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## Doctor of Philosophy in Public Health Sciences Specialization in Epidemiology

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Website: <http://louisville.edu/sphis/deph/academics.html>

### **Introduction**

The specialization in epidemiology in the Ph.D. program in public health sciences is designed to develop academic researchers in population-based epidemiology.

### **Competencies**

To graduate, students in the Ph.D. specialization in epidemiology must demonstrate the following competencies *in addition to those for the M.S. degree*:

- In depth knowledge of the history and philosophy of epidemiology
- Mastery of experimental and observational study designs and the ability to identify optimal designs for specific hypotheses
- Ability to develop and apply:
  - Questionnaires
  - Biomarkers for health status, exposure and susceptibility
- Mastery of multivariable analytic methods for evaluating risk and prognosis
- Ability to critically evaluate the published epidemiologic research
- Expertise in one or more epidemiologic specialties such as nutritional, molecular, clinical, genetic, cancer, or chronic disease epidemiology
- Practical knowledge of issues in research management including:
  - Formation and leadership of multidisciplinary teams
  - Staffing, budgeting, tracking
  - Subject recruitment and retention
  - Data quality control and data safety management
  - Funding mechanisms and grantsmanship
  - Research ethics and regulations
- Professional quality peer-review, oral and poster presentation, report, grant, and manuscript writing
- Mentoring of junior peers
- Development, conduct, completion and defense of a dissertation on an original research project

Competencies are demonstrated by passage of the proficiency and candidacy examinations, by successful mentoring of master's students or doctoral students not yet in candidacy, and by successful completion and defense of the dissertation.

### **Admission**

Students who have satisfactorily completed the M.S. degree in epidemiology are eligible for the Ph.D. specialization in epidemiology. Students with a master's degree in a related discipline or an advanced degree (for example, M.D., Ph.D., D.O.) may be accepted also pending evaluation of appropriate training, experience, and coursework. Previous coursework in mathematics and/or statistics and biological or health sciences (for example, biology, biochemistry, anatomy, physiology, microbiology) is strongly recommended. Students completing the M.Sc. in clinical investigation sciences or MPH with an epidemiology specialization may be required to complete additional coursework to be accepted into the epidemiology Ph.D. specialization.

### **Curriculum**

#### ***Faculty Advisor***

Upon admission to the specialization, each student is assigned a faculty advisor who works with the student to develop a program of study.

#### ***Program of Study***

The program of study recognizes core elements of modern epidemiology as well as its breadth and multidisciplinary nature. This requires the selection of a minor field of specialization, such as biostatistics, environmental science, molecular genetics, behavioral science, health management and systems sciences, clinical research, or another relevant area of study, and the completion of at least 6 credit-hours of coursework in this field.

#### ***Degree Requirements***

The emphasis in doctoral training goes beyond accumulating course credit. The coursework is organized into two blocks of 25/26 and 24 credit-hours. Completion of the first block of coursework is prerequisite for sitting for the proficiency examination. After passing the proficiency examination, the student can proceed with the second block of coursework. Successful completion of the second block is prerequisite to sitting for the candidacy examination. After passing the candidacy examination, the student is admitted to doctoral candidacy. A doctoral candidate must then successfully develop and defend a dissertation proposal that describes an original and independent research project. Upon successful defense of the proposal, the student may then proceed to dissertation research. Upon successful completion of the research, oral defense of the dissertation, and demonstration of the required competencies listed above, the student is awarded the Ph.D. degree.

The Ph.D. specialization in epidemiology is designed to consist of 49 to 50 credit-hours of coursework over a minimum of two years plus one to four years for completion of the dissertation. The coursework outlined below represents an ideal sequence for a full-time student. A part-time student may need to deviate from this sequence. As part of the first block, a student is expected to complete required courses in basic and advanced epidemiologic methods that cover core areas including study design, research management, and statistical analysis; the

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survey course in disease biology and pathophysiology; and a minimum of 6 credit-hours of epidemiology seminars. The student must pass the proficiency examination before proceeding to minor electives and individual studies in the second block, which must include an additional 3 credit-hours of epidemiology seminars. Exceptions may be granted upon approval by the student's advisor and the department chair.

