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 https://www.brown.edu/academics/public-health/academics.

Requirements for Class of 2020

1. Core Courses: (non-substitutable; 4 required for honors, 5 for non-honors)
   - PHP 0310 Health Care in the United States
   - PHP 0320 Introduction to Public Health
   - PHP 0850 Fundamentals of Epidemiology
   - PHP 1910, Senior Seminar.
   - PHP 1501 Essentials of Data Analysis

2. Environmental Health and Policy (Select one of the following):
   - PHP 1101 World of Food: Personal to Global Perspectives on Nutrition, Agriculture and Policy
   - PHP 1700 Current Topics in Environmental Health
   - PHP 1710 Climate Change and Human Health
   - AMST 1700I Community Engagement with Health and the Environment
   - BIOL 1820 Environmental Health and Disease
   - ENVS 0705 Equity and the Environment: Movements, Scholarship, Solutions
   - ENVS 1580 Environmental Stewardship and Resilience in Urban Systems
   - PLCY 1702 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
   - 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
   - PHP 1802S Human Security and Humanitarian Response: Increasing Effectiveness and Accountability
   - PHP 1820 Designing Education for Better Prisoner and Community Health
   - 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
   - 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
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHP 1610</td>
<td>Tobacco, Disease and the Industry: cigs, e-cigs and more</td>
</tr>
<tr>
<td>PHP 1680U</td>
<td>Intersectionality and Health Inequalities</td>
</tr>
<tr>
<td>PHP 1880</td>
<td>Meditation, Mindfulness and Health</td>
</tr>
<tr>
<td>PHP 1920</td>
<td>Social Determinants of Health</td>
</tr>
<tr>
<td>PHP 2355</td>
<td>Designing and Evaluating Public Health Interventions</td>
</tr>
<tr>
<td>POLS 1740</td>
<td>Politics of Food</td>
</tr>
</tbody>
</table>

5. Humanities/Fine Arts/Humanistic Social Sciences Course for Public Health (Select one of the following)

- **AFRI 0550**: African American Health Activism from Emancipation to AIDS
- **AFRI 1060W**: Policy, Culture and Discourse that Shape Health and Access to Healthcare
- **AFRI 1060Z**: Race, Sexuality, and Mental Disability History
- **AMST 1600C**: The Anti-Trafficking Savior Complex: Saints, Sinners, and Modern-Day Slavery
- **AMST 1601**: Health and Healing in American History
- **COST 0100**: Introduction to Contemplative Studies
- **EDUC 0800**: Introduction to Human Development and Education
- **ENGL 1030C**: Writing Science
- **ETHN 1750B**: Treaty Rights and Food Fights: Eating Local in Indian Country
- **ETHN 1890J**: Native American Environmental Health Movements
- **GNSS 0090C**: Reproductive Health: Science and Politics
- **GNSS 0120**: Introduction to Gender and Sexuality Studies
- **GNSS 1961H**: Literary Imaginations of the Law: Human Rights and Literature
- **HISP 0490A**: Spanish for Health Care Workers
- **HISP 0750Q**: Health, Illness and Medicine in Spanish American Literature and Film
- **HIST 0150H**: Foods and Drugs in History
- **HIST 0270B**: From the Columbian Exchange to Climate Change: Modern Global Environmental History
- **HIST 0286A**: History of Medicine I: Medical Traditions in the Old World Before 1700
- **HIST 1080**: Humanitarianism and Conflict in Africa
- **HIST 1830M**: From Medieval Bedlam to Prozac Nation: Intimate Histories of Psychiatry and Self
- **HIST 1977I**: Gender, Race, and Medicine in the Americas
- **HIST 1960Q**: Medicine and Public Health in Africa
- **HIST 1972H**: U.S. Human Rights in a Global Age
- **HMAN 1970G**: International Perspectives on NGOs, Public Health, and Health Care Inequalities
- **LACA 1503H**: Sexuality, Human Rights and Health: Latin American Perspective and Brazilian Experiences
- **PHIL 0060**: Modern Science and Human Values
- **PHIL 0260**: Philosophy of Social Science
- **PHIL 0390**: Global Justice
- **POBS 1501E**: Histories of Global Health from Lusophone Africa: Biomedical Actions in Angola, Mozambique, Guinea
- **TAPS 1281W**: Artists and Scientists as Partners

6. General Electives (Class of 2020: Select three)

General electives may be selected from: A. All PHP and BIOL course offerings; B. the approved content area electives (#2, #3, and #4) listed above; or C. the approved general electives listed below. No more than two (2) BIOL courses can count as general electives.

