department of Biostatistics also offers the Health Data Science track (<https://www.brown.edu/academics/public-health/biostatistics/health-data-science-track>) within the Master's of Science degree program and a 5th-Year Master's (<https://www.brown.edu/academics/public-health/biostatistics/5th-year>) is available to Brown Undergraduates. Required courses for the Biostatistics Master's degree program are listed below. Additional details can be found on the Department's webpage: <https://brown.edu/biostatistics>

For more information on admission and program requirements, please visit <http://www.brown.edu/academics/gradschool/programs/biomed-biostatistics>.

### Required Courses

PHP 2515	Fundamentals of Probability and Statistical Inference	1
PHP 2560	Statistical Programming with R	1
PHP 2120	Introduction to Methods in Epidemiologic Research	1
PHP 2980	Graduate Independent Study and Thesis Research	1-5

### Elective Courses (At Least 4)

PHP 2030	Clinical Trials Methodology	1
PHP 2530	Bayesian Statistical Methods	1
PHP 2550	Practical Data Analysis	1
PHP 2561	Programming for Health Data Science	
PHP 2601	Linear Models	1
PHP 2602	Analysis of Lifetime Data	1
PHP 2603	Analysis of Longitudinal Data	1
PHP 2604	Statistical Methods for Spatial Data	1
PHP 2605	Generalized Linear Models	1
PHP 2610	Causal Inference and Missing Data	1
PHP 2620	Statistical Methods in Bioinformatics, I	1
PHP 2650	Statistical Learning and Big Data	1

## Behavioral and Social Health Sciences Graduate Program

The graduate programs in Behavioral and Social Health Sciences offer comprehensive course work leading to the Master of Science (Sc.M.) and Doctor of Philosophy (Ph.D.) degrees. The interdisciplinary graduate programs train graduate students who are interested in analyzing the complex behavioral and social determinants of public health, and in developing interventions to change behaviors and improve social contexts related to public health, to employ behavioral and social science theory and methods to understand contemporary health problems and to develop

interventions that improve the health of individuals and populations. The program puts substantive focus on diet, physical activity and obesity; alcohol and other drug abuse; smoking and tobacco use; HIV and STI risk behaviors; and health disparities and culture.

For more information on admission and program requirements, please visit:

<http://www.brown.edu/academics/gradschool/programs/behavioral-and-social-health-sciences>

## Master's in BSHS Required Core Courses

### Master's in BSHS Required Core Courses

PHP 2300	Research Methods in Behavioral Science
PHP 2340	Behavioral and Social Science Theory for Health Promotion
PHP 2360	Designing and Evaluating Public Health Interventions
PHP 2380	Health Communication
PHP 2390	Quantitative Methods for Behavioral and Social Sciences Intervention Research

### Electives: Must take 3 from this list <sup>1</sup>

PHP 1070	The Burden of Disease in Developing Countries
ANTH 1300	Anthropology of Addictions and Recovery
PHP 1320	Survey Research in Health Care
PHP 1400	HIV/AIDS in Africa: A Multidisciplinary Approach to Support HIV/AIDS Care and Treatment Programs
PHP 1500	Global Health Nutrition
PHP 1530	Case Studies in Public Health: The Role of Governments, Communities and Professions
PHP 1540	Alcohol Use and Misuse
PHP 1600	Obesity in the 21st Century: Causes, Consequences and Countermeasures
PHP 1740	Principles of Health Behavior and Health Promotion Interventions <sup>2</sup>
PHP 1880	Meditation, Mindfulness and Health
PHP 1920	Social Determinants of Health
PHP 2030	Clinical Trials Methodology
PHP 2040	Survey Research Methods
PHP 2060	Qualitative Methods in Health Research
PHP 2080	Public Health Law and Ethics
PHP 2120	Introduction to Methods in Epidemiologic Research
PHP 2130	Human Biology for Public Health
PHP 2170	Injury As A Public Health Problem
PHP 2220A	Epidemiology of Violence and Its Consequences
PHP 2220C	Perinatal Epidemiology
PHP 2325	Place Matters: Exploring Community-Level Contexts on Health Behaviors, Outcomes and Disparities
PHP 2365	Public Health Issues in LGBT Populations
PHP 2370	Etiology of Substance Use Disorders
PHP 2371	Psychosocial and Pharmacologic Treatment of Substance Use Disorders
PHP 2400	The U.S. Health Care System: Case Studies in Financing, Delivery, Regulation and Public Health
PHP 2980	Graduate Independent Study and Thesis Research <sup>3</sup>

- <sup>1</sup> Additional electives may be considered and are subject to approval by the BSS curriculum committee. Students wishing to take an elective that is not listed should consult with their adviser and complete a Curriculum Appeal Form.
- <sup>2</sup> This course has substantial overlap with PHP 2360; please consult your adviser.
- <sup>3</sup> Students have the option of enrolling in a Graduate Independent Study as an elective course under the instruction of their thesis adviser. Please choose the section that has your adviser listed as the instructor and have an override code ready in order to register.

## Clinical and Translational Research Graduate Program

The goal of the Master of Science (ScM) degree program in Clinical and Translational Research is to train clinicians and basic scientists to extend basic scientific research into the clinical arena, ultimately leading to improvements in individual and population health. By translating basic research into improved clinical outcomes, researchers and clinicians are able to provide new treatments to patients more efficiently and quickly.

Full details on the Master of Science in Clinical and Translational Research, including the most up to date list of course requirements, can be found at <https://www.brown.edu/academics/public-health/education-training/masters/clinical-and-translational-research/scm-ctr-core-requirements>.

For more information on admission and program requirements, please visit: <http://www.brown.edu/academics/gradschool/programs/biomed-clinical-and-translational-research>

## Master's in CTR Requirements

### Master's in CTR Requirements

Intro to Research Methods (Students must complete one of the following two courses)

PHP 2150	Foundations in Epidemiologic Research Methods
PHP 2120	Introduction to Methods in Epidemiologic Research

Biostatistics and Applied Data Analysis (Students must complete both of the following courses)

PHP 2507	Biostatistics and Applied Data Analysis I
PHP 2508	BioStatistics and Data Analysis II

Advanced Research Methods (Students must complete two of the following courses)

PHP 2030	Clinical Trials Methodology
PHP 2060	Qualitative Methods in Health Research
PHP 2040	Survey Research Methods
PHP 2180	Interpretation and Application of Epidemiology

PHP 2415	Introduction to Evidence-based Medicine
PHP 2430	Analysis of Population Based Datasets
PHP 2410E	Medicare: A Data Based Policy Examination

Scientific Writing (Students must complete the following course)

PHP 2090	Research Grant Writing for Public Health
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Topics in CTR (Students must enroll in this half credit course two times to fulfill the one credit requirement)

PHP 2470	Topics in Clinical, Translational and Health Services Research
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Students must complete two CTR electives found at <https://www.brown.edu/academics/public-health/education-training/masters/clinical-and-translational-research/scm-ctr-electives>

The Certificate in Clinical and Translational Research is designed for trainees who need a more structured and intensive experience than can be obtained from taking one or two courses as a special student, but do not need or are not in a position to pursue the full Master's

Degree. Students in the Certificate Program in Clinical and Translational Research must complete four courses. Full details on the Certificate in CTR can be found at <https://www.brown.edu/academics/public-health/education-training/masters/clinical-and-translational-research/certificate-clinical-and-translational-research>.

## Certificate in CTR Course Requirements

### Certificate in CTR Course Requirements

Research Methods (Students must complete one of the following courses)

PHP 2120	Introduction to Methods in Epidemiologic Research
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PHP 2150	Foundations in Epidemiologic Research Methods
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PHP 2300	Research Methods in Behavioral Science
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Biostatistics and Applied Data Analysis (Students must complete both of the following courses)

PHP 2507	Biostatistics and Applied Data Analysis I
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PHP 2508	BioStatistics and Data Analysis II
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Students must complete one elective from the list found at <https://www.brown.edu/academics/public-health/education-training/masters/clinical-and-translational-research/news/2016-11/certificate-electives>

## Epidemiology Graduate Program

The graduate program in Epidemiology offers comprehensive course work leading to a Master of Science (Sc.M.) degree and the Doctor of Philosophy (Ph.D.) degree. Using sophisticated study designs, statistical analyses, field investigations, and laboratory techniques, epidemiology students investigate the multiple causes of a disease, disease distribution (geographic, ecological, and social), methods of transmission, and measures for control and prevention.

For more information on admission and program requirements, please visit: <http://www.brown.edu/academics/gradschool/programs/epidemiology-0>

## Master's in Epidemiology Required Courses:

### Master's in Epidemiology Required Courses:

PHP 2150	Foundations in Epidemiologic Research Methods
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PHP 2200	Intermediate Methods in Epidemiologic Research
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PHP 2130	Human Biology for Public Health
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### AND at least two of the following:

PHP 2030	Clinical Trials Methodology
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PHP 2040	Survey Research Methods
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PHP 2180	Interpretation and Application of Epidemiology
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PHP 2250	Advanced Quantitative Methods in Epidemiologic Research
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PHP 2260	Applied Epidemiologic Analysis Using SAS
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PHP 2430	Analysis of Population Based Datasets
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PHP 2560	Statistical Programming with R
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PHP 2455A	Health Services Research Methods I
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PHP 2455B	Health Services Research Methods II
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PHP 2520	Statistical Inference I
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PHP 2530	Bayesian Statistical Methods
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PHP 2540	Advanced Methods for Multivariate Analysis
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PHP 2550	Practical Data Analysis
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PHP 2601	Linear Models
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PHP 2602	Analysis of Lifetime Data
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PHP 2603	Analysis of Longitudinal Data
PHP 2610	Causal Inference and Missing Data
PHP 2620	Statistical Methods in Bioinformatics, I
<b>Required Biostatistics Courses:</b>	
PHP 2510	Principles of Biostatistics and Data Analysis
PHP 2511	Applied Regression Analysis

The remaining courses can be selected from among various offerings in Public Health, Sociology, Environmental Studies or related disciplines with approval from the student's academic advisor.

## Health Services Research Graduate Program

The graduate program in Health Services Research offers comprehensive course work leading to the Doctor of Philosophy (Ph.D.) degree. The program seeks to develop scientists experienced in the use of state-of-the-art experimental and non-experimental research methods to investigate how people obtain access to health care, the components and impacts of health care costs, and what happens to patients as a result of care. Health services research aims to identify the most effective ways to organize, manage, finance, and deliver high quality care to benefit population health.

For more information on admission and program requirements, please visit: <http://www.brown.edu/academics/gradschool/programs/biomed-health-services-research>

## Global Public Health Graduate Program

As with all educational programs in the School of Public Health, our Global Public Health ScM students learn public health by doing public health. Course work comes alive during an international fieldwork experience that fosters deep engagement and understanding of a global public health location. Academic and hands-on experiences culminate with a thesis project. Most full-time students complete the degree in two years, fulfilling the fieldwork requirement during the summer between academic years 1 and 2. The degree may be completed on a part-time basis.

