POPULATION HEALTH, PH.D.

The Department of Population Health Sciences, part of the School of Medicine and Public Health, strives to provide leadership in the emerging, integrative field of population health. Its mission is to create, integrate, disseminate, and apply knowledge promoting the most efficient, equitable, and effective possible use of resources to maintain and improve the health of populations.

The department offers two graduate degree programs: an M.S. and a Ph.D. in population health and an M.S. and Ph.D. in epidemiology. Concentrations are available in epidemiology, health services research, social and behavioral health sciences, and clinical research.

The research-oriented degree programs are designed to provide rigorous, interdisciplinary training to develop students’ abilities to synthesize knowledge and skills needed to address today’s health-related problems. Methodological and analytical training is grounded in biostatistics, epidemiology, and health services research, but also emphasizes methods employed in the social sciences and econometrics that contribute to the study of health in populations. While the program is based on a sequence of core courses, students, in consultation with their major professor, have the flexibility to design advanced study and research that best prepares them for their chosen area of interest.

Individuals choose this program because of its innovative approach, strong research focus, and personal attention to students. It is an ideal option for those considering a broad array of fields including epidemiology, public health, health policy, health economics, health services research, environmental health, industrial engineering, demography, and more. UW–Madison ranks as one of the most prolific research universities in the world, consistently placing in the top five among American public universities for research expenditures. The program’s interdisciplinary focus allows students the flexibility to work with a wide array of research/faculty on campus. For instance, program faculty include members from a number of other departments such as business, family medicine, industrial engineering, law, medical history and bioethics, medicine, nursing, ophthalmology, public affairs, sociology, and veterinary medicine. The multidisciplinary faculty coupled with the diverse backgrounds of the students provides a rich and stimulating training environment.

Faculty, staff, and students in the Department of Population Health Sciences engage in a wide variety of epidemiological and health services world-class research projects to understand determinants of health and health problems in populations, to analyze public and clinical health policies, and to improve the effectiveness and efficiency of healthcare. Research topics may include (but are not limited to) chronic, infectious, and environmental disease epidemiology; public health; studies of medical outcomes; health economics; the determinants and measurement of population health status; and health administration and policy. These multidisciplinary research programs may include (but are not limited to) the study the effects and interactions of genetic traits; biologic and metabolic processes; pathogens; pollutants; lifestyles; behaviors; economic social and physical environments; and public health and health care systems on the health of populations. Methods employed involve developing and maintaining long term cohort studies, disease registries, population surveys, and retrospective analyses of large observational databases. Researchers in the department also work to advance methodology in health economics, population health evaluation, and statistical analyses.

For more information, see the graduate program Academic Guide (http://www.pophealth.wisc.edu/Current-Students/Policy-Procedures/Handbooks).

FUNDING

Students admitted to our degree programs are automatically considered for any available scholarships, traineeships, or graduate assistant positions in the department. The most common forms of funding support for our students are assistantships, traineeships, and fellowships.

REQUIREMENTS

MINIMUM DEGREE REQUIREMENTS AND SATISFACTORY PROGRESS

To make progress toward a graduate degree, students must meet the Graduate School Minimum Degree Requirements and Satisfactory Progress (http://guide.wisc.edu/graduate/#policiesandrequirementstext) in addition to the requirements of the program.

DOCTORAL DEGREES

Ph.D., with available named option in Epidemiology

MINIMUM GRADUATE DEGREE CREDIT REQUIREMENT

51 credits

MINIMUM GRADUATE RESIDENCE CREDIT REQUIREMENT

39 credits

MINIMUM GRADUATE COURSEWORK (50%) REQUIREMENT

100% of all coursework taken as a graduate student must be in graduate-level coursework; courses with the Graduate Level Coursework attribute are identified and searchable in the university's Course Guide (http://my.wisc.edu/CourseGuideRedirect/BrowseByTitle).

PRIOR COURSEWORK REQUIREMENTS: GRADUATE WORK FROM OTHER INSTITUTIONS

With program approval, students are allowed to count a maximum of 12 credits of graduate coursework taken from other institutions as a graduate student. coursework earned five or more years prior to admission to a doctoral degree is not allowed to satisfy requirements.

