

Doctor of Philosophy in Epidemiology  
Assessment Plan

Division of Epidemiology & Biostatistics  
Department of Environmental Health  
College of Medicine

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## I. Program Outcomes

*Please include in this section your program learning outcomes as they are listed in the P-1 form in eCurriculum. If you are already planning to revise those program learning outcomes, indicate in this section which ones might be changed, and what the new program learning outcomes are likely to be. In general, learning outcomes should be measurable, assessable, or observable in some way and aligned with national standards.*

A brief summary of this graduate program is presented below. The purpose is to provide an overall perspective on the Doctor of Philosophy in Epidemiology program in the Department of Environmental Health, Division of Epidemiology and Biostatistics. While the Master's and Doctoral programs are similar in a number of respects, we regard the Master's program as an apprenticeship to the field as research support staff and the Doctoral program as an induction into the field as an expert and independent investigator who can plan and manage large-scale human clinical studies.

Epidemiology is defined as the study of the distribution and determinants of disease, disability and injury within human populations. The goals of the epidemiologist are to identify the factors or agents that are linked with objectively measured patterns of harm; to advance and evaluate methods of disease prevention; and to aid in planning and evaluation of the effectiveness of programs that advance public health. The results of epidemiological research have had a great influence on clinical medicine. The training program in Epidemiology stresses environmental, clinical, molecular, genetic, quantitative, and community epidemiology. Students are provided with the tools to plan and execute observational and interventional studies of various designs as well as analyze and interpret the results of their investigations. Students also have the opportunity to take courses in many of the various subspecialties of epidemiology such as cancer, cardiovascular, infectious disease, pharmacological, pediatric, and neurological. Courses are also available in other departments in the College of Medicine that can provide students with a further understanding of the basic biological processes underlying human disease. Students are strongly encouraged to apply their training to ongoing research projects conducted by departmental faculty, faculty from other clinical departments in the College of Medicine, and clinical researchers working in affiliated health care institutions such as the Children's Hospital Medical Center and the Veteran's Administration Medical Center. The PhD program requires that students propose and execute original studies that test hypotheses concerning risk factors for disease and/or approaches to disease prevention.

The epidemiology and biostatistics programs are closely linked, with faculty and students working together on interdisciplinary research activities. Current research undertaken in the Division is wide ranging and includes health effects related to exposures to lead, arsenic, manganese, mercury, solvents, fuels, pesticides, organochlorines and other persistent organic pollutants, fibers, radiation, statistical issues in regulatory toxicology, alcohol and illicit drugs, and work-related ergonomic disorders. The health outcomes being studied include: *allergy, asthma, reproductive, hormone, many types of cancer, genetics of complex diseases, growth and development, neurological and psychiatric disorders, pulmonary disease, injuries, stroke, heart disease, bone health, mortality and exposure body burden*. All classical study designs are currently utilized by our faculty and students including randomized clinical trials, longitudinal studies, environmental intervention approaches, retrospective cohort, cross-sectional and case-control methodologies.

As stated in our P-1 form in eCurriculum, the program learning outcomes for the PhD in Epidemiology are:

- Understanding of responsible conduct of research according to NIH standards.
- Knowledge in clinical epidemiology, genetic epidemiology, quantitative genetics, clinical

effectiveness, general biostatistics, molecular epidemiology, and clinical trials.

- Ability to be a critical consumer of the medical, epidemiological, and biostatistical literature.
- Understanding of biostatistical methods in terms of the ability to successfully execute, interpret, and communicate analyses of complex data on human health.
- Ability to develop research hypotheses, specific aims, and the methodology to conduct patient-oriented research.
- Ability to apply contemporary research tools in biology, medicine, and biostatistics to clinically relevant areas of investigation.