- 12 courses, including 9 required courses and 3 electives
- 8-week international fieldwork experience
- Thesis project

For further information on admission and program requirements, please visit: <https://www.brown.edu/academics/gradschool/programs/global-public-health>

## Courses

### PHP 0030. Health of Hispaniola.

Two developing countries, Dominican Republic and Haiti, have widely differing health outcomes despite centuries of shared experience on the Caribbean Island of Hispaniola. This course will examine the history, politics, economics, culture, international relations, demography, and geography, as well as epidemiology and health services, to demonstrate that multiple factors, both recent and long-standing, determine the present health of these populations. Enrollment limited to 19 first year students. Instructor permission required. FYS WRIT

Spr	PHP0030	S01	24928	TTh	6:40-8:00PM(18)	(T. Empkie)
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### PHP 0040. Addiction: The Causes, Cures and Consequences of Substance Abuse in Modern Society.

Addiction has been recognized by the psychological and medical community as a chronic, physical disease, affecting the body in ways which mirror the mechanisms of other neurological disorders. However, despite definitive research suggesting the genetic and physical roots of addiction disorders, the disease of addiction still faces significant prejudice from laws and societies seeking to place blame upon addicts themselves. Stereotypes and misconceptions that cast addicts as morally corrupt deviants lacking in will power still pervade cultural and political discourse, creating and maintaining powerful stigmas that prohibit addicts and their families from seeking care. Enrollment limited to 19 first year students. FYS WRIT

### PHP 0050. Pain and the Human Condition: Exploring the Science, Medicine, and Culture of Pain.

Pain is a universal human experience, yet it is highly subjective. For most, pain represents an occasionally unpleasant, self-limited experience. However, for others, chronic pain persists beyond the recovery from an injury or as a result of a chronic health condition. Persons with chronic pain often describe their pain as permeating every aspect of their lives. While an active area of research, pain remains a significant challenge to the individual seeking treatment, the health care provider and society. This multidisciplinary course introduces students to scientific, medical, and public health aspects of pain and explores personal narratives and cultural meanings of pain. Enrollment limited to 19 first year students. FYS WRIT

Fall	PHP0050	S01	16849	TTh	9:00-10:20(02)	(N. Trivedi)
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### PHP 0100. First year seminar: Statistics is everywhere.

Statistics is the universal language behind data-enabled decision making. Examples include Google's page ranking, Amazon's customer recommendations, weather prediction, medical care and political campaign strategy. This seminar will expose students to a variety of problems encountered in the media, in science and in life for which solutions require analysis of and drawing inferences from data. We will introduce basic concepts such as randomness, probability, variation, statistical significance, accuracy, bias and precision. The course will discuss statistical problems from reading assignments and material identified by the students. We will use simulation to illustrate basic concepts, though previous programming experience is not required. FYS

Fall	PHP0100	S01	16862	TTh	1:00-2:20(10)	(Z. Wu)
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### PHP 0310. Health Care in the United States.

Introduction to the health care delivery system. An overview of the U.S. health care financing, delivery and regulatory system. Considers the interaction between paying for and providing and assuring the quality of health services; changes in one component of the system inevitably affect the others. Addresses the balance between employer funded health insurance, publicly funded health insurance and the consequences of not being insured. Seven discussion sections arranged during the semester. Open to undergraduates only.

Spr	PHP0310	S01	25484	MWF	12:00-12:50(05)	(I. Wilson)
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### PHP 0320. Introduction to Public Health.

An introductory overview of the U.S. Public Health System with an emphasis on the core functions of public health, challenges and strategies for working with communities, and specific health issues that impact the health of the population. Presents a comprehensive overview of the environmental and behavior factors associated with health promotion and disease prevention.

Fall	PHP0320	S01	15494	MWF	11:00-11:50(16)	'To Be Arranged'
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**PHP 0850. Fundamentals of Epidemiology.**

As the cornerstone of public health, a strong foundation in epidemiology provides students with the ability to investigate, clarify and criticize claims of disease causation. This course provides students with a foundation in basic epidemiologic concepts and methods. Key measures of disease occurrence and effects used in epidemiology will be discussed; strengths and weaknesses of alternative epidemiologic study designs will be examined. Interpreting epidemiologic evidence to inform public health policy and practice will be emphasized throughout the course.

Open to Public Health concentrators and others by permission; Class limit 80.

Fall PHP0850 S01 15520 TTh 2:30-3:50(03) (S. Buka)

**PHP 1010. Doctors and Patients- Clinical Communication in Medicine.**

Communication is central to medical practice and interpersonal relationships between patients and physicians can be powerful curative agents. This course reviews theory and research on physician-patient communication. Lectures, readings, and discussions are enhanced by direct observation of clinicians in clinical settings. Appropriate for students interested in communication sciences, health psychology, health education, pre-med and other clinical training, and medical anthropology. NOTE: Classes are on Mondays and Wednesdays 4-6pm - two FRIDAY classes are scheduled at the beginning and end of the semester. Remaining class time fulfilled through clinical shadowing scheduled when students and doctors are available. Contact instructor for schedule.

**PHP 1070. The Burden of Disease in Developing Countries.**

Defines and critically examines environmental, epidemiologic, demographic, biomedical, and anthropological perspectives on health and disease in developing countries. Emphasis on changes in the underlying causes of morbidity and mortality during economic development. Focuses on the biosocial ecology of diseases. Required major term paper worth 50% of final grade is scholarly centerpiece of course. Weekly discussion sections and small group research projects supplement the two exams and term paper. Guest lecturers cover different diseases and public health perspectives. Enrollment limited to 65. DPLL WRIT

Fall PHP1070 S01 15517 MW 8:30-9:50(01) (S. McGarvey)

**PHP 1100. Comparative Health Care Systems.**

Focuses on principles of national health system organization and cross-national comparative analysis. Emphasizes application of comparative models to the analysis of health and health-related systems among nations at varying levels of economic development and health care reform. Addresses research questions related to population health and systems' performance. Questionnaire completion required for Freshman and Sophomore students. Enrollment limited to 30. DPLL

Fall PHP1100 S01 15518 MW 10:00-11:20 (O. Galarraga)

**PHP 1101. World of Food: Personal to Global Perspectives on Nutrition, Agriculture and Policy.**

This course addresses issues of food and nutrition in America and around the world through the lens of public health, economics, and agriculture. The online setting intentionally requires students to engage in and learn about their own community from perspectives likely not previously noticed. Students will read class from many sources; will review documentary films; and will write for several audiences.

At the completion of this course, students will:

- Describe how nutrients are consumed through foods
- Explore food consumption in the US and abroad
- Describe US agricultural production techniques
- Propose policy and other changes to the current food system

**PHP 1320. Survey Research in Health Care.**

An introduction to the methodology of survey research as it is conducted by social scientists and epidemiologists. Provides an overview of all aspects of study design and instrument development as well as an introduction to statistical analysis of survey data. Prerequisite: PHP 0320. Students should fulfill the department's statistics requirement prior to taking, or concurrently with, this course.

**PHP 1400. HIV/AIDS in Africa: A Multidisciplinary Approach to Support HIV/AIDS Care and Treatment Programs.**

The course is intended to challenge students from different disciplines to develop strategies to address the challenges of establishing and sustaining HIV/AIDS care and treatment programs in Africa. The course will begin with a general introduction to HIV/AIDS to provide a foundation wherein students will obtain a basic scientific and sociological understanding of the disease. Discussion topics on: the impact of AIDS, introducing antiretroviral therapy in Africa, monitoring and evaluating ARV therapy scale up and developing a country wide plan for a national laboratory system to support HIV/AIDS care and treatment will be facilitated through the use of case studies. Enrollment limited to 25 juniors and seniors. Graduate students with permission of instructor. DPLL

Spr PHP1400 S01 24437 T 4:00-6:30(16) (M. Ghee)

**PHP 1500. Global Health Nutrition.**

The course focuses on nutritional status influences on population health of low and middle income countries. It covers both 1) undernutrition, including protein-calorie malnutrition and specific micronutrient deficiencies; and 2) overnutrition, including obesity. It covers morbidity and mortality associated with under- and overnutrition. Nutritional aspects of maternal and child health and the association of nutritional exposures early in life and later adult health are emphasized. Specific areas include nutritional status measurement, including body size and composition, dietary intake and physical activity, as well as household, community, and national, socioeconomic and political factors. Prerequisite: PHP 1070, 2120, 2150, or BIOL 0030. DPLL

Spr PHP1500 S01 24919 TTh 2:30-3:50(11) (S. McGarvey)

**PHP 1501. Essentials of Data Analysis.**

This course covers the basic concepts of statistics and the statistical methods commonly used in the social sciences and public health with an emphasis on applications to real data. The first half of the course introduces descriptive statistics and the inferential statistical methods of confidence intervals and significance tests. The second half introduces bivariate and multivariate methods, emphasizing contingency table analysis, regression, and analysis of variance. This is designed to be a first course in Statistics. The course is intended for Public Health or Statistics concentrators. Others can register with instructor's permission. There are no prerequisites.

Fall PHP1501 S01 15539 TTh 1:00-2:20(10) (R. Gutman)

Fall PHP1501 L01 15540 M 2:00-2:50 (R. Gutman)

Fall PHP1501 L02 15541 W 11:00-11:50 (R. Gutman)

Fall PHP1501 L03 15542 F 9:00-9:50 (R. Gutman)

Fall PHP1501 L04 15543 F 10:00-10:50 (R. Gutman)

**PHP 1520. Emergency Medical Systems: An Anatomy of Critical Performance.**

Problems and issues surrounding delivery of emergency medical services in U.S. Topics: cost of illness; rationing health care; living wills; malpractice and its effects; effects of alcohol and other risk behavior. Priority to public health concentrators and PLME students pursuing MPH degree. Enrollment limited to 60.

**PHP 1530. Case Studies in Public Health: The Role of Governments, Communities and Professions.**

This course provides an integrated knowledge of the public health's development, policy, practice and infrastructure and its relationship to medical care, social services and the environment. The matrix approach juxtaposes public health content (e.g., infectious disease) and public health tools (e.g., behavioral theory, policy/advocacy/epidemiology/quality improvement/program planning) using case studies. It aims to strengthen students' capacity to apply a population-based viewpoint to public health practice. Prerequisite: PHP 0320. Enrollment limited to 40.