Coursework

49 to 50 total credit hours (beyond admission requirements) consisting of the following:

- 23 credit-hours of required courses
- 9 credit-hours of seminars in epidemiology
- 14-15 total credit-hours of electives:
  - 8-9 credit-hours of epidemiology electives
  - 6 credit-hours of epidemiology or biostatistics electives
  - 3 credit-hours of mentored independent study in epidemiology

<i>Required Coursework</i>			
<i>Semester</i>	<i>Course #</i>	<i>Course Title</i>	<i>Credit-Hours</i>
Block 1			
Fall I	PHEP-621	Statistical Foundations for Epidemiology	3
	PHEP-648	Data Management and Analysis for Epidemiology I	1
	PHEP-623	Theoretical Foundations of Epidemiology	3
	PHEP-XXX	<i>Content Course Elective*</i>	3
	PHEP-750	Seminars in Epidemiology	3
	Semester total		
Spring I	PHEP-618	Epidemiology Methods II	3
	PHEP-649	Data Management and Analysis for Epidemiology II	1
	PHEP-XXX	<i>Content Course Elective*</i>	2 to 3
	PHEP-622	Population Pathology	3
	PHEP-750	Seminars in Epidemiology	3
	Semester total		
Block 1 total			25 <sup>1</sup> to 26

<i>Required Coursework</i>			
<i>Semester</i>	<i>Course #</i>	<i>Course Title</i>	<i>Credit-Hours</i>
Block 2			
Fall II	PHEP-701	Advanced Epidemiologic Methods	3
	PHEP-702	Epidemiologic Research Management	3
	PHEP-XXX -OR- PHST-XXX	<i>Content Course Elective*</i> -OR- <i>Biostatistics Elective**</i> - depending upon program of study	3
	PHEP-750	Seminars in Epidemiology	3
	Semester total		12
Spring II	PHEP-XXX -OR- PHST- XXX	<i>Content Course Elective*</i> -OR- <i>Biostatistics Elective**</i> depending upon program of study	3 to 6
	PHEP-XXX	<i>Content Course Elective*</i>	3
	PHEP-778	Doctoral Independent Study in Epidemiology and Population Health	3 to 6
		Semester total	
Block 2 Total			24
Degree Total			49 <sup>2</sup> to 50

***Note that students who have completed the MS degree and have been accepted to the PhD program will advance to Block 2 of the PhD curriculum upon matriculation.***

\**Content Course Electives* consist of courses specialized in either an exposure or disease category and offerings will vary from semester to semester based upon faculty workloads and student programs of study.

\*\* *Biostatistics Electives* for PhD students should be restricted to advanced courses such as Categorical Data Analysis, Survival Analysis, Longitudinal Data Analysis, Bioinformatics, etc.

<sup>1</sup>A minimum of 25 credits of coursework is required before taking the Proficiency Exam.

<sup>2</sup>A minimum of 49 credits of coursework is required before taking the Candidacy Exam.

*Minor Elective Requirement*

As a part of the approved program of study, the student is required to complete 6 credit-hours of coursework in a minor field of specialization. Areas directly relevant to the science of epidemiology are preferred, including, but not limited to, biostatistics, bioinformatics, medical

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geography, molecular or population genetics, environmental health, toxicology, microbiology, health management, health promotion and behavioral science, and clinical research. These courses may be selected from ones offered within the school, other departments within the university, or from sources outside the university with permission and acceptance of credit by the school and university.

Minor courses should be chosen by the student in consultation with his or her advisor and the respective course directors. Students may petition to take courses not on this list with approval of the instructor, program director, and the chair of the Department of Epidemiology and Population Health. The student must provide a written rationale for the choice of minor coursework in the program of study. The following is a partial list of approved minor courses. Some courses may have prerequisites, and the student is expected to either meet these or obtain permission from the instructor before registering.