- **PHP 0030**: Health of Hispanics
- **PHP 0050**: Pain and the Human Condition: Exploring the Science, Medicine, and Culture of Pain
- **PHP 1400**: HIV/AIDS in Africa: A Multidisciplinary Approach to Support HIV/AIDS Care and Treatment Programs
- **PHP 1680I**: Pathology to Power: Disability, Health and Community
- **AFRI 1060W**: Policy, Culture and Discourse that Shape Health and Access to Healthcare
- **AMST 1601**: Health and Healing in American History
- **AMST 1906P**: Food in American Society and Culture
- **ANTH 0110**: Anthropology and Global Social Problems: Environment, Development, and Governance
- **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 0700**: Social Psychology
- **CLPS 1700**: Abnormal Psychology
- **CLPS 1783**: Nudge: How to Use Social Psychology to Create Social Change
- **ECON 0390**: Income, Wealth, and Health Inequality in the United States
- **ECON 0510**: Development and the International Economy
- **ENVS 0490**: Environmental Science in a Changing World
- **ENVS 1105**: Introduction to Environmental GIS
- **ETHN 1890J**: Native American Environmental Health Movements
### Requirements for Class of 2021

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHP 0310</td>
<td>Health Care in the United States</td>
</tr>
<tr>
<td>PHP 0320</td>
<td>Introduction to Public Health</td>
</tr>
<tr>
<td>PHP 0850</td>
<td>Fundamentals of Epidemiology</td>
</tr>
<tr>
<td>PHP 1501</td>
<td>Essentials of Data Analysis</td>
</tr>
<tr>
<td>PHP 1910</td>
<td>Public Health Senior Seminar</td>
</tr>
<tr>
<td>BIOL 0200</td>
<td>Principles of Environmental Health</td>
</tr>
<tr>
<td>UNIV 0090</td>
<td>Meditation and the Brain: Applications in Basic</td>
</tr>
</tbody>
</table>

**Total Credits:** 12

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHP 1101</td>
<td>World of Food: Personal to Global Perspectives</td>
</tr>
<tr>
<td>PHP 1700</td>
<td>Current Topics in Environmental Health</td>
</tr>
<tr>
<td>AMST 1700I</td>
<td>Community Change and Human Health and the</td>
</tr>
<tr>
<td>BIOL 1820</td>
<td>Environmental Health and Disease</td>
</tr>
<tr>
<td>ENVS 0705</td>
<td>Equity and the Environment: Movements, Scholarship,</td>
</tr>
</tbody>
</table>

**Total Credits:** 1

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHP 1070</td>
<td>The Burden of Disease in Developing Countries</td>
</tr>
<tr>
<td>PHP 1100</td>
<td>Comparative Health Care Systems</td>
</tr>
<tr>
<td>PHP 1500</td>
<td>Global Health Nutrition</td>
</tr>
<tr>
<td>PHP 1520</td>
<td>Emergency Medical Systems: An Anatomy of Critical</td>
</tr>
<tr>
<td>PHP 1530</td>
<td>Case Studies in Public Health: The Role of</td>
</tr>
<tr>
<td>PHP 1820S</td>
<td>Human Security and Humanitarian Response:</td>
</tr>
<tr>
<td>PHP 1820</td>
<td>Designing Education for Better Prisoner</td>
</tr>
<tr>
<td>PLCY 1700K</td>
<td>Health Policy Challenges</td>
</tr>
<tr>
<td>ECON 1360</td>
<td>Health Economics</td>
</tr>
<tr>
<td>PLCY 1700V</td>
<td>Health Care in the United States</td>
</tr>
<tr>
<td>PLCY 1802</td>
<td>Health Care in the United States</td>
</tr>
</tbody>
</table>

**Total Credits:** 1

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHP 1010</td>
<td>Doctors and Patients: Clinical Communication</td>
</tr>
<tr>
<td>PHP 1400</td>
<td>HIV/AIDS in Africa: A Multidisciplinary</td>
</tr>
<tr>
<td>PHP 1540</td>
<td>Alcohol Use and Misuse</td>
</tr>
<tr>
<td>PHP 1560</td>
<td>Tobacco, Disease and the Industry: cigs, e-cigs</td>
</tr>
<tr>
<td>PHP 1680U</td>
<td>Intersectionality and Health Inequities</td>
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<td>PHP 1880</td>
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<tr>
<td>PHP 1920</td>
<td>Social Determinants of Health</td>
</tr>
<tr>
<td>PHP 2355</td>
<td>Designing and Evaluating Public Health Interventions</td>
</tr>
<tr>
<td>PLCY 1702E</td>
<td>Environmental Law and Policy</td>
</tr>
</tbody>
</table>

**Total Credits:** 1

**5. Biology (Select one of the following):**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 0200</td>
<td>The Foundation of Living Systems</td>
</tr>
<tr>
<td>BIOL 0470</td>
<td>Genetics</td>
</tr>
<tr>
<td>BIOL 0510</td>
<td>Introductory Microbiology</td>
</tr>
<tr>
<td>BIOL 0530</td>
<td>Principles of Immunology</td>
</tr>
<tr>
<td>BIOL 0800</td>
<td>Principles of Physiology</td>
</tr>
<tr>
<td>BIOL 1040</td>
<td>Multi-Disciplinary</td>
</tr>
</tbody>
</table>