Spr PHP1530 S01 24924 T 3:00-5:30 (P. Nolan)



**PHP 1540. Alcohol Use and Misuse.**

Reviews the epidemiology of alcohol use, abuse, and dependence and examines its neurobiological and behavioral underpinnings. Covers etiology including physiological, genetic, psychological and social cultural influences, and prevention, brief intervention and treatment considerations. Course background in psychology, sociology, or public health is recommended. Recommended prerequisites: PHP 0320 and CLPS 0010. Enrollment limited to 20 juniors, seniors, and graduate students.

**PHP 1600. Obesity in the 21st Century: Causes, Consequences and Countermeasures.**

The scope of obesity knowledge is too large to cover during one single course, therefore we will focus primarily on obesity-related health outcomes, assessment of obesity, obesity epidemiology, social and behavioral correlates of obesity, obesity and stigma, policy and interventions across population groups. The readings for this course are multi-disciplinary in nature and integrate epidemiological, biological, sociological, political and philosophical perspectives. This course is specific to the United States and thusly all readings will reflect this contextual focus. Enrollment limited to 30. DPLL

Spr PHP1600 S01 24499 M 3:00-5:30(13) (A. Keita)

**PHP 1610. Tobacco, Disease and the Industry: cigs, e-cigs and more.**

This class will help students gain knowledge about tobacco use and cigarette smoking, nicotine addiction, novel new products, and the tobacco industry. We will cover the link between smoking, disease, and death; smoking prevalence and nicotine dependence; novel products such as e-cigarettes and Modified Risk Tobacco Products; the role of the tobacco industry; behavioral and pharmacological smoking cessation treatments; community, organizational, and media campaigns; tobacco policy; and, global tobacco control. The course is designed as a seminar course emphasizing class discussion and debate, as well as in-depth discussion of the assigned readings. Suggested prerequisites PHP 0850, PHP 2120, or PHP 2150

**PHP 1680I. Pathology to Power: Disability, Health and Community.**

This course offers a comprehensive view of health and community concerns experienced by people with disabilities. Guest speakers, and hands on field research involving interactions with people with disabilities will facilitate the students gaining a multi-layered understanding of the issues faced by people with disabilities and their families. DPLL

Fall PHP1680I S01 15871 W 3:00-5:30(17) (S. Skeels)

**PHP 1680J. The Race To Inner Space: Conflating Science, Politics, and Economics To Promote Brain Health.**

Provides an understanding of how funds are raised and spent for disease-targeted research; Provides hands-on experience and exposure to public and private decisionmakers influencing healthcare policy related to diseases of the brain; Provides an understanding of issues, challenges, and opportunities related to neurological and psychiatric illness parity with other illnesses; Identifies lessons learned from health care research funding policy successes and failures; and, Identifies directions for future brain health policy research related to the measurement of program effectiveness and comparative effectiveness, economic benefit. Permission of primary instructor (J. Bentkover) required. Enrollment limited to 24 juniors, seniors, and graduate students.

**PHP 1680K. Introduction to Conducting Clinical Research.**

This course is intended to help students become familiar with the design and implementation of clinical research, including ethical and logistical processes related to collecting data and interpretation of published medical literature. In addition to weekly sessions, the course requires 4-6 hours weekly in the Emergency Department at Rhode Island Hospital enrolling patients in clinical trials. As students will be directly exposed to patient and clinical care, the course is limited to 12 students for the semester. Interested students should contact the course director to be considered for enrollment. Not open to first year students. Instructor permission required.

**PHP 1680M. The Epidemiology of Violence and its Consequences.**

Overview of the epidemiology of intentional injury within the social context. Selected topics include homicide, suicide, child abuse, intimate partner and family violence, sexual assault, elder mistreatment and officially sanctioned violence. Methodological challenges for epidemiologists, and the role of guns and substance use are examined. Intended as a junior/senior level course. Prerequisite: PHP 2120 or equivalent. Enrollment limited to 10.

**PHP 1680S. Bioethics at the Bedside.**

This course explores a variety of topics in biomedical ethics. Each class will begin with a vignette, short film, or speaker, followed by a short lecture. A large portion of class time will then be devoted to class discussion/debate. The course has four parts: introduction to medical ethics in which we consider what value we assign to individuals within various ethical constructs; discussion of bioethical issues at the beginning and end of life; examination of the duty of physicians; and selection of additional topics exploring ethical issues that arise from the social, economic, and cultural differences between physician and patient. Enrollment limited to 30.

**PHP 1680T. Translation, Diffusion and Cultural Relevance of Health Promotion Interventions.**

Course content covers three key aspects of disease prevention/health promotion programs: (1) how "basic" behavioral and social science research is tested for effectiveness in real-life settings (translation); (2) how programs with demonstrated effectiveness, in one or more local settings, are introduced and adopted more broadly (diffusion); and (3) how cultural relevance is involved in both translation and diffusion. Translation and Diffusion are the two main sections of the semester. Cultural relevance is a theme integrated into each part of the course. Appropriate for BSSI, MPH, and advanced undergraduate students with coursework in public/community health. Open to juniors, seniors graduate students. DPLL

**PHP 1680U. Intersectionality and Health Inequities.**

This course examines health inequities in the U.S from an intersectionality perspective. Intersectionality is both a theory and methodology focused on the power dynamics between oppression and privilege and how various axes of social categories and systems interrelate on various and simultaneous levels. This framework critically examines how systemic injustice and social inequality transpires on a multidimensional basis. This course provides a broad overview of health disparities in the U.S., specifically, examining them through intersecting structural and social factors (e.g., race and ethnicity; gender; immigration status; socioeconomic position; age; sexual orientation; and the promise and limitations of public policy).

**PHP 1700. Current Topics in Environmental Health.**

This course is designed to introduce students to the field of environmental health, and demonstrate how environmental health is integrated into various aspects of our lives, both directly and indirectly. Topics to be covered include: toxic metals, vector-borne disease, food safety, water quality, radiation, pesticides, air quality, hazardous waste, risk assessment, and the role of the community in environmental health. Several topics will be presented by guest speakers so that students can learn from the expertise of professionals in the field. Enrollment limited to 65.

Fall PHP1700 S01 15510 F 1:00-3:30 (K. Kelsey)

**PHP 1710. Climate Change and Human Health.**

Global climate change is occurring and these changes have the potential to profoundly influence human health. This course provides students with a broad overview of the diverse impacts of projected climate change on human health, including effects of changing temperatures, extreme weather events, infectious and non-infectious waterborne threats, vector-borne disease, air pollution, the physical and built environment and policies to promote mitigation and adaptation. Students will explore multiple sides of controversial issues through lively and informed class discussions, writing exercises, and participation in a series of end-of-term debates. Enrollment is limited to 20 students.

Fall PHP1710 S01 15521 MW 1:30-2:50 (G. Wellenius)

**PHP 1740. Principles of Health Behavior and Health Promotion Interventions.**

Examines health behavior decision-making and elements for design of health promotion interventions. Covers theories of health behavior (focusing on primary and secondary prevention), principles of intervention design, and reading of research literature. Emphasizes psychological, social, and proximate environmental influences on individuals' health-related behaviors. Restricted to juniors, seniors, and graduate students. Prerequisite: PHP 0320 or equivalent. Enrollment limited to 25.

**PHP 1800. TRI-Lab Seminar on Healthy Early Childhood Development: A Team Approach.**

This seminar, open by invitation only to participants in the TRI-Lab program, will investigate a range of topics related to the healthy development of children from pregnancy through school entry, including the prevalence and determinants of major health and developmental concerns of infants and young children as well as key state and federal programs designed to address them. Readings, lectures, discussions, and in-class exercises will be used to foster collaborative inquiry by students, faculty, and community participants. Students will develop projects aimed at advancing or refining solutions to key healthy early childhood development challenges in Rhode Island.

**PHP 1802S. Human Security and Humanitarian Response: Increasing Effectiveness and Accountability.**

Disasters, natural and anthropogenic, pose significant threats to human security. Effective humanitarian action is important for both short and long-term responses to complex emergencies. The array of factors contributing to the economic and human losses experienced in both natural disasters and complex humanitarian emergencies are vast and complicated, and the strategies employed to mitigate and heal the damage caused by these disturbances must be equal to the task. This course covers diverse topics including the role of NGOs, UN agencies, local governments, peacekeepers and military in humanitarian response; economic impact of humanitarian aid; the evidence base for humanitarian interventions.

**PHP 1820. Designing Education for Better Prisoner and Community Health.**

This course will provide the needed background and context for understanding the multiple issues and challenges facing prisoners and the national justice and health systems that impact their fate. In addition to contextual background, students in this course will attain the knowledge and skills needed to develop a final practical, real world health communication/ intervention project that addresses one or more health literacy challenges facing people who are incarcerated. Some of these final projects will be developed as prototypes over summer 2016, when students from the course will design and test health curricula and delivery modules in a multidisciplinary laboratory.

**PHP 1850. TRI-Lab Seminar on Healthy Food Access: A Team Approach.**

The Healthy Food Access Lab will investigate community-based approaches to increasing access to healthy food and reducing obesity and overweight and food insecurity and hunger. It will provide students with an integrative scholarship experience that combines in-class and field-based learning opportunities with the development of applied, community-based research projects addressing a range of healthy food access challenges facing Providence and Rhode Island.

**PHP 1852. TRI-Lab Seminar on Healthy Food Access: A Team Approach (Part 2).**

The Healthy Food Access TRI-Lab brings together interdisciplinary groups of students, faculty and community practitioners to engage on the issue of healthy food access. Students will deepen their understanding of this issue, and develop and refine collaborative knowledge and potential solutions. They will investigate community-based approaches to increasing access to healthy food and reducing obesity and overweight and food insecurity and hunger. It will provide students with an integrative scholarship experience that combines in-class and field-based learning opportunities with the development of applied, community-based research projects addressing a range of healthy food access challenges facing Providence and Rhode Island.

**PHP 1854. The Epidemiology and Control of Infectious Diseases.**

Course objectives are to introduce students to key methods and concepts in the epidemiological study and control of infectious diseases. By the end of this course, students will have a solid foundation in the distribution, transmission, and pathogenesis of major infectious diseases that affect human populations. We will investigate methods to design and evaluate public health strategies to prevent or eliminate infectious diseases, including: outbreak investigation, disease surveillance, infection control, screening, and vaccination. The course is open to undergraduate students who have completed PHP0320 and to graduate students who have completed or are concurrently enrolled in either PHP2120 or PHP2150.

Spr PHP1854 S01 24500 MW 9:00-10:20 (B. Marshall)

**PHP 1880. Meditation, Mindfulness and Health.**

This course provides an overview on the relation of meditation and mindfulness (the ability to attend in a nonjudgmental way to one's own physical and mental processes during ordinary, everyday tasks) with various health outcomes and disease risk factors such as depression, anxiety, diet, substance use, and cardiovascular disease. Mechanisms by which mindfulness may influence health will be addressed. The course will assess studies in the field for methodological rigor, and students will be taught strengths and weaknesses of current research. Students will be taught various mindfulness practices including direct experience with mindfulness meditation.