PRIOR COURSEWORK REQUIREMENTS: UW–MADISON UNDERGRADUATE

No credits from a UW–Madison undergraduate degree are allowed to count toward the degree.

PRIOR COURSEWORK REQUIREMENTS: UW–MADISON UNIVERSITY SPECIAL

With program approval, students are allowed to count no more than 12 credits of coursework numbered 300 or above taken as a UW–Madison...
University Special student. Coursework earned ten or more years prior to admission to a doctoral degree is not allowed to satisfy requirements.

CREDITS PER TERM ALLOWED
15 credits

PROGRAM-SPECIFIC COURSES REQUIRED

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>POP HLTH/B M I 451</td>
<td>Introduction to SAS Programming for Population Health</td>
<td>2</td>
</tr>
<tr>
<td>POP HLTH/B M I 551</td>
<td>Introduction to Biostatistics for Population Health</td>
<td>3</td>
</tr>
<tr>
<td>POP HLTH/B M I 552</td>
<td>Regression Methods for Population Health</td>
<td>3</td>
</tr>
<tr>
<td>POP HLTH/B M I 651</td>
<td>Advanced Regression Methods for Population Health</td>
<td>3</td>
</tr>
<tr>
<td>POP HLTH 795</td>
<td>Principles of Population Health Sciences</td>
<td>1-3</td>
</tr>
<tr>
<td>POP HLTH 796</td>
<td>Introduction to Health Services Research</td>
<td>3</td>
</tr>
<tr>
<td>POP HLTH/SOC 797</td>
<td>Introduction to Epidemiology</td>
<td>3</td>
</tr>
<tr>
<td>POP HLTH 798</td>
<td>Epidemiologic Methods</td>
<td>3</td>
</tr>
<tr>
<td>POP HLTH 820</td>
<td>Graduate Research Seminar</td>
<td>1</td>
</tr>
<tr>
<td>Select a minimum of 1 credit of medical ethics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POP HLTH 794</td>
<td>Biological Basis of Population Health</td>
<td>2</td>
</tr>
</tbody>
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1 Some students must complete this course.

DOCTORAL MINOR/BREADTH REQUIREMENTS

All doctoral students are required to complete a 10-credit minor.

OVERALL GRADUATE GPA REQUIREMENT

Students must maintain a cumulative GPA of at least 3.25 in all graduate work (including transfer credits) unless conditions for probationary status require higher grades. Students must also maintain a cumulative GPA of 3.25 or better in all coursework completed while enrolled in the population health graduate program. No grade of BC or lower in epidemiology required courses will be accepted for the degree.

OTHER GRADE REQUIREMENTS

Maintain no more than 6 credits ofIncomplete (I) grades during any semester.

PROBATION POLICY

A student not meeting guidelines for satisfactory progress will be placed on probation for one semester and will be reviewed by the steering committee following the probationary semester. Students may be dropped or allowed to continue by the committee based on review of progress during the probationary semester.

ADVISOR / COMMITTEE

All students will have a hold placed on their registration each semester. Students must meet with their advisor once each semester for academic advising to have the hold removed.

ASSESSMENTS AND EXAMINATIONS

Full-time students have up until the end of their third year to pass the qualifying exam and their first sitting must occur no later than the end of their second year. Part-time students are expected to pass the exam before the end of their fourth year (regardless of whether the student is continuously enrolled) and their first sitting must occur no later than the end of their third year.

TIME CONSTRAINTS

Dissertation required. Doctoral students have a maximum of five years from the date of passing the preliminary examination to take the final oral examination and deposit the dissertation.

Doctoral degree students who have been absent for five or more consecutive years lose all credits that they have earned before their absence.

LANGUAGE REQUIREMENTS

No language requirements.

ADMISSIONS

Applications are welcome from students with diverse academic backgrounds. Students with strong academic preparation in the biological/medical sciences, quantitative analysis, and/or population health related social sciences are strongly encouraged to apply. Historically, many applicants who have succeeded in our program have come to the program with backgrounds in fields as diverse as microbiology, genetics, nutritional sciences, medicine, nursing, pharmacy, veterinary medicine, environmental sciences, political sciences, business, sociology, education, engineering, psychology, and economics.