**Total Credits:** 1

**6. Humanities/Fine Arts/Humanistic Social Sciences Course for Public Health (Select one of the following):**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFRI 0550</td>
<td>African American Health Activism from Emanicipation to AIDS</td>
</tr>
<tr>
<td>AFRI 1060W</td>
<td>Policy, Culture and Discourse that Shape Health and Access to Healthcare</td>
</tr>
<tr>
<td>AFRI 1060Z</td>
<td>Race, Sexuality, and Mental Disability History</td>
</tr>
<tr>
<td>AMST 1600C</td>
<td>The Anti-Trafficking Savior Complex: Saints, Sinners, and Modern-Day Slavery</td>
</tr>
<tr>
<td>AMST 1601</td>
<td>Health and Healing in American History</td>
</tr>
<tr>
<td>COST 0100</td>
<td>Introduction to Contemplative Studies</td>
</tr>
<tr>
<td>EDUC 0800</td>
<td>Introduction to Human Development and Education</td>
</tr>
</tbody>
</table>

**Total Credits:** 1
7. General Electives (Class of 2021: Select two)

General electives may be selected from: A. All PHP and BIOL course offerings; B. the approved content area electives (#2, #3, #4, and #5) listed above; or C. the approved general electives listed below. No more than one (1) BIOL course can count as a general elective.

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 1030</td>
<td>Writing Science</td>
</tr>
<tr>
<td>ETHN 1750B</td>
<td>Treaty Rights and Food Fights: Eating Local in Indian Country</td>
</tr>
<tr>
<td>ETHN 1890J</td>
<td>Native American Environmental Health Movements</td>
</tr>
<tr>
<td>GNSS 0090C</td>
<td>Reproductive Health: Science and Politics</td>
</tr>
<tr>
<td>GNSS 0120</td>
<td>Introduction to Gender and Sexuality Studies</td>
</tr>
<tr>
<td>GNSS 1961H</td>
<td>Literary Imaginations of the Law: Human Rights and Literature</td>
</tr>
<tr>
<td>HISP 0490A</td>
<td>Spanish for Health Care Workers</td>
</tr>
<tr>
<td>HISP 0750Q</td>
<td>Health, Illness and Medicine in Spanish American Literature and Film</td>
</tr>
<tr>
<td>HIST 0150H</td>
<td>Foods and Drugs in History</td>
</tr>
<tr>
<td>HIST 0270B</td>
<td>From the Columbian Exchange to Climate Change: Modern Global Environmental History</td>
</tr>
<tr>
<td>HIST 0286A</td>
<td>History of Medicine I: Medical Traditions in the Old World Before 1700</td>
</tr>
<tr>
<td>HIST 1080</td>
<td>Humanitarianism and Conflict in Africa</td>
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<tr>
<td>HIST 1830M</td>
<td>From Medieval Bedlam to Prozac Nation: Intimate Histories of Psychiatry and Self</td>
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<tr>
<td>HIST 1977I</td>
<td>Gender, Race, and Medicine in the Americas</td>
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<tr>
<td>HIST 1960Q</td>
<td>Medicine and Public Health in Africa</td>
</tr>
<tr>
<td>HMAN 1970G</td>
<td>International Perspectives on NGOs, Public Health, and Health Care Inequalities</td>
</tr>
<tr>
<td>LACA 1503H</td>
<td>Sexuality, Human Rights and Health: Latin American Perspective and Brazilian Experiences</td>
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<tr>
<td>PHIL 0060</td>
<td>Modern Science and Human Values</td>
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<tr>
<td>PHIL 0260</td>
<td>Philosophy of Social Science</td>
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<tr>
<td>PHIL 0390</td>
<td>Global Justice</td>
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<tr>
<td>POBS 1501E</td>
<td>Histories of Global Health from Lusophone Africa: Biomedical Actions in Angola, Mozambique, Guinea</td>
</tr>
<tr>
<td>TAPS 1281W</td>
<td>Artists and Scientists as Partners</td>
</tr>
<tr>
<td>ANTH 1300</td>
<td>Anthropology of Addictions and Recovery</td>
</tr>
<tr>
<td>ANTH 1310</td>
<td>International Health: Anthropological Perspectives</td>
</tr>
<tr>
<td>BIOL 0030</td>
<td>Principles of Nutrition (Human Biology/Physiology course)</td>
</tr>
<tr>
<td>BIOL 0040</td>
<td>Nutrition for Fitness and Physical Activity</td>
</tr>
<tr>
<td>BIOL 0140K</td>
<td>Conservation Medicine</td>
</tr>
<tr>
<td>BIOL 0180</td>
<td>The Biology of AIDS</td>
</tr>
<tr>
<td>BIOL 0190E</td>
<td>Botanical Roots of Modern Medicine</td>
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<tr>
<td>BIOL 0200</td>
<td>The Foundation of Living Systems (Human Biology/Physiology course)</td>
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<tr>
<td>BIOL 0470</td>
<td>Genetics (Human Biology/Physiology course)</td>
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<td>BIOL 0530</td>
<td>Principles of Immunology (Human Biology/Physiology course)</td>
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<td>BIOL 0800</td>
<td>Principles of Physiology (Human Biology/Physiology course)</td>
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<td>BIOL 0850</td>
<td>Diet and Chronic Disease</td>
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<td>BIOL 0920A</td>
<td>Controversies in Medicine (Human Biology/Physiology course)</td>
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<td>BIOL 1920B</td>
<td>Health Inequality in Historical Perspective</td>
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<td>BIOL 1920C</td>
<td>Social Contexts of Disease</td>
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<td>BIOL 1920D</td>
<td>Race, Difference and Biomedical Research: Historical Considerations</td>
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<td>CLPS 0700</td>
<td>Social Psychology</td>
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<td>CLPS 1700</td>
<td>Abnormal Psychology</td>
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<tr>
<td>CLPS 1783</td>
<td>Nudge: How to Use Social Psychology to Create Social Change</td>
</tr>
<tr>
<td>ECON 0390</td>
<td>Income, Wealth, and Health Inequality in the United States</td>
</tr>
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<td>ECON 0510</td>
<td>Development and the International Economy</td>
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<td>ENVS 0490</td>
<td>Environmental Science in a Changing World</td>
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<td>ENVS 1105</td>
<td>Introduction to Environmental GIS</td>
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<td>ETHN 1890J</td>
<td>Native American Environmental Health Movements</td>
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<tr>
<td>GNSS 0090C</td>
<td>Reproductive Health: Science and Politics</td>
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<tr>
<td>HMAN 1970G</td>
<td>International Perspectives on NGOs, Public Health, and Health Care Inequalities</td>
</tr>
<tr>
<td>NEUR 0010</td>
<td>The Brain: An Introduction to Neuroscience (Human Biology/Physiology course)</td>
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<td>NEUR 0700</td>
<td>Psychoactive Drugs and Society</td>
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<td>PLCY 1700V</td>
<td>Nonprofit Organizations</td>
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<td>PLCY 1802</td>
<td>Engaged Research Engaged Publics</td>
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<td>PLCY 1910</td>
<td>Social Entrepreneurship</td>
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<td>POLS 1740</td>
<td>Politics of Food</td>
</tr>
<tr>
<td>SOC 0230</td>
<td>Sex, Gender, and Society</td>
</tr>
<tr>
<td>SOC 0300B</td>
<td>Environment and Society</td>
</tr>
<tr>
<td>SOC 0300E</td>
<td>HIV/AIDS: Politics, Culture and Society</td>
</tr>
<tr>
<td>SOC 0300F</td>
<td>Unequal From Birth: Child Health From a Social Perspective</td>
</tr>
<tr>
<td>SOC 0300K</td>
<td>Inequalities and Health</td>
</tr>
<tr>
<td>SOC 1250</td>
<td>Perceptions of Mental Illness</td>
</tr>
<tr>
<td>SOC 1315</td>
<td>Macro-Organizational Theory: Organizations in Social Context</td>
</tr>
<tr>
<td>SOC 1410</td>
<td>Aging and the Quality of Life</td>
</tr>
</tbody>
</table>
or a methodological/theoretical project. Students also have opportunities to complete a capstone project that involves a substantial data analysis methodology. In addition to the formal coursework, students are required to delve into more advanced material covering important areas of statistical theory and data analysis. The third part includes four core courses that provide a comprehensive account of the fundamentals of statistical theory and data analysis. A capstone project involving substantial data analysis or focused on methodology/theory is required.