**PHP 1900. Epidemiology of Disorders and Diseases of Childhood and Young Adulthood.**

Students will learn about diseases and disorders of childhood and young adulthood, including allergies, autism, eating disorders, obesity, endometriosis, and migraines. Students will learn how these disorders are defined, how many youth are impacted, and the age-appropriate epidemiologic methods to study disorders and diseases during childhood, adolescence, and young adulthood, respectively. For the final project, students will pick a disease or disorder of interest that occurs during childhood, adolescence, or young adulthood, synthesize the results from multiple epidemiological studies, and concisely present this information in both a written report and an oral presentation.

Spr PHP1900 S01 25127 T 9:00-11:30 (A. Field)

**PHP 1910. Public Health Senior Seminar.**

The course provides an overarching capstone experience to Public Health seniors. It is designed to weave together 3 threads, specifically: (1) Capstone final written project based on Public Health concentration goals, including a systematic review or data analysis; (2) Formalizing and presenting career plans; (3) Learning and practicing key principles of effective workplace skills. The course provides opportunities to synthesize and reflect on the knowledge gained during the undergraduate program, provide support for solidifying effective next career steps, and provide important soft skills for excelling in the workplace. Prerequisite: PHP 0310 and 0320. Open to Senior Public Health concentrators only. WRIT

Fall PHP1910 S01 15495 W 3:00-5:30(17) (J. Ahluwalia)

**PHP 1920. Social Determinants of Health.**

The course provides an overview of social determinants of health. Examples of topics include health effects of educational attainment, social integration, neighborhood socioeconomic characteristics, racial discrimination, gender, income inequality, childhood socioeconomic circumstances, parental neglect, and job strain. Mixed teaching methods are used, including small group discussions, problem-based learning and guest lectures. Open to graduate students and advanced undergraduates. DP LL

**PHP 1960. Epidemiology of Chronic Disease.**

This course is aimed at providing students with an introduction to the epidemiology of chronic disease. The topics in this course will review major chronic diseases; review descriptive data on population differences and time trends in incidence, prevalence and mortality; summarize mechanisms of pathogenesis; discuss major risk factors and address methodological issues in establishing causality; address potential opportunities for disease prevention and control. Students will be expected to present a selected topic on a current topic, providing opportunities to discuss cutting-edge research areas in the field.

**PHP 1964. Cancer Epidemiology and Prevention.**

This course is aimed at enhancing the knowledge and skills central to the subject domain of cancer epidemiology; and helping graduate students with a deep understanding of cancer etiology that can be translated into cancer prevention and control. We will exam cancer incidence and trends both in the U.S. and globally and interpret their implication for cancer etiology, and will critically analyze current evidence regarding the role of various major risk factors on human cancer risks by focusing on cancers with significant public health implication. The methods central to cancer prevention and control will be discussed.

Spr PHP1964 S01 24502 F 1:00-3:30 (T. Zheng)

**PHP 1970. Independent Study.**

A special project may be arranged in consultation with an individual faculty sponsor. Section numbers vary by instructor. Please check Banner for the correct section number and CRN to use when registering for this course.

**PHP 1980. Honors Thesis Preparation.**

Two semesters of PHP 1980, Honors Thesis Preparation, will be devoted to the development and implementation of an Honors project, and of the writing of the Honors Thesis for the Public Health Concentration. WRIT

**PHP 1994. Case Studies in Maternal and Child Health.**

This course examines current topics in maternal and child health in the United States by addressing the question: How can the communities we serve become the healthiest place for children? This is not a survey course covering all topics. Rather the course will focus on particular topics each year. In this first year of the course, the focus is on the major causes of mortality and how to address them. We will have a particular focus on Rhode Island.

**PHP 1999. Public Health Nutrition: Concepts and Controversies.**

Provides an introduction to the concepts and scope of public health nutrition with a focus mainly on the U.S. Students will gain an understanding of the science behind national dietary recommendations and learn about dietary assessment methods, determinants of food intake, and interventions to improve diet. The course will emphasize ways in which environment and policy can influence nutritional status of diverse populations. It will also focus on controversial topics in nutrition and will employ hands-on activities such as self-dietary assessment, debates, op-eds, and individual presentations of nutrition topics of interest. Enrollment limited to 25 juniors, seniors, and graduate students. DPLL

**PHP 2018. Epidemiology of Cardio-Metabolic Health.**

This course surveys the entire landscape of the nutritional, biochemical, and genetic aspects of cardiometabolic health addressing issues of obesity, diabetes, metabolic syndrome, and their micro- and macro-vascular complications. Students will learn about both the descriptive and analytical epidemiology of these seemingly distinct but clearly clustered disorders including the so-called metabolic syndrome comprehensively and in-depth. International comparison of prevalent data in different social contexts will also be reviewed, so that the strategies for prevention by either changing our cultures or natures can be appreciated and debated with a better understanding of the related issues confronted by public health and medical professionals.

**PHP 2019. Measurement Issues in Health Care.**

Provides a theoretical and practical basis for measurement in health care. Introduces measurement theory, scale development, and criteria to be considered when choosing measures in clinical practice and research. Practical exercises include questionnaire development and a written research protocol for the development and validation of a new measure. Prerequisites: PHP 2120, 2130.

**PHP 2020. Disability Over the Life Course.**

An overview of the epidemiology of physical and cognitive disability in America, associated patterns of medical and social service use, and current as well as "ideal" population-specific systems of formal and family care. Also explores medical, social, and psychological needs associated with the stage of life in which disability is experienced. Prerequisites for advanced undergraduates are PHP 0310 or SOC 1550, and introductory statistics.

**PHP 2025. Including the Excluded: Global Health Ethics.**

This course explores the ethics of global public health engagement. Global health implementation is fraught with ethical conundrums. These ethical conundrums include the process of generating rigorous evidence, championing health as a human right, engaging global partners in meaningful collaborations, and implementing complex programs in low-resource settings. These ethical challenges are driven by North-South inequities and by differences in socioeconomic backgrounds, culture, language, and other intersectional identities. This course introduces scholars to global health ethics as a framework for tackling health disparities, grappling in a scholarly and practical way with the complex fabric of global health research, policy, and practice.

Fall PHP2025 S01 15872 F 9:00-11:30 (C. Kuo)

**PHP 2030. Clinical Trials Methodology.**

We will examine the modern clinical trial as a methodology for evaluating interventions related to treatment, rehabilitation, prevention and diagnosis. Topics include the history and rationale for clinical trials, ethical issues, study design, protocol development, sample size considerations, quality assurance, statistical analysis, systematic reviews and meta-analysis, and reporting of results. Extensively illustrated with examples from various fields of health care research. Recommended prerequisites: introductory epidemiology and statistics. Pre-requisites: (PHP 2120 or PHP 2150) and either PHP 2508, 2510, or 2520. Open to graduate students only.

Fall PHP2030 S01 15713 M 1:00-3:30 (I. Gareen)

**PHP 2040. Survey Research Methods.**

Emphasizes the theory of sampling and survey methods and their application to public health research. Topics include: survey design and planning; principles of sampling and survey terminology; questionnaire construction; protection of human subjects; data collection (including interviewing and data coding procedures); and application, presentation, and evaluation of results. Suggested prerequisites: PHP 2120, and PHP 2508 or 2510. Open to graduate students only.

**PHP 2060. Qualitative Methods in Health Research.**

Introduces qualitative approaches to data collection and analysis in health research. Methods covered include: participant observation, key-informant interviews, focus groups, innovative data collection strategies, and non-obtrusive measures. Students will use applied projects to develop skills in: qualitative data collection and management, interviewing, transcript analysis using computerized software, triangulation between qualitative and quantitative data, and report preparation for qualitative studies. Enrollment limited to 15 graduate students.

**PHP 2070. Public Health/Community Service Internship.**

The course is an introduction to the history, organization, resources, concepts and issues of public health and health care. Students will be matched according to their interests in a related practical experience in a health-related organization, with the expectation that they complete a project or produce a product of public health utility. This gives students an opportunity to critically apply knowledge and skills learned in didactic sessions. Instructor permission required.

**PHP 2075. MPH Analytic Internship.**

The primary objective of this course is to gain hands-on experience in using data to address public health questions. Concepts from previous courses will be re-enforced as students work through the steps of addressing a public health question. Both data analysis and data interpretation will be emphasized in the context of a public health question. STATA 8.0 will be used to analyze data. Prerequisites: PHP 2120, and either PHP 2500 or 2510. Open to graduate students in the MPH program only.

**PHP 2080. Public Health Law and Ethics.**

The protection and preservation of the public's health are quintessential goals of government. Equally critical is the need to respect individual rights and morals in American society. The classic conundrum of public health law and ethics is the extent to which government may restrain or impinge citizens' interests, directly or indirectly, to promote the health and safety of the community. This course, Public Health Law and Ethics, explores the inherent tensions between promoting the public's health and protecting the legal and ethical rights and interests of individuals.



**PHP 2090. Research Grant Writing for Public Health.**

This course focuses on providing knowledge and experience in creating high quality public health research grant applications. Course objectives include developing significant and innovative scientific hypotheses, learning principles of effective written communication, and developing a research grant application suitable to submit for funding. Designed for Public Health School PhD students, post-doctoral fellows, and Masters students with advanced degrees (e.g. MD, PhD). Prerequisite: PHP 2120 or PHP 2150 or instructor permission.

Fall PHP2090 S01 15715 W 9:30-12:00 (J. Braun)

**PHP 2120. Introduction to Methods in Epidemiologic Research.**

Epidemiology quantifies patterns and determinants of human population health, with a goal of reducing the burden of disease, injury, and disability. An intensive first course in epidemiological methods, students learn core principles of study design and data analysis through critiques of published epidemiological studies as well as hands on practice through weekly exercises and assignments. This is a graduate-level course aimed at masters and PhD students. The course is not open to first year students or sophomores but may be available for advanced undergraduates with the instructor's permission.

Fall PHP2120 S01 15523 TTh 10:30-11:50(13) (M. Lurie)

**PHP 2130. Human Biology for Public Health.**

This course provides basic principles of human biology and its applications to public health. Examples of biology topics include the cardiovascular system, endocrine system, immune system, nervous system, genetics, cancer, cardiovascular disease, HIV/AIDS, and depression. Examples of applied topics include strengths and weaknesses of using biomarkers, accuracy and precision of biological measures, quality assurance and quality control methods for using biomarkers for public health research. Mixed teaching methods are used, including small group discussions, problem-based learning and guest lectures. Prerequisite: PHP 2120 (may be taken concurrently) or instructor permission. Enrollment limited to 20 graduate students.