Minimum requirements are:

1. Applicants must have an undergraduate degree with a grade point average of 3.0 (on a 4.0 scale), although successful applicants generally have GPAs above 3.0.
2. GRE are required for admission. The scores must be no more than five years old at the time of application. For applicants who have completed a doctoral degree, GRE scores are preferred but the program will accept scores for the entrance exam required for the doctoral degree (e.g., MCAT, LSAT). Students should contact the graduate program coordinator to find out if their scores are competitive.
3. Applicants whose native language or language of study is not English must submit official TOEFL scores. Scores must be no more than five years old at the start of the semester for which an applicant is applying. Further details are available on the Graduate School website (http://grad.wisc.edu/admissions/requirements). Note that the minimum test scores for the program are higher than those required by the Graduate School. For the Test of English as a Foreign Language, TOEFL (http://www.toefl.org), a minimum score of 580 (written), 237 (computer-based), or 92 (Internet-based) or above is absolutely required.
4. At least one semester of advanced quantitative preparation (calculus is strongly preferred) with a grade of B or better.
5. A personal statement and three letter of recommendation are required.
6. Applicants must meet both the above departmental admission requirements and the Graduate School admission requirements.

Upon entry to the graduate programs, students are matched with a faculty advisor. Faculty advisors helps students hone their interests, assists with identifying research projects, provide support for career
LEARNING OUTCOMES

KNOWLEDGE AND SKILLS

HEALTH SERVICES RESEARCH

• Understand and apply principles of population health science in characterizing: a) the multiple determinants of health; and b) the allocation of resources across those determinants and its influence on health and health disparities.

• Understand and apply principles of microeconomic theory relating to human and institutional decisions in the allocation of scarce resources for the production of health at individual, system and population levels.

• Understand and apply the principles of health outcomes measurement and its role in the design of health services, policy, intervention and evaluation.

• Understand and apply the methods of econometric analysis in relating models of economic behavior, processes and interventions to the utilization and cost of health services and/or the production of health.

• Describe the historical and current organization, delivery and financing of health care services in the United States.

• Describe the historical and current role of government in the regulation, provision and financing of health care services in the United States.

• Describe the role of social institutions, culture and behavior on the production of health at individual, system and population levels.

• Apply economic principles to describe, predict and evaluate the impact of government policy on the production of health and health care.

• Understand advantages and disadvantages of experimental, quasi-experimental and observational study designs for the evaluation of interventions, policies and processes that affect utilization and cost of health services and/or the production of health.

• Have a working knowledge of the availability, use, advantages and limitations of various sources of publicly available and/or electronically captured data on health care utilization and outcomes, including but not limited to: major surveys of healthcare utilization, electronic medical records and administrative claims datasets.

BIOSTATISTICS

• Be thoroughly familiar with how to organize and manipulate data and perform basic statistical analyses in at least one major statistical software package (SAS, Stata, or R, perhaps SPSS is sufficient for some).

• Be familiar with the basic concepts of probability, random variation and commonly used statistical probability distributions and their applications in health research.

• Understand the foundations of statistical inference such as parameters, estimators, hypothesis tests and confidence intervals.

• Be able to describe samples appropriately, using measures of central tendency and dispersion.

• Know and assess assumptions and types of data needed for different common approaches to compare samples and be able to conduct and interpret these comparisons.

• Fit and interpret the results from linear, logistic and Cox regression models (including logistic models with multiple outcome categories and those for case-control data).

• Understand and be able to assess the assumptions of linear, logistic and Cox models.

• Explain the results of the above statistical analyses in subject matter terms to researchers and health professionals.

• Understand how measures of association, risk and rate learned in epi courses relate to estimators arising from the above models.

• Apply the concepts of intermediate variables, confounding variables, and interacting variables in the process of variable selection and model building.

• Possess a high level of comfort in analyzing real data.

• Possess a high level of facility in interpreting results from regression analysis.

• Understanding some of the theoretical underpinnings of statistics —especially as needed to read articles from statistical journals and software manuals and apply new methods.