The Concentration is based on several premises: that statistics is a science of data analysis; and that it is best taught in conjunction 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. 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.

Honors:
An Honors track is available for students who qualify. Honors track students do not enroll in PHP1910, Senior Seminar, during the Fall semester of their senior year, but rather are required to enroll in PHP1980 for both semesters of their senior year to conduct research and write the honors thesis. Thus, thirteen courses are required for completion of the concentration requirements for an honors track student. Please visit https://www.brown.edu/academics/public-health/undergraduate/curriculum 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:

**LEVEL I: Foundations in Mathematics - Calculus**
- MATH 0100: Introductory Calculus, Part I
- MATH 0180: Intermediate Calculus

**LEVEL I - Foundations in Mathematics - Linear Algebra**
- MATH 0520: Linear Algebra

**Computing**
- APMA 0160: Introduction to Scientific Computing
- or CSCI 0040: Introduction to Scientific Computing and Problem Solving

**Introduction to Statistical Thinking and Practice**
- PHP 1501: Essentials of Data Analysis

**With the approval of the Director of the Statistics Concentration, one of the following courses may serve as replacement:**
- 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
- CLPS 0900: Statistical Methods

**LEVEL II - Core Courses in Theory and Data Analysis**
- APMA 1650: Statistical Inference I
- or APMA 1655: Statistical Inference I
- APMA 1660: Statistical Inference II
- OR
- MATH 1610: Probability
- MATH 1620: Mathematical Statistics

**Introduction to Biostatistics**
- PHP 1510: Principles of Biostatistics and Data Analysis
- OR
- PHP 2510: Principles of Biostatistics and Data Analysis

**LEVEL III: Advanced Courses in Statistical Methods**
- PHP 1560: Statistical Programming in R
- OR
- PHP 2560: Statistical Programming with R
- AND
- PHP 1511: Applied Regression Analysis
- OR
- PHP 2511: Applied Regression Analysis