Spr PHP2130 S01 24927 F 9:30-12:00 (K. Kelsey)

**PHP 2150. Foundations in Epidemiologic Research Methods.**

The overall objective of this course is to provide students with a strong foundation in epidemiologic research methods. This is the first of a two- or four-course sequence in epidemiologic methods aimed at students who expect to eventually conduct their own epidemiologic research. There will be a strong quantitative focus in this course. By the end of the foundations course, students should be sufficiently familiar with epidemiologic research methods to begin to apply these methods to their own work. Prerequisite: PHP 2507 or 2510 (either may be taken concurrently); the typical student will also have some introductory knowledge of epidemiology.

Fall PHP2150 S01 15718 TTh 10:30-11:50(13) (T. Zheng)

**PHP 2160. The Global Burden of Mental Illness: A Public Health Approach.**

Provides an introduction to the classification, epidemiology, etiology, treatment and potential prevention of psychiatric disorders from a population perspective. Reviews the magnitude and social burden associated with mental disorders worldwide and opportunities to enhance prevention and treatment.

Covers concepts and methods used to study mental illness at the population level, including definitions of "normality" and "pathology", current classification systems and measurement approaches to assess psychopathology and severity and cross-cultural issues.

Covers the prevalence, risk factors, and etiology of major disorders of children, adolescents and adults, including autism spectrum disorders, attention deficit disorders, mood and anxiety disorders, schizophrenia and substance use disorders.

**PHP 2170. Injury As A Public Health Problem.**

Injury causes significant morbidity and mortality in the U.S and across the globe. However, injuries – both violent and non-violent – are eminently preventable. The overarching objective of this course is to enable students to understand the epidemiology of injury and violence, as well as strategies to improve public health through injury prevention. Prerequisite: PHP 2120 or 2150 (may be taken concurrently) or instructor permission. Enrollment limited to 20 graduate students.

**PHP 2180. Interpretation and Application of Epidemiology.**

This course builds upon the foundation of introductory epidemiology and a basic understanding of quantitative and conceptual methods, with a focus on the interpretation of the strength and meaning of epidemiologic findings. The goal is to help students develop critical thinking skills in order to become more sophisticated interpreters of epidemiologic evidence for guiding policy, clinical practice, and individual decisions, combining subject matter knowledge and epidemiologic methods to wisely evaluate the available research findings. We will focus on judging causality and identifying gaps that future research would need to fill to strengthen our understanding. Prerequisite required or permission of instructor.

Spr PHP2180 S01 24930 M 9:00-11:30 (D. Savitz)

**PHP 2200. Intermediate Methods in Epidemiologic Research.**

This second course in epidemiologic methods reinforces the concepts and methods taught in PHP 2150, with in-depth instruction in issues of study design, assessing threats to study validity including confounding and selection bias, and analyzing data with standard regression models. The course emphasizes hands-on learning and includes a combination of didactic lectures, discussions of methodologic papers, and a required laboratory component where students will learn to apply the concepts learned in class to real-world problems. Prerequisites: PHP 2150 and either 2510 or 2507, or permission of the instructor. Co-requisite: PHP 2511 or 2508.

Spr PHP2200 S01 24931 MW 1:00-2:20 (G. Wellenius)

**PHP 2220A. Epidemiology of Violence and Its Consequences.**

Overview of the epidemiology of intentional injury within the social context. Selected topics include homicide, suicide, child abuse, intimate partner and family violence, sexual assault, elder mistreatment and officially sanctioned violence. Methodological challenges for epidemiologists, and the role of guns and substance use are examined. Prerequisite: PHP 2120 or knowledge of elementary epidemiologic methods. Enrollment limited to 10.

**PHP 2220B. Nutritional Epidemiology.**

Although epidemiology is logically equipped to address the dietary causes of disease, the complex nature of diet has posed an unusually difficult challenge to this discipline. This course will focus on the methodological challenges that epidemiologists face in studying dietary factors as determinants of chronic diseases. Dietary assessment methods, biomarkers, and anthropometric measures will be reviewed. Substantive material and up-to-date issues will be used as examples. The course will consist of lectures and exercises to develop basic skills to allow students to have a strong grounding in this field. Open to graduate students only.

**PHP 2220C. Perinatal Epidemiology.**

Provides an overview of topics related to reproduction, maternal and fetal outcomes of pregnancy, and longer term consequences of adverse pregnancy outcomes. Methodological issues unique to reproductive and perinatal epidemiology are discussed, as well as general epidemiologic methods as applied to topics in reproductive and perinatal epidemiology. Students are expected to actively participate in class discussions, lead discussions related to selected topics by providing an overview of the biology, descriptive epidemiology, and known risk factors of the topic, along with a detailed critique of recently published articles on the topic. Open to graduate students only.

Fall PHP2220C S01 15513 M 3:30-6:00 (D. Savitz)

**PHP 2220E. Topics in Environmental and Occupational Epidemiology.**

This course introduces students to the epidemiological study of historical and contemporary environmental/occupational agents, focusing on study design, biases, and methodological tools used to evaluate and extend the evidence linking exposures to human disease. The course will discuss applications, strengths, and limitations of different study designs and their use in studying specific environmental agents. Didactic lectures and student-led discussions will be used to provide students with a basic understanding of and the tools to apply/extend their knowledge of specific environmental agents (endocrine disruptors) and special topics (children's neurodevelopment). Prerequisite: PHP 2120, PHP 2150, or equivalent. Undergrads with PHP 0850 and instructor's permission.

Spr PHP2220E S01 24933 Th 9:30-12:00 (J. Braun)



**PHP 2220G. Methodological and Practical Issues in Global Health Research.**

This seminar-style course will develop critical thinking and writing about global health research among graduate students interested in population health. Reading and writing assignments are on key conceptual, methodological and practical issues. It is interdisciplinary in nature but will reflect public health and epidemiologic perspectives on measures of population health, health disparities, interactions of effects on health, and implementation research. It is suitable for graduate students in the public health sciences, social sciences, pathobiology and public policy. Prior training in epidemiologic methods and global health, or their equivalents, are expected. Recommended prerequisite: PHP 2120. Open to graduate and medical students only.

**PHP 2220H. The Epidemiology, Treatment and Prevention of HIV.**

The purpose of this seminar is to use HIV as an example to introduce students to a variety of methodological issues in the epidemiologic study of infectious diseases. While we will study the treatment and prevention of HIV in detail, emphasizing the current state of knowledge and critiquing the most recent literature, this course aims to use HIV as an example to better understand the variety of methodological issues in global and domestic infectious disease epidemiology today. Enrollment limited to 25 students. Prerequisites: PHP 0850 or PHP 1854 (undergraduates); PHP 2120 or 2150 and PHP 2508 or 2511 (graduate students).

Fall PHP2220H S01 15810 Th 2:30-5:00 (M. Lurie)

**PHP 2222. Genetics, Human Population and Diseases.**

The purpose of this course is: 1) to introduce students to genetics, genomics and various designs of genetic studies of human diseases, and 2) to discuss selected topics in challenges and advances in human genetic studies. Some prior knowledge with genetics or epidemiology is preferred. This course may be most appropriate for second-year MPH, ScM, or PhD students, as well as first-year graduate students and advanced undergraduate students with previous exposure to introductory epidemiology and biostatistics. Prerequisite: introductory-level statistical analyses and epidemiology courses, such as PHP 2507 or 2510, and 2120 or 2150. Undergraduates need permission of instructor to register.

**PHP 2230. Epidemiology of Infectious Diseases.**

This course will introduce students to the field of infectious disease epidemiology. Topics will include a history of infectious diseases, epidemiology and control of infectious diseases, analytic methods, study design, outbreak investigations, and epidemic modeling. Prerequisite: PHP 2120 or PHP 2150 and PHP 2507 or 2510, or with permission of instructor. Enrollment limited to 25 students.

**PHP 2240. Methods of Environmental Epidemiology.**

In this course, students will understand, implement, and interpret the design and analysis tools commonly used in environmental epidemiology. Topics to be discussed include cohort, time-series, case-crossover, and panel study designs, modeling of flexible dose-effect relationships, consequences of measurement error and missing data, and analyses of effects of exposures with unknown latencies. Although these methods will be presented in the context of estimating the health effects of environmental exposures, many of these methods are readily applied to other fields. Prerequisite: PHP 2200 or instructor permission. Open to graduate students only.

**PHP 2250. Advanced Quantitative Methods in Epidemiologic Research.**

This course provides students with conceptual and quantitative tools based on counterfactual theory to make causal inference using data obtained from observational studies. Causal diagrams will be used to provide alternative definitions of and inform correcting for common biases. Non-, semi-, and fully parametric methods for addressing these biases will be discussed. These methods include standard regression, instrumental variables, propensity scores, inverse probability weighting, and marginal structural models. Settings when such methods may not be appropriate will be emphasized. Prerequisite: PHP 2200 and 2511; or PHP 2200 and 2508; or instructor permission. Enrollment limited to 25 graduate students.

Fall PHP2250 S01 15811 TTh 1:00-2:20(10) (C. Howe)

**PHP 2260. Applied Epidemiologic Analysis Using SAS.**

Epidemiologic and health services research requires the use of statistical software to describe and analyze data. This computer lab-based course will introduce students to applied epidemiologic analysis using the SAS® system. In addition, students will be directed through the process of writing a journal style article in which their SAS analyses will be incorporated. Course enrollment is restricted to graduate students in the Department of Epidemiology. However, graduate students in other departments/programs (e.g., MPH and Health Services, Policy, and Practice) may enroll with instructor permission.

**PHP 2300. Research Methods in Behavioral Science.**

This course provides students with fundamental principles of behavioral and social research methodology for understanding the determinants of public health problems, and for executing and testing public health interventions. We will focus on experimental methods, observational studies, and qualitative approaches. We will develop skills in understanding and interpreting data—both quantitative and qualitative. Throughout the course we will emphasize ethical, cultural, and professional issues for designing public health interventions. Prior coursework in research methodology and quantitative methods is recommended but not required. Open to graduate students and advanced undergraduates. Enrollment limited to 15.

**PHP 2310. Physical Activity and Public Health.**

This course examines physical activity and health with an emphasis on the development of behavioral interventions to increase physical activity. Students gain knowledge of the impact of physical activity on health outcomes as well as differences in physical activity among subpopulations. They are introduced to behavioral theories, intervention design approaches, measurement issues, and methods that are relevant to physical activity. Through seminar discussions, a group project, and presentations, students engage with the material and gain skills in the development and evaluation of behavioral interventions. Students with an interest in behavioral interventions and physical activity will benefit from taking the course. Recommended prerequisites: PHP 1740, 2320, or 2360. Enrollment limited to 20. Open to graduate students and seniors concentrating in Community Health.