## II. Curriculum/Program Map

*Please include in this section a grid that identifies connections that exist between required courses in this program and the corresponding program-level learning outcomes. In other words: how will program outcomes be met? This grid should further indicate the expected levels of learning at each level (whether emerging, developing, or achieved). The CET&L web site includes templates that you might find useful in completed this grid.*

Program learning outcome	Required courses & experiences												
	BE-8028/8029	ENV-7001/7002	BE-7022	BE-7078C	BE-7076	BE-7067/ GNTD-7003	BE-9073C	BE-9075	BE-7097/ BE-7061	BE-7088	TOX-7082	BE-7089	ENV-9091
	Epi/Biostats Seminar	Environmental Health Seminar	Intro to Biostatistics	Intro to SAS Programming	Intro to Epidemiology	Ethics in Research/ Scientific Integrity	Molecular Epidemiology	Design & Management of Field Studies	Categorical Data Anlys/ Biostats in Research	Regression Analysis	Survey of Toxicology	Experimental Design	PhD Dissertation Research
Understanding of responsible conduct of research according to NIH standards.	E	E			E	E D A	E D	E D A					A
Knowledge in clinical epidemiology, genetic epidemiology, quantitative genetics, clinical effectiveness, general biostatistics, molecular epidemiology, and clinical trials.	E	E	E D		E D		E D A	E D A		D A	E D	D A	D A
Ability to be a critical consumer of the medical, epidemiological, and biostatistical literature.	E	E	E D	E D	E D		E D A	E D A	D A	D A	E D	D A	A
Understanding of biostatistical methods in terms of the ability to successfully execute, interpret, and communicate analyses of complex data on human health.	E	E	E D	E D A	E D		E D	E D A	D A	D A		D A	D A
Ability to develop research hypotheses, specific aims, and the methodology to conduct patient-oriented research.	E	E	E D		E D		E D	E D A	D A	D A		D A	A
Ability to apply contemporary research tools in biology, medicine, and biostatistics to clinically relevant areas of investigation.	E	E	E D	E D	E D		E D A	E D A	D A	D A	E D	D A	D A

### III. Methods and Measures

Please include in this section a description of the assessment methods that your program plans to use in assessing each of its program learning outcomes. These methods ideally include both direct and indirect examples of student learning, with authentic, performance-based assessment performed at all levels.

- One helpful guide for this section is the “Program Assessment Checklist” (also available on the CET&L web site), which lists and describes a variety of possible assessment measures. You might include that list and then check off any of the measures that you plan to use to assess the learning outcomes in your program.
- As a next step with this Checklist, identify what knowledge/skills students must be able to demonstrate at various levels at the end of each required course and upon graduation, verify that they align with your program outcomes, and describe how that alignment will be measured and assessed.

Assessment Measures Aligned with Program Outcomes				
Program Outcome	Assessment Tools	Course/ Experience	Time Line	Responsible Person
<b>Understanding of responsible conduct of research according to NIH standards.</b>	Students participate in discussions that require critical thinking about the gray areas in research ethics. Students must also complete CITI training as part of this course.	BE-7067/GNTD-7003 Ethics in Research/Scientific Integrity E, D, A levels	First Year	Course Director
	Students must meet an attendance requirement. They learn about a broad variety of research projects from faculty, guests, and other students. Students also are encouraged to present their own research and receive feedback.	BE-8028/8029 Epidemiology & Biostatistics Division Seminar E level	At least 2 semesters	Course Director
	Students must meet an attendance requirement. They learn about a broad variety of research projects from faculty, guests, and other students.	ENV-7001/7002 Environmental Health Seminar E level	At least 4 semesters	Course Director