**Capstone Project**
- PHP 1970: Independent Study

**Electives in Social Science and Biostatistics (Students must choose 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

Total Credits: 12
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

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: Roee Gutman, Box G-S-121-7; Telephone: 401-863-2682; Fax: 401-863-9182; e-mail: Roee 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

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 2355  Designing and Evaluating Public Health Interventions
PHP 2360  Developing + Testing Theory-Driven, Evidence Based Psychosocial and Behavioral 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

Research Methods (Students must complete one of the following courses)
The School of 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 2355 Designing and Evaluating Public Health Interventions

Students must complete the following two half credit courses:

- PHP 2071 Applied Public Health: Systems and Practice
- 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

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/mph-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/biostats/academics/masters-program/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/biostats/academics/masters-program/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 1
- 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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>PHP 2300</td>
<td>Research Methods in Behavioral Science</td>
</tr>
<tr>
<td>PHP 2340</td>
<td>Behavioral and Social Science Theory for Health Promotion</td>
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<tr>
<td>PHP 2360</td>
<td>Developing + Testing Theory-Driven, Evidence Based Psychosocial and Behavioral Health Interventions</td>
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<tr>
<td>PHP 2380</td>
<td>Health Communication</td>
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<tr>
<td>PHP 2390</td>
<td>Quantitative Methods for Behavioral and Social Sciences Intervention Research</td>
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</tbody>
</table>

**Electives:** Must take 3 from this list

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

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1 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.
2 This course has substantial overlap with PHP 2360; please consult your adviser.
3 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

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

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

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
- PHP 2150 Foundations in Epidemiologic Research Methods
- PHP 2300 Research Methods in Behavioral Science

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

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: https://www.brown.edu/academics/public-health/education-training/masters/clinical-and-translational-research

Master's in Epidemiology Required Courses:

Master's in Epidemiology Required Courses:

- PHP 2150 Foundations in Epidemiologic Research Methods
- PHP 2200 Intermediate Methods in Epidemiologic Research
- PHP 2130 Human Biology for Public Health

AND at least two of the following:

- PHP 2030 Clinical Trials Methodology
- PHP 2040 Survey Research Methods
- PHP 2180 Interpretation and Application of Epidemiology
- PHP 2250 Advanced Quantitative Methods in Epidemiologic Research
- PHP 2260 Applied Epidemiologic Analysis Using SAS
- PHP 2430 Analysis of Population Based Datasets
- PHP 2560 Statistical Programming with R
- PHP 2455A Health Services Research Methods I
- PHP 2455B Health Services Research Methods II
- PHP 2520 Statistical Inference I
- PHP 2530 Bayesian Statistical Methods
- PHP 2540 Advanced Methods for Multivariate Analysis
- PHP 2550 Practical Data Analysis
- PHP 2601 Linear Models
- PHP 2602 Analysis of Lifetime Data

Required Biostatistics Courses:

Required Biostatistics Courses:

- 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

PHP 2710 Global Health Perspectives 1
PHP 2730 Including the Excluded: Global Health Ethics 1
PHP 2507 Biostatistics and Applied Data Analysis I 1
PHP 2120 Introduction to Methods in Epidemiologic Research 1
PHP 2720 Implementing Public Health Programs and Interventions in the Global South 1
PHP 2740 Global Health Seminar 1
PHP 2508 BioStatistics and Data Analysis II 1
PHP 2750 Communicating and Disseminating Global Public Health Research 1
PHP 2760 Social and Analytic Approaches to Global Health 1

Plus 3 electives 3

Total Credits 12
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.
Spr PHP0030 S01 24914 TTh 6:40-8:00PM(18) (T. Empkie)

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.

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.

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.

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.

Fall PHP0310 S01 24956 MWF 12:00-12:50(05) (I. Wilson)

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 behavioral factors associated with health promotion and disease prevention.

Fall PHP0320 S01 16098 MWF 11:00-11:50(16) (M. Clark)

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 16099 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.

This course seeks to expand the study of bioethics beyond its usual boundaries by engaging students in a semester-long discussion about health, science, ethics, and power. We will focus on corporate influence and corruption in medicine and other topics that relate to medical and public health decision making. The topics we focus on include: the use of human research subjects, the corporate use and corruption of science, health and development, and the science of gender and reproduction. We use readings, movies and YouTube presentations in bioethics, cultural theory, public health and history as a basis for addressing these questions.

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.

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.

PHP 1101. World of Food: Personal to Global Perspectives on Nutrition, Agriculture and Policy.
This course explores food and nutrition in the US 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 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 changes to the current food system
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 0850 OR prior coursework in psychology, epidemiology, sociology or related fields.
Spr PHP1160 S01 25643 Th 12:00-2:30 (S. Buka)

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.

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.

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.