**PHP 2320. Environmental and Policy Influences on the Obesity Epidemic.**

This course examines environmental influences on the obesity epidemic with an emphasis on the impact of the built environment and policy on physical activity. Through seminar discussions, literature reviews, policy briefs, and presentations, students will engage with the material and gain skills in the development of policy and environmental change strategies to impact physical inactivity and poor diet. Students with an interest in environmental change and policy to prevent obesity and increase physical activity will benefit from taking this course. Enrollment limited to 25.

**PHP 2325. Place Matters: Exploring Community-Level Contexts on Health Behaviors, Outcomes and Disparities.**

There is growing recognition among researchers, public health practitioners and policymakers that place matters for health behaviors and health outcomes. But what is place, and why does it matter? As with many health-related outcomes, the prevalence of ill health is unequally distributed across populations with certain features playing significant roles on health. In this course, we will explore the features of community environments and the associations with health behaviors (e.g. physical activity, preventive care, alcohol, sexual behaviors) and health outcomes (e.g. obesity, cardiovascular disease and mental health). This course is specific to the US.

Fall PHP2325 S01 15874 T 9:00-11:30 (A. Keita)

**PHP 2330. Behavioral and Social Approaches to HIV Prevention.**

This course examines concepts, approaches, and empirical findings from behavioral and social research to prevent HIV transmission. Students will become familiar with behavioral theories, social epidemiological principles, intervention design, and debates within the field of HIV prevention. A particular focus of this course is on the linkages between science and HIV prevention practice/policy. Students will conduct weekly readings, engage actively in seminar discussions, and participate in small-group presentations and research activities. Prior coursework in public health research methodology is recommended. Prerequisites: Graduate student or senior public health concentrator. Enrollment limited to 15 advanced undergraduate, graduate and medical students.

**PHP 2340. Behavioral and Social Science Theory for Health Promotion.**

This course will help students become familiar with behavioral and social science theories commonly used for planning disease prevention/health promotion interventions. In addition to review of specific theories, topics to be discussed include: how theories are developed and tested; challenges and potential pitfalls in using theory for intervention planning; and creation of causal diagrams based on concepts from theories. Undergraduates need permission of instructor; priority will be for Public Health concentrators. Enrollment limited to 25.

Fall PHP2340 S01 15875 T 12:00-2:30 (D. Williams)

**PHP 2350. Economics of Medical Therapies: Health Policy and Practice.**

Introduces methods and applications of decision analysis, cost-effectiveness analysis, and benefit-cost analysis in public health policy and practice, including health care technology assessment, medical decision making, and health resource allocation. Examines technical features of these methods, problems associated with implementing them, and advantages and pitfalls in their application in setting public health policy. Open to juniors, seniors, and graduate students.

**PHP 2360. Designing and Evaluating Public Health Interventions.**

Aims to develop skills in designing and evaluating public health interventions. Levels of intervention include the individual; families or small groups; organizations such as schools, worksites, health care settings; communities; social marketing and health communications; policy and environmental changes. Will identify personal and environmental factors that affect public health and discuss needs assessment, formative research, cultural sensitivity, behavior change theories, intervention mapping, process and impact/outcome evaluation and dissemination. Students will critique intervention studies and gain experience in developing a hypothetical behavior change intervention. Graduate students and AB-MPH undergraduates only. DPLL

**PHP 2365. Public Health Issues in LGBT Populations.**

This seminar is designed for graduate students interested in health disparities and determinants of health in LGBT populations (also referred to as sexual minority populations). Students will become familiar with key epidemiological reports, behavioral and social science theories/frameworks, intervention studies, and scientific debates related to the determinants of and disparities affecting the health of LGBT and sexual minority populations. The course will focus primarily on US populations, but will also include global LGBT and sexual minority populations. Readings and discussion will be considered in light of social, policy, and cultural contexts that frame the lives of LGBT populations.

**PHP 2370. Etiology of Substance Use Disorders.**

This course will help students become familiar with behavioral, genetic, neurobiological, and cultural factors related to the onset and course of substance use disorders. In addition to review of specific theories, empirical evidence supporting models will be covered as will the integration of evidence across models. Priority will be given to postdoctoral fellows.

**PHP 2371. Psychosocial and Pharmacologic Treatment of Substance Use Disorders.**

Intended to provide an overview of the history of the treatment of substance use disorders; assessment methods designed to determine progress in substance use treatment; and the current most common types of psychosocial and pharmacologic treatments for substance use. Enrollment limited to 20 graduate and medical students. Instructor permission required.

Fall PHP2371 S01 15877 F 1:15-3:45 (P. Monti)

**PHP 2380. Health Communication.**

This class will explore Health Communication, with a focus on behavioral and social science interventions delivered through health communication programs. The course is structured so that basic building blocks (i.e., definitions of health communication, public health context for health communications interventions, theories of health communication and health behavior change) are presented sequentially early in the semester. Students will synthesize knowledge and demonstrate their understanding of the role of health communication through a final research project.

Seniors with concentration in Public Health may enroll with instructor's permission. Enrollment limited to 20 graduate and medical students. DPLL

Spr PHP2380 S01 24935 M 2:30-5:00 (K. Carey)

**PHP 2390. Quantitative Methods for Behavioral and Social Sciences Intervention Research.**

This course provides broad coverage of the quantitative methods used in behavioral intervention research ranging from descriptive data analysis to longitudinal methods. Students will learn to conduct, interpret, and write up a range of statistical procedures including basic psychometrics, t-tests and ANOVAs, correlations, and multiple regression. Students also will be introduced to more advanced techniques used for longitudinal data analysis in order to understand their common uses in behavioral intervention research. The course provides students in the Master's program in Behavioral and Social Health Sciences the requisite skills to conduct analyses of behavioral data as part of their Master's Thesis. Enrollment limited to 15 graduate students in the BSHS Master's program and the MPH program.

Fall PHP2390 S01 15878 MTh 2:00-3:20 (C. Kahler)

**PHP 2400. The U.S. Health Care System: Case Studies in Financing, Delivery, Regulation and Public Health.**

Reviews the development of the health care delivery, financing and regulatory control systems in the U.S. and reviews the literature on the relationship between health system structure and the services used and health outcomes that populations experience. A case-study approach is used to understand the inter-relationship between financing, delivery and regulatory components of the health system and their implication for public health by drawing on epidemiological, economic, political and sociological principals. Prerequisites: Graduate standing or PHP 0310 or PHP 0070 (not available to first year students or sophomores). Instructor permission required.

**PHP 2410E. Medicare: A Data Based Policy Examination.**

This course will explore the role of Medicare as America's health insurer for the elderly and disabled through the use of real Medicare insurance claims data, examining how Medicare policy changes in financing and regulation have affected the delivery and receipt of medical services. At the end of the course students will: 1) know the history of important Medicare policy changes; 2) be able to construct aggregated patient case mix acuity adjusted measures of provider quality using insurance claims data; 3) be able to conduct policy analyses using Medicare claims data that are sensitive to standardized coding schemes. Enrollment limited to 15 graduate students. Prerequisite: PHP 2120, 2508, or 2510. Instructor permission required.

Fall PHP2410E S01 16869 Th 12:00-2:30 (V. Mor)

**PHP 2415. Introduction to Evidence-based Medicine.**

Unbiased assessments of the scientific literature by means of research synthesis methods are critical for formulating public health policy, counseling patients or prioritizing future research. We focus on the methods and uses of systematic reviews and meta-analyses and their applications in medicine and health policy. After course completion, and with some direction, students will be able to undertake a basic systematic review or meta-analysis. Enrollment limited to 15. Prerequisites: PHP 2120, 2150, or 2460; and PHP 2507/08 or 2510/11 (2508 and 2511 may be taken concurrently); and clinical background or training in basic concepts in medicine (must discuss with instructor).

Spr PHP2415 S01 24936 W 9:00-11:30 (T. Trikalinos)

**PHP 2425. Doing Public Health: Getting It Done in the Real World.**

This course covers topics that MPH graduates will encounter in public health work and engages students with important challenges in public health practice. Class sessions will be as real-world as possible. We will choose a major current public health problem in RI and develop a coalition of agencies. Each student will learn about a different agency, develop its role in addressing the problem as a part of the coalition, and design a proposal for intervention, interacting with experienced public health practitioners, interviewing agency staff, gathering data, writing proposals, drafting budgets etc. Assignments will foster good communication within organizations and coalitions.

**PHP 2429. Prevention: Medicine, Public Health, Law and Policy.**

Explores the role of law and policy in promoting prevention in medicine and public health and in reducing health disparities and health care costs. Themes will include: the limits of legal authority in public health promotion and in regulating health behaviors; promoting prevention through healthcare reform; and the use of medical and public health evidence in policymaking. Case study topics include obesity, gun violence, distracted driving, lead poisoning and injury prevention. Includes students from the disciplines of medicine, public health, law and public policy. Students will participate in an interdisciplinary experiential learning project at a public health agency or organization.

**PHP 2430. Analysis of Population Based Datasets.**

Epidemiologic and health services research often conducts analysis using existing population-based datasets. Benefits include representative sampling frames, timeliness, and lower costs. Information technology makes it possible to link some databases providing richer sources of information. There are several technical and methodological concerns when conducting this type of "secondary analyses." Students will download, link, and analyze several data sets to understand the advantages of these data for health policy analysis as well as understand and apply different analytic methods. Prerequisites: PHP 2120; PHP 2508 (may be taken concurrently) or PHP 2510 or similar. Open to graduate and medical students only.

**PHP 2440. Introduction to Pharmacoepidemiology.**

The course will focus on substantive topics in pharmacoepidemiology, including relevant principles of pharmacology, inference from spontaneous case reports, study design considerations, premarketing pharmacoepidemiology, common data sources for pharmacoepidemiologic studies, drug utilization review, adherence, and the development, implementation, and assessment of therapeutic risk management policies. The course will also focus on issues in pharmacovigilance, including the legal and historical basis of pharmacovigilance, evaluation of individual adverse drug events, signal detection, active safety surveillance, and medication errors. A clinical background is not required. Prerequisites are PHP 2507, PHP 2508, PHP 2510, or PHP 2511, AND PHP 2120 or PHP 2150, or permission.

**PHP 2450. Measuring and Improving the Quality of Health Care.**

The quality of health care in the United States is in urgent need of improvement. This course will focus on the science of measuring and improving the quality of health care. Topics will include quality assessment, patient safety, medical errors, public reporting, financial incentives, organizational change, and health care disparities. Students will engage in a team-based quality improvement project. Open to graduate and medical students only.

Fall PHP2450 S01 16870 M 3:00-5:30(05) (A. Trivedi)

**PHP 2451. Exchange Scholar Program.**

Fall PHP2451 S01 15170 Arranged 'To Be Arranged'

**PHP 2455A. Health Services Research Methods I.**

Health services researchers use theories, models, and data to understand the health care system, assess the effectiveness of interventions (at multiple levels of the healthcare system), and inform health policy decisions. This course reviews the application of statistical and epidemiological principles to the design and analysis of health services research studies. The goal is to familiarize students with common study designs and methods in health services research, so that they can critically review the published literature and use these approaches in their own research.