<i>Approved Electives for Minor Requirement</i>		
<i>Course #</i>	<i>Course Title</i>	<i>Credit-Hours</i>
PHPH-610	New Drug and Device Development	2
PHPH-632	Ethical Conduct of Health Care Research	2
PHEH-650	Advanced Topics in Environmental and Occupational Health	3
PHMS-650	Advanced Topics in Health Management and Systems Science	3
PHPB-650	Advanced Topics in Health Promotion and Behavioral Science	1-3
PHST-624	Clinical Trials I	2
PHST-625	Clinical Trials II	2
PHST-650	Advanced Topics in Biostatistics	3
PHST-680	Biostatistical Methods I	3
PHST-681	Biostatistical Methods II	3
PHST-661	Probability	3
PHST-662	Mathematical Statistics	3
PHST-683	Survival Analysis	3
PHST-682	Multivariate Statistical Analysis	3
PHST-684	Categorical Data Analysis	3
PHST-750	Statistics for Bioinformatics	3
PHST-751	High-throughput Data Analysis	3
PHST-785	Nonlinear Regression	3

*Proficiency Examination*

Upon successful completion of the first block of required coursework, the student is eligible to sit for the written proficiency examination, which is administered by a committee of departmental faculty appointed by the chair. The timing of the proficiency examination is determined by the student's faculty advisor and the department chair. The subject matter includes basic knowledge of disease biology and pathophysiology; theory and skills in epidemiologic research methods, including study design and management; and quantitative analytic methods. A student who does not successfully pass the proficiency examination is allowed a second

opportunity to pass the exam. Failing the proficiency examination the second time results in dismissal from the program.

### Candidacy Examination

After passing the proficiency examination and upon completion of the second block of coursework, the student is eligible to sit for the written and oral candidacy examination, which is administered by a committee appointed by the department chair and composed of graduate faculty. The subject matter includes knowledge of advanced epidemiologic methods; specialized knowledge pertaining to the minor field of specialization; disease biology and pathophysiology, which may be tailored to the student's special area of interest; and knowledge of the research process. Successful passage of the candidacy examination admits the student to doctoral candidacy. A student who does not successfully pass the candidacy examination may be required to take additional or remedial coursework and is allowed a second opportunity to pass the exam. Failing the candidacy examination the second time results in dismissal from the program.

### Dissertation

A dissertation is required of every candidate for the degree of doctor of philosophy in public health sciences with a specialization in epidemiology. The dissertation is a scholarly achievement in research and presents an original contribution to knowledge. It should demonstrate a thorough understanding of research techniques in epidemiology and the ability to conduct independent research. The following sections summarize the basic requirements for the dissertation committee, dissertation proposal, and defense. Additional details are available in the department's document "Student Advising, Thesis and Dissertation Committees."

### *Dissertation Committee*

The dissertation is read by a dissertation committee, chaired by the student's faculty advisor and appointed by the dean of the school on the recommendation of the program director and chair of the department. The committee consists of at least four members and must include one representative of an allied department. The dissertation must be approved by the committee and the chair of the department.

### *Dissertation Proposal*

After successful completion of the qualifying examination, a doctoral candidate must submit a written dissertation proposal to the members of the dissertation committee. The candidate is then orally examined on the dissertation proposal.

### *Dissertation Preparation*

The dissertation is prepared with the format and binding according to the guidelines of the School of Interdisciplinary and Graduate Studies, available at <http://louisville.edu/graduate/current-students/thesis-dissertation-information>.

### *Dissertation Approval*

The dissertation is submitted in completed form to the chair of the department at least thirty days before the end of the term in which the candidate expects to be graduated, and the candidate is not eligible for final examination until the dissertation has been received by the committee and chair.

The dissertation committee schedules an oral defense by the candidate. The time and place for the defense is published to the general academic community, members of which are free to attend the defense. The dissertation is approved by a majority vote of the committee and the concurrence of the department chair.

### *Dissertation Submission*

The following steps must be taken to submit the final copy of the dissertation electronically after oral defense and approval of the committee:

1. Final document must be converted to a PDF (following the guidelines as noted above) and sent to SIGS and the department's administrative assistant.
2. Submit as advised by the School of Interdisciplinary and Graduate Studies through the ThinkIR repository. [Click here to download instructions on this process.](#)
3. The signature page within the electronic version must have the names of your committee members typed under the signature line; the signatures cannot be scanned into the document.
4. Submit a signed signature page on white paper, with original signatures, to the School of Interdisciplinary and Graduate Studies, attention Courtney Kerr.

A copy of the final, signed dissertation must also be deposited with the department office.

### **Accreditation**

The School of Public Health and Information Sciences is accredited by the Council on Education for Public Health (CEPH).

