Epidemiology, Ph.D.

Epidemiology is the scientific discipline primarily concerned with identifying the distribution and causes of disease in populations. It encompasses a rich methodology including observational and experimental study designs, statistical methods, an understanding of pathogens, environmental and behavioral risk factors, and human biology. Epidemiological methods have evolved to meet threats of global infectious diseases and the complex health challenges presented by an aging population, as well as to capitalize on the expanding understanding of human genetics. As the fundamental discipline of public health, epidemiology provides essential knowledge to design, implement, and assess approaches to effectively prevent disease and improve quality of life in the population.

The research-oriented degree programs are designed to provide rigorous training to develop students’ abilities to synthesize knowledge and skills needed to address today’s health-related problems. 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. The interdisciplinary focus allows students the flexibility to work with a wide array of research/faculty on campus.

The department offers two graduate degree programs: an M.S. and a Ph.D. in epidemiology and an M.S. and Ph.D. in population health. While the program is based on a sequence of core courses, students, in consultation with their major professor, have some flexibility to design advanced study and research that best prepares them for their chosen area of interest.

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.

Minimum graduate degree credit requirement

65 credits

Minimum graduate residence credit requirement

53 credits

Minimum graduate coursework (50%) requirement

100% of all coursework taken as a graduate student in any of the four degrees the program offers must be completed 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/B M I 652</td>
<td>Topics in Biostatistics for Epidemiology</td>
<td>1-3</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 805</td>
<td>Advanced Epidemiology. Causal Inference in Epidemiological Studies</td>
<td>3</td>
</tr>
<tr>
<td>POP HLTH 806</td>
<td>Advanced Epidemiology. Practice of Epidemiology</td>
<td>3</td>
</tr>
<tr>
<td>POP HLTH 820</td>
<td>Graduate Research Seminar</td>
<td>1</td>
</tr>
</tbody>
</table>

Select a minimum of 1 credit of medical ethics

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 of Incomplete (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.

**LEARNING OUTCOMES**

**KNOWLEDGE AND SKILLS**

- Complete course work or equivalent in human physiology and pathophysiology, with special competence in the disease addressed in the student’s dissertation.
- Produce the descriptive epidemiology of a given condition, including case definition, calculation of the primary measures of disease morbidity and mortality, and appropriate comparisons by person, place and time.
- List the strengths and limitations of descriptive studies.
- Identify data from existing national and international sources.
- Identify major chronic and infectious diseases, their general pathophysiology, descriptive epidemiology and risk factors.
- Identify leading causes of death.
- Understand the general history of the development of epidemiology, including the major epidemiological studies of selected diseases.
- Know the principles of screening and of surveillance systems, including understand the concepts of validity and reliability of screening tests and be able to calculate associated measures and know 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 and intervention studies.
- Search, review and critically evaluate the literature.
- Synthesize available information.
- Identify meaningful gaps in knowledge.
- Formulate an original and key hypothesis or statement of the research problem.
- Design a study using any of the main study designs (including clinical trials and community trials).
• Understand the advantages and limitations of each design for addressing specific problems, as well as practical aspects of their uses, including trade-offs.
• Calculate the requisite sample size.
• Identify and minimize sources of bias; describe both the direction and magnitude of the bias and the effect of potential biases on the measures of association.
• Use basic population sampling methods.
• Use methods of measurement design data collection forms assessing both exposures and outcomes; determine the validity of the instrument; identify the presence and magnitude of measurement error; adjust for measurement error when appropriate data are available.
• Monitor the conduct and progress of data collection; develop, implement and assess quality control measures.
• Create data files appropriate for analysis; carry out the steps needed to create new variables, clean the data sets, etc.
• Use statistical computer packages to calculate and display descriptive statistics, analyze categorical data, and perform multivariable regression, survival analysis, and longitudinal analysis.
• Examine data for the presence of confounding and interaction (effect modification), identify their presence, and manage them appropriately.
• Interpret the research results, make appropriate inferences based on results, and recognize the implications of the research results.
• Communicate research results orally and in writing to both scientists and non-scientists.
• Present research data in both tabular and figure forms.
• Understand the concepts of human subjects protections and confidentiality, and awareness of particular issues relevant to the study of specific populations.
• Apply this understanding as evidenced in the design and conduct of their research.
• Demonstrate mastery of a substantive area, including knowledge and application of that knowledge in conducting original research related to a specific topic.
• 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.

PROFESSIONAL CONDUCT

• Recognizes and applies principles of ethical and professional conduct as they apply to Epidemiology.

PEOPLE

Faculty: Professors Nieto (chair), Cruickshanks, Durkin, Kanarek, Palta, Patz, Remington, Young; Associate Professors Astor, Bautista, Engleman, Gangnon, Martinez-Donate, Peppard, Sethi, Trentham-Dietz; Assistant Professor Malecki; CHS Professor Brokopp