Fall PHP2455A S01 16871 F 10:00-12:30 (I. Dahabreh)

**PHP 2455B. Health Services Research Methods II.**

This course covers commonly used statistical (regression) models for health services research, including survival analysis; examines the problem of missing data and strategies for addressing it; and provides a basic introduction to causal inference methods for time-varying exposures (including non-adherence). The goal is to familiarize students with important methods in applied work, so they can critically review the published literature and use the methods in their own research. The topics covered should be of interest to students in Health Services, Policy + Practice, Epidemiology, Economics, and beyond. Pre Requisites: Successful completion of PHP 2455A or instructor permission. Interested students who have not taken PHP 2455A should contact issa\_dahabreh@brown.edu to make arrangements. Those with adequate background in basic health services research or epidemiologic methods and regression analysis will be able to gain from this course, even if they have not taken PHP 2455A.

**PHP 2460. Research Methods in Clinical, Translational and Health Services Research.**

This course will take an applied approach to understanding research methods used in health research. Students will explore concepts, gain knowledge and develop skills in the following areas: 1. Developing and refining research questions; 2. Designing research projects and appropriately implementing research methodologies; 3. Understanding the strengths and weaknesses of different study designs in addressing specific research questions, including an understanding of threats to validity; 4. Identifying Data Sources, including primary and secondary sources; 5. Understanding research ethics, including IRB processes and HIPPA regulations. Students must be accepted to the Clinical and Translational Research Summer Institute to enroll.

**PHP 2470. Topics in Clinical, Translational and Health Services Research.**

Through a combination of mini-courses and seminars, students will explore concepts, gain knowledge and develop skills in a variety of public health areas. To receive a half credit for this course, students will be required to successfully complete 70 units. Units must be pre-determined by the course instructor and the unit instructor. Units are generally based on the number of in-person contact hours and the number of outside of class/homework hours required for a mini-course or seminar. Students must receive special permission from the instructor or be accepted to the Clinical and Translational Research Summer Institute to enroll.

**PHP 2480. Selected Topics in Global Health Economics.**

This course will survey selected topics in global health economics. It is designed to introduce students to specific issues, theory and practice of health economics at the global level. The first part of the course will survey research papers on econometric methods in global health including: field experiments, instrumental variables, propensity score matching and regression discontinuity. The second part will discuss current topics such as: conditional economic incentives for providers and consumers, social health insurance, public goods, and externalities. Prerequisites: PHP 2511 and ECON 1110, or equivalent. Enrollment limited to 8 graduate students. Instructor permission required.



**PHP 2490. Methods in Pharmacoepidemiology.**

This course will cover applications of epidemiologic methods to the study of medical interventions (drugs, vaccines, devices, and procedures), focusing on advanced methods. We will use formal frameworks of causal inference. The course will focus on substantive topics in pharmacoepidemiology, including design and analytic strategies to overcome the limitations of common data sources. Other topics include the assessment of therapeutic risk management policies. Although a clinical background will be useful, it is not required. Prerequisites: PHP 2120, or PHP 2150 and 2200; and PHP 2507, 2510, or 2520; and PHP 2508 or 2511; or instructor permission. Enrollment limited to 20.

**PHP 2500. Introduction to Biostatistics.**

The first in a two-course series designed for students who seek to develop skills in biostatistical reasoning and data analysis. Offers an introduction to basic concepts and methods of statistics as applied to diverse problems in the health sciences. Methods for exploring and presenting data; direct and indirect standardization; probability; hypothesis testing; interval estimation; inference for means and proportions; simple linear regression, etc. Statistical computing is fully integrated into the course. Not open to freshmen or sophomores.

**PHP 2501. Introduction to Multivariate Regression.**

The first in a series of two-half semester courses on regression methods, designed for students who seek to develop biostatistical reasoning and data analysis skills. This course provides an introduction to multiple linear and logistic regression models as applied to diverse problems in the health sciences. PHP 2500 or equivalent is a prerequisite.

**PHP 2502. Regression Analysis Discrete and Event Time Data.**

The second course in the sequence on Introductory Biostatistics methods. This course will focus on regression methods (multiple linear regress, ANOVA, ANCOVA) and their natural extensions such as Logistic and Poisson regression in applications to diverse problems in the health sciences. Additionally, this course will cover regression methods for time to event data such as Cox regression for survival data. PHP 2500 or equivalent is a prerequisite.

**PHP 2507. Biostatistics and Applied Data Analysis I.**

The objective of the year long, two-course sequence is for students to develop the knowledge, skills and perspectives necessary to analyze data in order to answer a public health questions. The year long sequence will focus on statistical principles as well as the applied skills necessary to answer public health questions using data, including: data acquisition, data analysis, data interpretation and the presentation of results. Through lectures, labs and small group discussions, this fall semester course will focus on identifying public health data sets, refining research questions, univariate and bivariate analyses and presentation of initial results. Prerequisite: understanding of basic math concepts and terms; basic functional knowledge of Stata. Enrollment limited to 50 MPH and CTR students. Instructor permission required.

Fall	PHP2507	S01	16883	W	6:30-8:00PM	(A. Gjelsvik)
Fall	PHP2507	S01	16883	Th	1:00-2:20	(A. Gjelsvik)
Fall	PHP2507	L01	16884	Arranged		(A. Gjelsvik)
Fall	PHP2507	L02	16885	Arranged		(A. Gjelsvik)
Fall	PHP2507	L03	16886	Arranged		(A. Gjelsvik)
Fall	PHP2507	L04	16887	Arranged		(A. Gjelsvik)

**PHP 2508. BioStatistics and Data Analysis II.**

Biostatistics and Applied Data Analysis II is the second course in a year-long, two-course sequence designed to develop the skills and knowledge to use data to address public health questions. The courses are specifically for students in the Brown MPH program, and the training programs in Clinical and Translational Research. The sequence is completed in one academic year, not split across two years. The courses focus on statistical principles as well as the applied skills necessary to answer public health questions using data, including: acquisition, analysis, interpretation and presentation of results. Prerequisite: PHP 2507. Enrollment limited to 48. Instructor permission required.

Spr	PHP2508	S01	25487	W	6:30-8:00PM	(A. Gjelsvik)
Spr	PHP2508	S01	25487	Th	1:00-2:20	(A. Gjelsvik)
Spr	PHP2508	L01	25488	Arranged		(A. Gjelsvik)
Spr	PHP2508	L02	25489	Arranged		(A. Gjelsvik)
Spr	PHP2508	L03	25490	Arranged		(A. Gjelsvik)
Spr	PHP2508	L04	25491	Arranged		(A. Gjelsvik)

**PHP 2510. Principles of Biostatistics and Data Analysis.**

Intensive first course in biostatistical methodology, focusing on problems arising in public health, life sciences, and biomedical disciplines. Summarizing and representing data; basic probability; fundamentals of inference; hypothesis testing; likelihood methods. Inference for means and proportions; linear regression and analysis of variance; basics of experimental design; nonparametrics; logistic regression. Open to advanced undergraduates with permission from the instructor.

Fall	PHP2510	S01	15954	TTh	9:00-10:20(02)	'To Be Arranged'
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**PHP 2511. Applied Regression Analysis.**

Applied multivariate statistics, presenting a unified treatment of modern regression models for discrete and continuous data. Topics include multiple linear and nonlinear regression for continuous response data, analysis of variance and covariance, logistic regression, Poisson regression, and Cox regression. Prerequisite: APMA 1650 or PHP 2510. Open to advanced undergraduates with permission from the instructor.

Spr	PHP2511	S01	25486	MW	10:30-11:50	(A. Sullivan)
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**PHP 2514. Applied Generalized Linear Models.**

This course provides a survey of generalized linear models (GLMs) for outcomes including continuous, binary, count, survival and correlated data. This course will work through the basic theories of GLMs. Emphasis will be on understanding the implications of this theory and the applications to solving real data problems. Extensive use of computer programming will be required to analyze the data in this class. This course is designed for graduate and advanced undergraduate students who will be analyzing data and want to develop a practical hands on toolkit as well as understanding of the theoretical underpinnings of regression.

Spr	PHP2514	S01	25494	MW	9:00-10:20	(C. Schmid)
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**PHP 2515. Fundamentals of Probability and Statistical Inference.**

This course will provide an introduction to probability theory, mathematical statistics and their application to biostatistics. The emphasis of the course will be on basic mathematical and probabilistic concepts that form the basis for statistical inference. The course will cover fundamental ideas of probability, some simple statistical models (normal, binomial, exponential and Poisson), sample and population moments, nite and approximate sampling distributions, point and interval estimation, and hypothesis testing. Examples of their use in modeling will also be discussed.

Fall	PHP2515	S01	16743	MW	9:00-10:20	(A. Sullivan)
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**PHP 2520. Statistical Inference I.**

First of two courses that provide a comprehensive introduction to the theory of modern statistical inference. PHP 2520 presents a survey of fundamental ideas and methods, including sufficiency, likelihood based inference, hypothesis testing, asymptotic theory, and Bayesian inference. Measure theory not required. Open to advanced undergraduates with permission from the instructor.

Fall	PHP2520	S01	16745	MW	9:00-10:20	(Z. Wu)
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**PHP 2530. Bayesian Statistical Methods.**

Surveys the state of the art in Bayesian methods and their applications. Discussion of the fundamentals followed by more advanced topics including hierarchical models, Markov Chain Monte Carlo, and other methods for sampling from the posterior distribution, robustness, and sensitivity analysis, and approaches to model selection and diagnostics. Features nontrivial applications of Bayesian methods from diverse scientific fields, with emphasis on biomedical research. Prerequisites: APMA 1650, PHP 2510, PHP 2511, or equivalent. Open to advanced undergraduates with permission from the instructor.

Spr PHP2530 S01 25495 TTh 1:00-2:20(08) (R. Gutman)

**PHP 2540. Advanced Methods for Multivariate Analysis.**

Survey of modern statistical methods for analysis of multivariate and high-dimensional data. Topics include inference for multivariate normally distributed data, methods for data reduction, classification and clustering, multiple comparisons for high-dimensional data, analysis of multidimensional contingency tables, and functional data analysis. Applications to diverse areas of scientific research, such as genomics, biomarker evaluation, and neuroscience will be featured. Prerequisites: APMA 1650 and 1660; or PHP 2520. Open to advanced undergraduates with permission from the instructor.