	Students complete a written final project that requires them to consider the complexities of study design.	BE-7076 Introduction to Epidemiology E level	First Year	Course Director
	Students write a publishable review of the literature on the use of a biomarker(s) as it relates to a particular health-related state, exposure, or outcome.	BE-9073C Molecular Epidemiology E, D levels	First Year (Second Semester) or Second/Third Year	Course Director
	Students develop a research proposal following NIH guidelines. They present their study and participate in a written peer review exercise.	BE-9075 Design & Management of Field Studies E, D, A levels	First Year (Second Semester) or Second/Third Year	Course Director
	Students devise, carry out, and write up a full research project equivalent to two publications. Students are mentored by faculty to ensure research is conducted responsibly.	ENV-9091 PhD Dissertation Research A level	Final Year(s)	Dissertation Committee Members
<b>Knowledge in clinical epidemiology, genetic epidemiology, quantitative genetics, clinical effectiveness, general biostatistics, molecular epidemiology, and clinical trials.</b>	Students must meet an attendance requirement. They learn about a broad variety of research projects from faculty, guests, and other students. Students also are encouraged to present their own research and receive feedback.	BE-8028/8029 Epidemiology & Biostatistics Division Seminar E level	At least 2 semesters	Course Director
	Students must meet an attendance requirement. They learn about a broad variety of research projects from faculty, guests, and other students.	ENV-7001/7002 Environmental Health Seminar E level	At least 4 semesters	Course Director
	Students complete a written final project that requires them to consider the complexities of study design.	BE-7076 Introduction to Epidemiology E, D levels	First Year	Course Director
	Students complete homework assignments throughout the term to monitor comprehension of biostatistical concepts. Students are also assessed on a mid-term and final exam.	BE-7022 Introduction to Biostatistics E, D levels	First Year	Course Director
	Students write a publishable	BE-9073C	First Year	Course Director

	review of the literature on the use of a biomarker(s) as it relates to a particular health-related state, exposure, or outcome.	Molecular Epidemiology E, D, A levels	(Second Semester) or Second/Third Year	
	Students develop a research proposal following NIH guidelines. They present their study and participate in a written peer review exercise.	BE-9075 Design & Management of Field Studies E, D, A levels	First Year (Second Semester) or Second/Third Year	Course Director
	Students complete a final project that must utilize one or more regression or analysis of variance techniques, with an emphasis on the statistics used to test well-founded hypotheses.	BE-7088 Regression Analysis D, A levels	First Year (Second Semester) or Second/Third Year	Course Director
	Students attend a variety of lectures by the course director and many guest lecturers. Students also complete three written take-home exams that assess their comprehension of the lecture materials.	TOX-7082 Survey of Toxicology E, D levels	Second or Third Year	Course Director
	Students complete a final project that must utilize one (or more) of the advanced experimental designs covered in this class.	BE-7089 Experimental Design D, A levels	Second or Third Year	Course Director
	Students devise, carry out, and write up a full research project equivalent to two publications. Students are mentored by faculty to ensure research is conducted responsibly.	ENV-9091 PhD Dissertation Research D, A levels	Final Year(s)	Dissertation Committee Members
<b>Ability to be a critical consumer of the medical, epidemiological, and biostatistical literature.</b>	Students must meet an attendance requirement. They learn about a broad variety of research projects from faculty, guests, and other students. Students also are encouraged to present their own research and receive feedback.	BE-8028/8029 Epidemiology & Biostatistics Division Seminar E level	At least 2 semesters	Course Director
	Students must meet an attendance requirement. They learn about a broad variety of research projects from faculty,	ENV-7001/7002 Environmental Health Seminar E level	At least 4 semesters	Course Director

	guests, and other students.			
	Students complete homework assignments throughout the term to monitor comprehension of biostatistical concepts. Students are also assessed on a mid-term and final exam.	BE-7022 Introduction to Biostatistics E, D levels	First Year	Course Director
	Students complete a written final project that requires them to consider the complexities of study design by conducting a literature review.	BE-7076 Introduction to Epidemiology E, D levels	First Year	Course Director
	Students complete a final project that requires them to choose a statistical approach and analyze data using SAS. Students can use their own data or data provided by the instructors.	BE-7078C Introduction to SAS Programming E, D levels	First Year	Course Director
	Students write a publishable review of the literature on the use of a biomarker(s) as it relates to a particular health-related state, exposure, or outcome.	BE-9073C Molecular Epidemiology E, D, A levels	First Year (Second Semester) or Second/Third Year	Course Director
	Students develop a research proposal following NIH guidelines. They present their study and participate in a written peer review exercise.	BE-9075 Design & Management of Field Studies E, D, A levels	First Year (Second Semester) or Second/Third Year	Course Director
	Students describe and carry out an analysis of data collected in a study. They are expected to formalize the scientific questions, carry out the appropriate analyses, interpret the results, and write a comprehensive report on all of these activities.	BE-7097/BE-7061 Categorical Data Analysis/Biostatistics in Research D, A levels	Second or Third Year	Course Director
	Students complete a final project that must utilize one or more regression or analysis of variance techniques, with an emphasis on the statistics used	BE-7088 Regression Analysis D, A levels	First Year (Second Semester) or Second/Third Year	Course Director