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 16103 TTh 1:00-2:20(08) (R. Gutman)
Fall PHP1501 L01 16104 M 2:00-2:50 (R. Gutman)
Fall PHP1501 L02 16105 W 1:00-1:50 (R. Gutman)
Fall PHP1501 L03 16106 F 9:00-9:50 (R. Gutman)
Fall PHP1501 L04 16107 F 10:00-10:50 (R. Gutman)

PHP 1510. Principles of Biostatistics and Data Analysis.
This course is intended to provide a basic foundation in the methods and applications of biostatistics, and is geared towards the students whose fields of study include a substantial statistical or quantitative component. Ideally, this course is the first in a two-part sequence (the sequel being PHP 1511/2511: Applied Regression), designed to provide students in the public health, biological and life sciences with broad-based exposure to modern methods of biostatistical inference, in addition to an understanding of underlying mathematical principles and motivations.
Fall PHP1510 S01 16108 TTh 9:00-10:20(02) 'To Be Arranged'

This course provides a survey of regression techniques for outcomes common in public health data including continuous, binary, count and survival data. Emphasis is on developing a conceptual understanding of the application of these techniques to solving problems, rather than to the numerical details. Extensive use of the computer will be made for analysis of datasets.
Spr PHP1511 S01 25646 MW 10:30-11:50 (A. Sullivan)

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.
Spr PHP1520 S01 24958 W 3:00-5:30(10) (B. Becker)

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 24960 T 4:00-6:30(16) (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.
Fall PHP1540 S01 16921 TTh 9:00-10:20(02) (K. Carey)

PHP 1560. Statistical Programming in 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 in a "flipped" format. Students will watch a series of videos and work through some simple coding examples before coming to class.
Fall PHP1560 S01 16109 W 1:00-4:00 (A. Sullivan)
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.

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 1680L. 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.
Fall PHP1680L S01 16110 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.
Spr PHP1680J S01 25693 Th 10:00-12:30 (J. Nazareno)

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 or PHP 2150. 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.

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 transpire 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.

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.

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.

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.  
Spr PHP1802S S01 25694 Th 4:00-6:30(17) (A. Levine)

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. Students interested in taking the course must contact the professor directly for information about obtaining an override.  
Spr PHP1820 S01 25795 MW 3:00-4:20(10) (B. Brockmann)

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.  
Fall PHP1850 S01 14121 MW 3:00-4:20(10) (E. Loucks)

PHP 1854. The Epidemiology and Control of Infectious Diseases.  
Course objectives are to introduce students to methods and concepts in the 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 PHP 0320 or PHP 0850, and to graduate students who have completed or are concurrently enrolled in either PHP 2120 or PHP 2150.  
Spr PHP1854 S01 25695 MW 9:00-10:20 'To Be Arranged'

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.  
Fall PHP1880 S01 17012 W 3:00-5:30(17) (E. Loucks)

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 25654 T 9:00-11:30 (A. Field)

This dynamic course will provide an overarching public health capstone experience. Students will gain an in-depth knowledge by utilizing and strengthening oratory skills, written skills, and skills needed to work in teams. The instructor is formally trained in Internal Medicine, public health, health policy and clinical epidemiology, with experience which will be brought to the classroom. Topics will span public health successes, things that didn’t work, and things that need more work and effort. This seminar course will emphasize class discussion, interaction and debate regarding differing perspectives on each topic area, as well as in-depth discussion of the assigned readings.  
Fall PHP1910 S01 16114 W 3:00-5:30(17) (J. Ablawala)

The course provides an overview of significant 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.  
Spr PHP1920 S01 25655 W 3:00-5:30(10) (E. Loucks)

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.
This course is aimed at enhancing the knowledge and skills central to the application of epidemiologic methods to cancer screening, prevention, and control. We will examine cancer incidence and trends in the U.S. and globally, interpret their implication for cancer etiology, and critically analyze current evidence regarding the role of various major risk factors on human cancer risks. The class will focus on the impact of major environmental, occupational, and lifestyle risk factors on cancers of high public health significance.
Spr  PHP1964  S01  25656  F  1:00-3:30  (T. Zheng)

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.

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

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.

Provided 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.

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 macrovascular complications. Students will learn about both the descriptive and analytical epidemiology of these seemingly distinct but clearly clustered conditions 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 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.
Fall  PHP2018  S01  16150  T  9:30-12:00  (S. Liu)
Spr  PHP2018  S01  25780  T  9:00-12:00  (S. Liu)

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.

This is a graduate level course focused on maternal and child health in the United States. While some reference will be made to the experience in other countries, the focus of the course will be on the United States. A broad range of health conditions will be covered, with an emphasis on leading causes of mortality and morbidity. In addition, we will examine the range of programs designed to prevent or address important health threats.
Fall  PHP2023  S01  16724  T  2:30-5:45  (P. Vivier)
Fall  PHP2023  S01  16724  W  1:00-2:20  (P. Vivier)

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  16154  M  1:00-3:30  (L. 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.
Spr  PHP2040  S01  24961  MW  4:00-5:30  (M. Clark)

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 20 graduate students.
Spr  PHP2060  S01  24962  F  9:00-11:30  ‘To Be Arranged’