The University of Louisville is accredited by the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC).

For more information, see the [School's accreditation webpage](http://louisville.edu/sphis/accreditation) (<http://louisville.edu/sphis/accreditation>).

***Program Data and History***

<b>Program Data</b>	
<b>Name</b>	Doctor of Philosophy in Public Health Sciences, Specialization in Epidemiology
<b>Degree</b>	Ph.D.
<b>Department</b>	Epidemiology and Population Health
<b>Unit</b>	School of Public Health and Information Sciences
<b>Version</b>	2010.06.03-08

<b>Program History</b>				
<b>Version</b>	<b>Submitted</b>	<b>Approved</b>	<b>Change Summary</b>	<b>Author(s)</b>
2006.10.11	09/20/06	10/24/06	<ul style="list-style-type: none"> <li>Initial program and curriculum.</li> </ul>	
2006.10.11-01	07/18/07	07/18/07	<ul style="list-style-type: none"> <li>Changed course prefix to PHPB from PKHC.</li> </ul>	
2006.10.11-02	07/20/07	07/20/07	<ul style="list-style-type: none"> <li>Reformatted and reorganized to match template.</li> <li>Expanded dissertation section.</li> </ul>	
2008.05.14	05/27/08	06/24/08	<ul style="list-style-type: none"> <li>Revised required coursework.</li> <li>Divided coursework into two blocks.</li> <li>Expanded list of approved minor electives.</li> <li>Added proficiency exam.</li> <li>Revised description of candidacy exam.</li> <li>Edited to meet university styleguide.</li> </ul>	
2008.05.14-01	08/10/09	08/10/09	<ul style="list-style-type: none"> <li>Edited to change to SIGS and meet styleguide and policies.</li> </ul>	
2010.06.03	07/22/10	07/29/10	<ul style="list-style-type: none"> <li>Added PHEP-648 and -649 as required coursework.</li> <li>Increased required credit hours to 50 from 48.</li> <li>Expanded fall I and spring I electives to either epidemiology or biostatistics from epidemiology only.</li> </ul>	
2010.06.03-01	09/02/10	09/02/10	<ul style="list-style-type: none"> <li>Fixed course ID type in Spring 1 (PHEP-648 → PHEP-649)</li> </ul>	
2010.06.03-02	06/04/13	06/04/13	<ul style="list-style-type: none"> <li>Updated administrative assistant</li> <li>Changed PHBI course identifier to PHST</li> <li>Deleted PHCI-501</li> <li>Changed “concentration” to “specialization”</li> </ul>	Ms. Tammi Thomas
2010.06.03-03	08/05/14	07/08/15	<ul style="list-style-type: none"> <li>Replaced PHEP-619 with PHEP-622</li> </ul>	Jack Barnette
	07/08/15		<ul style="list-style-type: none"> <li>Added accreditation section</li> </ul>	Dr. Peter L. Walton
2010.06.03-04	02/11/16	2/26/2016	<ul style="list-style-type: none"> <li>Updated Thesis Distribution information and link to SIGS dissertation guidelines.</li> </ul>	C. Winton Reynolds
2010.06.03-05	4/29/2016	4/29/2016	<ul style="list-style-type: none"> <li>Updated PHCI prefix courses in electives. Prefix is obsolete.</li> </ul>	C. Winton Reynolds
2010.06.03-06	8/2/16	1/31/2018	<ul style="list-style-type: none"> <li>Updated list of elective courses to correspond to changes in the online catalog</li> <li>Changed course name for PHEP-778</li> </ul>	C. Winton Reynolds
2010.06.03-07	7/16/15	[July 2015?]	<ul style="list-style-type: none"> <li>Updates to curriculum implemented Fall 2015 (minutes from July AA/CC meeting missing).</li> <li>Deleted all non-SPHIS recommended electives</li> </ul>	Richard Baumgartner
2010.06.03-08	3/15/19	4/1/19	<ul style="list-style-type: none"> <li>Removed PHEP 703 from required coursework and increase elective or independent study credits accordingly</li> <li>Approved by SPHIS: 3/25/19</li> <li>Approved by Provosts’ Office: 4/1/19</li> </ul>	Richard Baumgartner