	to test well-founded hypotheses.			
	Students attend a variety of lectures by the course director and many guest lecturers. Students also complete three written take-home exams that assess their comprehension of the lecture materials.	TOX-7082 Survey of Toxicology E, D levels	Second or Third Year	Course Director
	Students complete a final project that must utilize one (or more) of the advanced experimental designs covered in this class.	BE-7089 Experimental Design D, A levels	Second or Third Year	Course Director
	Students devise, carry out, and write up a full research project equivalent to two publications. Students are mentored by faculty to ensure research is conducted responsibly.	ENV-9091 PhD Dissertation Research A level	Final Year(s)	Dissertation Committee Members
<b>Understanding of biostatistical methods in terms of the ability to successfully execute, interpret, and communicate analyses of complex data on human health.</b>	Students must meet an attendance requirement. They learn about a broad variety of research projects from faculty, guests, and other students. Students also are encouraged to present their own research and receive feedback.	BE-8028/8029 Epidemiology & Biostatistics Division Seminar E level	At least 2 semesters	Course Director
	Students must meet an attendance requirement. They learn about a broad variety of research projects from faculty, guests, and other students.	ENV-7001/7002 Environmental Health Seminar E level	At least 4 semesters	Course Director
	Students complete a written final project that requires them to consider the complexities of study design.	BE-7076 Introduction to Epidemiology E, D levels	First Year	Course Director
	Students complete a final project that requires them to choose a statistical approach and analyze data using SAS. Students can use their own data or data provided by the instructors.	BE-7078C Introduction to SAS Programming E, D, A levels	First Year	Course Director

	Students complete homework assignments throughout the term to monitor comprehension of biostatistical concepts. Students are also assessed on a mid-term and final exam.	BE-7022 Introduction to Biostatistics E, D levels	First Year	Course Director
	Students write a publishable review of the literature on the use of a biomarker(s) as it relates to a particular health-related state, exposure, or outcome.	BE-9073C Molecular Epidemiology E, D levels	First Year (Second Semester) or Second/Third Year	Course Director
	Students develop a research proposal following NIH guidelines. They present their study and participate in a written peer review exercise.	BE-9075 Design & Management of Field Studies E, D, A levels	First Year (Second Semester) or Second/Third Year	Course Director
	Students describe and carry out an analysis of data collected in a study. They are expected to formalize the scientific questions, carry out the appropriate analyses, interpret the results, and write a comprehensive report on all of these activities.	BE-7097/BE-7061 Categorical Data Analysis/Biostatistics in Research D, A levels	Second or Third Year	Course Director
	Students complete a final project that must utilize one or more regression or analysis of variance techniques, with an emphasis on the statistics used to test well-founded hypotheses.	BE-7088 Regression Analysis D, A levels	First Year (Second Semester) or Second/Third Year	Course Director
	Students complete a final project that must utilize one (or more) of the advanced experimental designs covered in this class.	BE-7089 Experimental Design D, A levels	Second or Third Year	Course Director
	Students devise, carry out, and write up a full research project equivalent to two publications. Students are mentored by faculty to ensure research is conducted responsibly.	ENV-9091 PhD Dissertation Research D, A levels	Final Year(s)	Dissertation Committee Members