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.
Spr  PHP2070  S01  24967  T  1:00-2:20  (A. Gjelsvik)
PHP 2072. Applied Public Health: Policy, leadership and communication.
Applied Public Health is a two-semester sequence of courses designed to give students the skills and experiences they need to master understanding public health and health care systems, policy in public health, leadership, communication, interprofessional practice, and systems thinking. This will be achieved through a combination of lectures, in class exercises, homework assignments, and practical experience in a public health setting. The second course (PHP 2072) is taken in the Fall of your second year.
Fall PHP2072 S01 16157 F 2:30-3:50 (A. Gjelsvik)

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 16158 W 9:30-12:00 (M. Lurie)

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 16160 TTh 10:30-11:50(13) (M. Lurie)

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 25606 F 9:30-12:00 (K. Kelsey)

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 16161 TTh 10:30-11:50(13) (B. Marshall)

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.
Spr PHP2160 S01 25645 Th 12:00-2:30 (S. Buka)

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 25697 Th 2:30-5:00 (D. Savitz)

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 25698 MW 1:30-2:50 (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 220B. Nutritional Epidemiology.
This course provides a comprehensive and systematic review of contemporary issues in human nutrition that require the application of epidemiologic principles and quantitative methods. Substantive topics range from the assessment of molecular etiologies for health and disease outcomes to evidence-based development of clinical guidelines and public health policies for foods and dietary supplements. This course is designed for graduate trainees in public health or the division of biology and medicine, visiting fellows, and advanced undergraduates who want to understand or conduct research in human nutrition and dietary assessment related to health and diseases.

This course introduces students to major topics that affect the health of women and their infants during pregnancy and the perinatal period. We will address issues relevant to both high and low-resource settings, but will pay particular attention to low-resource settings. The course covers pregnancy loss and pregnancy outcomes, chronic and infectious diseases during pregnancy, and key methodological issues when studying health outcomes during the perinatal period. The course will include course lectures, informal discussions with experts, and student-led discussions and journal clubs. Student will complete a course paper and brief presentation on a selected research topic. This course is open to masters and PhD students in any concentration or program who have taken an introductory epidemiology course such as PHP 2120 or PHP 2150, and, with instructor permission, to undergraduate students who have taken PHP 0850.

Spr PHP2220C S01 25699 W 3:00-5:30(10) (A. Bengtson)

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.

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 16725 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 16164 TTh 1:00-2:20(08) (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.

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.

Fall PHP2300 S01 17159 Th 4:00-6:30(04) (D. Operario)
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 aspects 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 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.
Spr PHP2380 S01 25703 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 16485 MTh 2:00-3:30 (C. Kahler)

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.
Spr PHP2400 S01 24967 F 1:00-3:30 (C. Koller)

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.

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 applications in medicine and health policy. After course completion, and methods and uses of systematic reviews and meta-analyses and their counseling patients or prioritizing future research. We focus on the synthesis methods are critical for formulating public health policy, 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 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.

The US spends more on pharmaceuticals than any other nation, reflecting higher use of medications and higher prices. US pharmaceutical firms are leaders in innovation and drug development. The purpose of this course is to provide an introduction to the study of the biopharmaceutical industry using an economic and policy analysis framework. This course is intended to broaden students’ understanding of the health policy process as it relates to pharmaceuticals. Students should have completed at least one year of biostatistics (PHP 2510 and PHP 2511) or equivalent coursework. Consent of the instructor may be sought as well.

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.
Spr PHP2440 S01 24970 T 9:30-12:00 (T. Shireman)

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.
PHP 2451. Exchange Scholar Program.
Fall PHP2451 S01 15328 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.

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 isa_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.
Spr PHP2455B S01 24973 M 1:00-3:30 (I. Dahabreh)

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 2465A. Introduction to Health Decision Analysis.
Many decisions in health are value-laden, involve competing objectives, or must be made under uncertainty. Health decision analysis is a structured approach to thinking through such decisional problems. This course introduces decision analysis and cost-effectiveness analysis for public health and clinical problems. It covers basic theory for decisionmaking; principles and techniques for mathematical modeling; and implementation, by analyzing archetypical decisional problems in health. Pre Requisites: Some facility with mathematical notation and basic concepts in probability (advanced undergraduate students can enroll after instructor approval). Recommended course: DATA 1010, MATH 1610, or APMA 1690.

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.
Spr PHP2480 S01 25409 F 3:00-5:30(15) (O. Galarraga)

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 regressor, 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 knowledge, skills and perspectives necessary to analyze data to answer public health questions. The year-long sequence focuses 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. Using lectures, labs and small group discussions, we focus on evaluating data sources, refining research questions, univariate and bivariate analyses, and presentation of initial results. Prerequisite: understanding of basic math concepts and terms. Enrollment limited to 50 students. Instructor permission required.
Fall PHP2507 S01 16166 W 6:30-8:00PM (A. Gjelsvik)
Fall PHP2507 S01 16166 Th 1:00-2:20 (A. Gjelsvik)
Fall PHP2507 L01 16167 Arranged (A. Gjelsvik)
Fall PHP2507 L02 16168 Arranged (A. Gjelsvik)
Fall PHP2507 L03 16169 Arranged (A. Gjelsvik)
Fall PHP2507 L04 16170 Arranged (A. Gjelsvik)

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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 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. This spring semester course
focuses on regression, interpretation of results, and communication
of results. Prerequisite: PHP 2507. Enrollment limited to 50. Instructor
permission required.