• Know how to analyze longitudinal and other correlated (hierarchical) data as well as survival data, be able to interpret results and assess assumptions.

• Master at greater depth the aspects of above that apply to the dissertation.

• Master additional areas of statistics that apply to the dissertation.

EPIDEMIOLOGY

• Have basic knowledge of human physiology and pathophysiology, with special competence in the aspects of health addressed in the student’s thesis or dissertation.

• Know the methods and measures of descriptive epidemiology, including case definition, calculation of the primary measures of disease morbidity and mortality, and appropriate comparisons by person, place and time.

• Be familiar with major disease categories and leading causes of death, their general pathophysiology, descriptive epidemiology & risk factors, and with the multiple determinants of health, including social, behavioral and other influences on the health of individuals and populations.

• Understand the concepts and practical implications of random and systematic errors (i.e. sampling error and bias: information, selection and confounding bias) as they apply to causal inferences in observational studies.

• Understand the concepts and practical implications of interaction, effect modification, and mediation of causal effects in observational studies.

• Identify the basic study designs used in epidemiologic research and know the advantages and disadvantages of each (including cross-sectional, case-control, cohort, and randomized trials).

• Understand principles of causal inference in epidemiologic studies and be able to critique, use or discuss them in the context of evaluating evidence. This includes application of the counterfactual model in estimation of causal effects and the ability to explain
assumptions needed for valid estimation of causal effects in epidemiologic studies.

• Be familiar with publicly available national and international data sources and resources, and know how to start accessing them.

• Read and critique studies with respect to most common biases (confounding, selection bias, and information bias), as well as role of random error, and interpretation of results.

• Synthesize available information by searching, review and critically evaluating the literature.

• Have in depth knowledge of at least one health condition, disease or risk factor area.

• Have in depth understanding of at least one methodological issue that arises in epidemiologic research.

• Know the uses and principles of screening, including the concepts of validity and reliability of screening tests and be able to calculate and interpret associated measures.

• Know the uses and principles of public health surveillance and the types of surveillance systems and approaches used in disease surveillance.

• Understand the global, cultural, and social context of health problems and how these influence the conduct, interpretation, and dissemination of research.

• Understand and apply the concepts of human subjects protections and confidentiality, and awareness of particular issues relevant to the study of specific populations.

• Understand and adhere to the principles of communicating epidemiologic research methods and results honestly and with integrity.

• Explain the importance of epidemiology for informing scientific, ethical, economic and political discussion of health issues.

• Relative to #6 above, have a more in-depth knowledge of study designs used in epidemiologic research (including cross-sectional studies, case-control studies, cohort studies, and randomized trials).

• Be able to identify meaningful gaps in knowledge.

• Formulate an original, key hypothesis or statement of a research problem.

• Design a study using any relevant study design (including clinical trial, community trial) OR one based on creative use of existing data. Understand the advantages and limitations of each design for addressing specific problems, as well as practical aspects of their uses, including trade-offs.

• In addition to item 9 above, be able to identify and minimize sources of bias in the chosen study design; describe both the direction and magnitude of the bias and the effect of potential biases on the measures of association.

• Understand the basics of population sampling methods.

• Assess validity of data collection tools for both exposures and outcomes; and the presence, magnitude and impact of measurement error.

• Interpret research results, and recognize their implications for future research needs and for population health and health policy.

• Communicate research results orally and in writing to both scientists and non-scientists.

• Demonstrate mastery of a substantive area, including knowledge and application of that knowledge in conducting original research related to a specific topic.


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**PROFESSIONAL CONDUCT**

• Recognizes and applies principles of ethical and professional conduct as they apply to Population Health Sciences.

**PEOPLE**

**Faculty:** Professors Nieto (chair), Cruickshanks, Durkin, Kanarek, Mullahy, Oliver, Palta, Patz, Remington, M. Smith, Wolfe, Young; Associate Professors Astor, Bautista, Engelman, Gangnon, Jacobs, Martinez-Donate, Olson, Peppard, Sethi, Si, Timberlake, Trentham-Dietz, Vanness; Assistant Professors M. Burns, DuGoff, Malecki, Pillai; CHS Professor Brokopp