<p><b>Ability to develop research hypotheses, specific aims, and the methodology to conduct patient-oriented research.</b></p>	<p>Students must meet an attendance requirement. They learn about a broad variety of research projects from faculty, guests, and other students. Students also are encouraged to present their own research and receive feedback.</p>	<p>BE-8028/8029 Epidemiology &amp; Biostatistics Division Seminar E level</p>	<p>At least 2 semesters</p>	<p>Course Director</p>
	<p>Students must meet an attendance requirement. They learn about a broad variety of research projects from faculty, guests, and other students.</p>	<p>ENV-7001/7002 Environmental Health Seminar E level</p>	<p>At least 4 semesters</p>	<p>Course Director</p>
	<p>Students complete homework assignments throughout the term to monitor comprehension of biostatistical concepts. Students are also assessed on a mid-term and final exam.</p>	<p>BE-7022 Introduction to Biostatistics E, D levels</p>	<p>First Year</p>	<p>Course Director</p>
	<p>Students complete a written final project that requires them to consider the complexities of study design.</p>	<p>BE-7076 Introduction to Epidemiology E, D levels</p>	<p>First Year</p>	<p>Course Director</p>
	<p>Students write a publishable review of the literature on the use of a biomarker(s) as it relates to a particular health-related state, exposure, or outcome.</p>	<p>BE-9073C Molecular Epidemiology E, D levels</p>	<p>First Year (Second Semester) or Second/Third Year</p>	<p>Course Director</p>
	<p>Students develop a research proposal following NIH guidelines. They present their study and participate in a written peer review exercise.</p>	<p>BE-9075 Design &amp; Management of Field Studies E, D, A levels</p>	<p>First Year (Second Semester) or Second/Third Year</p>	<p>Course Director</p>
	<p>Students describe and carry out an analysis of data collected in a study. They are expected to formalize the scientific questions, carry out the appropriate analyses, interpret the results, and write a comprehensive report on all of these activities.</p>	<p>BE-7097/BE-7061 Categorical Data Analysis/Biostatistics in Research D, A levels</p>	<p>Second or Third Year</p>	<p>Course Director</p>
	<p>Students complete a final project that must utilize one or more regression or analysis of</p>	<p>BE-7088 Regression Analysis D, A levels</p>	<p>First Year (Second Semester) or</p>	<p>Course Director</p>

	variance techniques, with an emphasis on the statistics used to test well-founded hypotheses.		Second/Third Year	
	Students complete a final project that must utilize one (or more) of the advanced experimental designs covered in this class.	BE-7089 Experimental Design D, A levels	Second or Third Year	Course Director
	Students devise, carry out, and write up a full research project equivalent to two publications. Students are mentored by faculty to ensure research is conducted responsibly.	ENV-9091 PhD Dissertation Research A level	Final Year(s)	Dissertation Committee Members
<b>Ability to apply contemporary research tools in biology, medicine, and biostatistics to clinically relevant areas of investigation.</b>	Students must meet an attendance requirement. They learn about a broad variety of research projects from faculty, guests, and other students. Students also are encouraged to present their own research and receive feedback.	BE-8028/8029 Epidemiology & Biostatistics Division Seminar E level	At least 2 semesters	Course Director
	Students must meet an attendance requirement. They learn about a broad variety of research projects from faculty, guests, and other students.	ENV-7001/7002 Environmental Health Seminar E level	At least 4 semesters	Course Director
	Students complete a written final project that requires them to consider the complexities of study design.	BE-7076 Introduction to Epidemiology E, D levels	First Year	Course Director
	Students complete a final project that requires them to choose a statistical approach and analyze data using SAS. Students can use their own data or data provided by the instructors.	BE-7078C Introduction to SAS Programming E, D levels	First Year	Course Director
	Students complete homework assignments throughout the term to monitor comprehension of biostatistical concepts. Students are also assessed on a mid-term and final exam.	BE-7022 Introduction to Biostatistics E, D levels	First Year	Course Director