Spr PHP2508 S01 25410 W 6:30-8:00PM (A. Gjelsvik)
Spr PHP2508 S01 25410 Th 1:00-2:20 (A. Gjelsvik)
Spr PHP2508 L01 25411 Arranged (A. Gjelsvik)
Spr PHP2508 L02 25412 Arranged (A. Gjelsvik)
Spr PHP2508 L03 25413 Arranged (A. Gjelsvik)
Spr PHP2508 L04 25414 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 17016 TTh 9:00-10:20(02) 'To Be Arranged'

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 25791 MW 10:30-11:50 (A. Sullivan)

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.

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 16922 MW 9:00-10:20 (A. Sullivan)

PHP 2516. Applied Longitudinal Data Analysis.
This course provides a survey of longitudinal data analysis. Topics will
range from exploratory analysis, study design considerations, GLM for
longitudinal data, covariance structures, generalized linear models for
longitudinal data, marginal models and mixed effects. Data and examples
will come from medical/pharmaceutical applications, public health and
social sciences.
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. Students in this class will need an understanding of how
to work with Stata. Prereq is: PHP 2511 or PHP 2514; PHP 2508 with
Permission from Instructor.
Fall PHP2516 S01 16923 WF 1:00-2:20 (S. Chrysanthopoulou)

PHP 2517. Applied Multilevel Data Analysis.
This course provides a survey of multilevel data analysis. Topics will range
from structure of multilevel data, basic multilevel linear models, multilevel
GLM, Model testing and evaluation and missing data imputation.
Data and examples will be drawn from medical, public health and social
sciences. Students will be using real data throughout this course.
This course is designed for graduate and advanced undergraduate
students who will be analyzing data and want to develop a practical
hands on toolkit for multilevel analysis. Students in this class will need an
understanding of how to work with R. Prereq is: PHP 2511 OR PHP 2514;
PHP 2508 with Permission from Instructor.

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 16964 MW 9:30-10:20 (Z. Wu)

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.

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 16965 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 to 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  16171  W  1:00-4:00  (A. Sullivan)

PHP 2561. Methods in Informatics and Data Science for Health.
The goal of this course is for students to develop a solution that uses data science and informatics approaches to address a biomedical or health challenge. This course will teach informatics and data science skills needed for public health and biomedicine research. Emphasis will be given to 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. This course has been developed as a Course-based Undergraduate Research Experience (CURE), where students will gain experience with the scientific method, its application, and presentation.

PHP 2570. Health Data Science Case Studies.
This course is designed to introduce students to the practice of data science in health-related fields via presentation and in-depth discussion of case studies of current or recently completed projects. The case studies will be selected to highlight important areas of research and health policy analysis. It is intended for students with advanced training in data science methods and computing at the level of courses offered in the Biostatistics Masters Program. Prerequisites include PHP 2514, PHP 2515, PHP 2550 and PHP 2560, or equivalent, or instructor permission.

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.

PHP 2601. Linear Models.
This course will focus on the focus on the theory and application 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  16173  TTh  1:00-2:20(08)  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.
Fall PHP2602  S01  17014  TTh  2:30-3:50(03)  (J. Steingrimsson)

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.

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 a categorical outcome includes 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 or PHP 2580.
Fall PHP2610  S01  16174  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.

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 2720. Implementing Public Health Programs and Interventions in the Global South.
This course will focus on the theory and methods related to increasing the impact of evidence-based public health interventions and the effectiveness of healthcare delivery in diverse resource-limited settings across the globe. This course will focus on the influence of social, structural, political, and organizational processes on the development, adaptation, implementation, and evaluation of public health interventions in the Global South. We will review the emerging field of implementation science and critically analyze approaches for the evaluation of ongoing global public health programs. This course is required for students in the Global Public Health ScM program.
Prerequisites include: 1) Previous completion with a B grade of above in PHP 2710: Interdisciplinary Perspectives on Disability and Death in the Global South AND 2) Previous completion with a B grade or above in PHP 2120: Introduction to Methods in Epidemiologic Research or PHP 2150: Foundations in Epidemiologic Research Methods, AND 3) Previous completion with a B grade or above in PHP 2730: Including the Excluded: Global Health Ethics AND Written permission of the instructor is required for students not in the Global Public Health master’s program.

PHP 2730. 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.

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.

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 2981. Graduate Independent Study and Thesis Research (half-credit).
Half-credit independent study research course consisting of 90 credit hours of supervised independent work. Intended for master’s students. 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.
For graduate students who have met the residency requirement and are continuing research on a full time basis.

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<thead>
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<th>Term</th>
<th>Course Code</th>
<th>Section</th>
<th>CRN</th>
<th>Instructor</th>
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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.