**PHP 2550. Practical Data Analysis.**

Covers practical skills required for successful analysis of scientific data including statistical programming, data management, exploratory data analysis, simulation and model building and checking. Tools will be developed through a series of case studies based on different types of data requiring a variety of statistical methods. Modern regression techniques such as cross-validation, bootstrapping, splines and bias-variance tradeoff will be emphasized. Students should be familiar with statistical inference as well as regression analysis. The course will use the R programming language.

Fall PHP2550 S01 16746 MW 10:30-11:50 (C. Schmid)

**PHP 2560. Statistical Programming with R.**

Statistical computing is an essential part of analysis. Statisticians need not only be able to run existing computer software but understand how that software functions. Students will learn fundamental concepts – Data Management, Data types, Data cleaning and manipulation, databases, graphics, functions, loops, simulation and Markov Chain Monte Carlo through working with various statistical analysis. Students will learn to write code in an organized fashion with comments. This course will be taught using both R and Julia languages in a flipped format.

Fall PHP2560 S01 16747 W 1:00-4:00 (A. Sullivan)

**PHP 2561. Methods in Informatics and Data Science for Health.**

This course will teach informatics and data science skills needed for research in public health and biomedicine. Particular emphasis will be given to formalisms and algorithms used within the context of biomedical research and health care, including those used in biomolecular sequence analysis, electronic health records, clinical decision support, and public health surveillance. General programming language skills will be taught (in Julia) within these contexts. Mastery of informatics and data science skills will be assessed by a final project done within a health or biomedical context.

Spr PHP2561 S01 25496 TTh 10:30-11:50(09) (N. Sarkar)

**PHP 2580. Statistical Inference II.**

This sequence of two courses provides a comprehensive introduction to the theory of modern inference. PHP 2580 covers such topics as non-parametric statistics, quasi-likelihood, resampling techniques, statistical learning, and methods for high-dimensional Bioinformatics data. Prerequisite: PHP 2520. Open to advanced undergraduates with permission from the instructor.

Spr PHP2580 S01 25497 MW 10:30-11:50 (C. Gatsonis)

**PHP 2601. Linear Models.**

This course will focus on the theory and applications of linear models for continuous responses. Linear models deal with continuously distributed outcomes and assume that the outcomes are linear combinations of observed predictor variables and unknown parameters, to which independently distributed errors are added. Topics include matrix algebra, multivariate normal theory, estimation and inference for linear models, and model diagnostics. Prerequisites: APMA 1650 or 1660, or taking PHP 2520 concurrently.

Note: The course will cover fundamental and advanced topics in linear models, and concepts related to the generalized linear models will not be covered during the course.

Fall PHP2601 S01 15955 TTh 1:00-2:20(10) 'To Be Arranged'

**PHP 2602. Analysis of Lifetime Data.**

Comprehensive overview of methods for inference from censored event time data, with emphasis on nonparametric and semiparametric approaches. Topics include nonparametric hazard estimation, semiparametric proportional hazards models, frailty models, multiple event processes, with application to biomedical and public health data. Computational approaches using statistical software are emphasized. Prerequisites: PHP 2510 and 2511, or equivalent. Open to advanced undergraduates with permission from the instructor.

**PHP 2603. Analysis of Longitudinal Data.**

Comprehensive coverage of methods for drawing inference from longitudinal observations. Theoretical and practical aspects of modeling, with emphasis on regression methods. Topics include: multilevel and marginal models; estimation methods; study design; handling dropout and nonresponse; methods for observational data (e.g. time-dependent confounding, endogeneity, selection bias). SAS and S-Plus software are used. Prerequisite: Statistical inference (APMA 1650- 1660 at minimum), regression (PHP 2511), working knowledge of matrix algebra (e.g. MATH 0520). Open to advanced undergraduates with permission from the instructor.

**PHP 2604. Statistical Methods for Spatial Data.**

This course covers a variety of topics for spatial data, including data visualization, Bayesian hierarchical models, spatial models, as well as the computation techniques and statistical software to implement these models. Examples of applications will include, but are not limited to, spatial modeling of data from epidemiology, environmental studies and social sciences. Prerequisites: APMA 1650-1660 or PHP 2510-2511, and MATH 0520; some experience with scientific computing.

**PHP 2605. Generalized Linear Models.**

This course will focus on the theory and application of generalized linear models (GLM), a unified statistical framework for regression analyses. Specifically, we will focus on using GLMs to model the categorical outcomes. The GLM for categorical outcomes include logistic regression, proportional odds model, and Poisson regression. Maximum likelihood estimation and inference will be introduced in the GLM context. The students are expected to have knowledge of probability and inference (at the level of APMA1650, APMA1660, or PHP2520), knowledge of matrix algebra (at the level of MATH0520), knowledge of regression analysis (at the level of PHP2511) and knowledge of R.

**PHP 2610. Causal Inference and Missing Data.**

Systematic overview of modern statistical methods for handling incomplete data and for drawing causal inferences from "broken experiments" and observational studies. Topics include modeling approaches, propensity score adjustment, instrumental variables, inverse weighting methods and sensitivity analysis. Case studies used throughout to illustrate ideas and concepts. Prerequisite: MATH 1610 or PHP 2511.

Fall PHP2610 S01 16877 TTh 9:00-10:20(02) 'To Be Arranged'

**PHP 2620. Statistical Methods in Bioinformatics, I.**

Introduction to statistical concepts and methods used in selected areas of bioinformatics. Organized in three modules, covering statistical methodology for: (a) analysis of microarray data, with emphasis on application in gene expression experiments, (b) proteomics studies, (c) analysis of biological sequences. Brief review and succinct discussion of biological subject matter will be provided for each area. Available software will be introduced. Intro level statistics (PHP 2507/2508 or PHP 2510/2511) recommended. Other students should contact instructor. Intro to software R and Bioconductor tools provided in lab. Open to advanced undergraduates with permission from the instructor.

**PHP 2630. Statistical Foundations of Data Science.**

Data Science is a broad and rapidly emerging field concerned with extraction of meaningful knowledge from data. This course provides an integrated survey of statistical methods and principles that are fundamental to these goals: causal inference, machine learning and prediction, data-driven decision making, quantification of uncertainty, and simulation-based modeling of complex systems. Many of the readings will be drawn from source literature in statistics and computer science. The course will be conducted in seminar style and will be project-based. Students will complete up to 4 data analysis projects using methods discussed in class.

**PHP 2650. Statistical Learning and Big Data.**

This course introduces modern statistical tools to analyze big data, including three interconnected components: computing tools, statistical machine learning, and scalable algorithms. It introduces the principal techniques: extract and organize data from complex sources, explore patterns, frame statistical problems, build computational algorithms, and disseminate reproducible research. Topics include web data extraction, database management, exploratory data analysis, dimension reduction, convex optimization algorithms, high-dimensional linear/nonlinear models, tree/ensemble methods, and predictive modeling. These techniques are illustrated using big data examples from many scientific disciplines. This course is open to graduate students and advanced undergraduate students pursuing degrees in science, technology, engineering, or mathematics. Students should have taken: either one course from: PHP 2510, PHP 2511, PHP 2550, APMA 2610; OR one course from: APMA 1690, APMA 1720, APMA 1930B, CSCI 0150, CSCI 0170; AND one course from: MATH 0520, MATH 0540. Students may ask permissions from the instructor for waiving this requirement. Students are also required to have some experience with any scripting language.

Spr	PHP2650	S01	25493	TTh	10:30-11:50(09)	(X. Luo)
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**PHP 2680. Research Methods in Biostatistics.**

This course is designed to cover essential elements of preparing for a career in research in biostatistics. The course will cover: methods of statistical research, with a focus on problem solving in real applications; key elements of communicating research, including writing for academic publication, writing and collaborating on grant proposals, and preparing and delivering oral presentations; and professional and research ethics, with emphasis on ethics of statistical practice in multidisciplinary collaborations. Enrollment limited to 15 graduate students in Biostatistics. Students must be in research phase of program of study.

**PHP 2690A. Advanced Topics in Biostatistics.**

Introduction to applications of statistics and the way statisticians collaborate in interdisciplinary research. Guest lecturers from industry, government and academia will describe how statisticians fit into their environment. Techniques for effective collaboration and oral and written presentation of work including interviewing, writing proposals, giving talks, working with a team and consulting as an individual will be taught. Designed for graduate students (Masters or PhD) who would like to learn how to collaborate on projects with non-statisticians. Permission of the instructor is required to enroll for the course.

**PHP 2690B. Introduction to Bayesian Inference: Hierarchical Models and Spatial Analysis.**

Intended as a first introduction to Bayesian inference. Relevant theoretical background will be reviewed, and the Bayesian paradigm will be introduced, including choice of prior distributions and calculation of posterior distributions. Main emphasis will be on how to use Bayesian thinking to develop models for data with complex structure. Hierarchical models, meta-analysis, Bayesian design and shrinkage estimation will be covered. The benefits of hierarchical modeling will be applied to spatial data analysis as a special topic. Students will be introduced to Bayesian computing and WinBUGS, which is a necessary skill for many modern analyses. Prerequisites: PHP 2510 and 2511, or equivalent. Additional exposure to statistical inference, statistical computing, and a course in calculus would be useful. Open to graduate students only.

**PHP 2950. Doctoral Seminar in Public Health.**

The purpose of this seminar is to facilitate discussions of current scientific literature in epidemiology, biostatistics, health services, behavioral and health sciences, and public health in general. The main goal is to expose students to current methodological issues and controversies, in an effort to integrate knowledge across disciplines. This seminar is only open to doctoral students in Epidemiology, Behavioral and Social Health Sciences, Biostatistics and Health Services Research.

Fall	PHP2950	S01	15956	F	1:00-1:50	(K. Carey)
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**PHP 2980. Graduate Independent Study and Thesis Research.**

Section numbers vary by instructor. Please check Banner for the correct section number and CRN to use when registering for this course.

**PHP 2985. MPH Independent Study for Thesis Preparation and Research.**

This optional half credit course may be taken up to two times during preparation for the MPH degree. It provides MPH students with self-directed thesis research and preparation time under the guidance of a thesis advisor. Prior to taking this course the student and advisor must reach agreement as to what constitutes satisfactory completion of the course (e.g., completion of a satisfactory literature review, attainment of specific thesis benchmarks, or completion of the thesis). Please check Banner for the correct section number and CRN to use when registering for this course.

**PHP 2990. Thesis Preparation.**

No description available.

Fall	PHP2990	S01	15171	Arranged		(K. Kelsey)
Spr	PHP2990	S01	24106	Arranged		'To Be Arranged'

**PHP XLIST. Courses of Interest to Concentrators in Community Health.**

## **Font Notice**

This document should contain certain fonts with restrictive licenses. For this draft, substitutions were made using less legally restrictive fonts. Specifically:

Helvetica was used instead of Arial.

The editor may contact Leepfrog for a draft with the correct fonts in place.