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	Students describe and carry out an analysis of data collected in a study. They are expected to formalize the scientific questions, carry out the appropriate analyses, interpret the results, and write a comprehensive report on all of these activities.	BE-7097/BE-7061 Categorical Data Analysis/Biostatistics in Research D, A levels	Second or Third Year	Course Director
	Students complete a final project that must utilize one or more regression or analysis of variance techniques, with an emphasis on the statistics used to test well-founded hypotheses.	BE-7088 Regression Analysis D, A levels	First Year (Second Semester) or Second/Third Year	Course Director
	Students attend a variety of lectures by the course director and many guest lecturers. Students also complete three written take-home exams that assess their comprehension of the lecture materials.	TOX-7082 Survey of Toxicology E, D levels	Second or Third Year	Course Director
	Students complete a final project that must utilize one (or more) of the advanced experimental designs covered in this class.	BE-7089 Experimental Design D, A levels	Second or Third Year	Course Director
	Students devise, carry out, and write up a full research project equivalent to two publications. Students are mentored by faculty to ensure research is conducted responsibly.	ENV-9091 PhD Dissertation Research D, A levels	Final Year(s)	Dissertation Committee Members

#### IV. Assessment Infrastructure

*Please include in this section a description of the process by which your program intends to assess its learning outcomes.*

- *Describe which program faculty will be charged with overseeing the execution of the assessment plan as well as the ways in which they will carry out that charge, including a description of the planned timeline for assessment.*
- *Identify what kinds of administrative support will be available for those faculty*

*Please note that assessment plans should be capable of producing reports annually based on their review of the relevant data from their programs. The work of your faculty might also be coordinated and aligned with similar assessment efforts at the college and institutional levels.*

The existing Academic Progress Review Committee (APRC) will oversee assessment for the Doctor of Philosophy in Epidemiology program. The APRC is currently comprised of three faculty members: Drs. Kim Dietrich, Erin Haynes, and Paul Succop. The APRC meets as needed, typically once a year.

The APRC will review the program's overall assessment plan annually as part of its regular review of curricular activities and requirements. The APRC typically reviews the records of all students in the program to monitor progress in terms of course grades and program milestones (completion of course requirements, completion of the Qualifying Exam, submission of Statement of Intent, completion of the Dissertation Defense, application to graduate, etc.). The Committee notes students who are under-performing or inactive, communicates with the appropriate academic advisors, and when necessary, contacts students who need to be reminded about degree requirements. As part of this annual review, the APRC will examine the assessment plan and determine whether any changes are necessary. Major recommendations will be presented to the Division Faculty for a vote, but minor changes related to student review and committee-level assessment of outcomes will be adopted by the APRC as considered necessary.

In addition to the above guidelines, learning outcomes in the Doctor of Philosophy in Epidemiology are regularly assessed in a variety of other ways. We conduct course evaluations every semester, and each respective faculty member receives a copy of their own summarized evaluation, along with the Division Director, Dr. Kim Dietrich. Our Division Curriculum Committee (Drs. Erin Haynes, Mario Medvedovic, Jarek Meller, Susan Pinney, and Paul Succop) oversees the creation of new courses in the Division and regularly reviews the curriculum to ensure alignment with program student learning outcomes. They hold student focus groups when questions arise about specific curricular requirements or electives. Additionally, qualitative data are collected at several points throughout the year, including by the 1) faculty in the Division who teach and work with students, 2) faculty advisors in their regular meetings with advisees, 3) faculty members that facilitate the dissertation process, 4) program staff who interact with students regularly. Additional performance metrics are also captured in the GRAAD reports produced by the Office for Graduate Education.

The final assessment of a student's achievement of our program learning outcomes is completion of the Doctoral dissertation. The dissertation is the culmination of the student's coursework and research experiences. It should be the result of independent research, demonstrating the student's ability to design a study, carry it out, and communicate the findings. The student's advisor and dissertation advisory committee oversee the student's work on the dissertation. It is a multi-step process,

including a Statement of Intent that describes the research plan, the research itself, and then the writing and revision process, usually followed by submission to a journal for publication.

## **V. Findings**

*Here you will describe and explain in this section any multi-year patterns and trends that your assessment efforts have identified, including a description of any relevant relationships to national standards.*

## **VI. Use of Findings**

*In this final section, you will describe how your program intends to make use of the program-level assessment data it has gathered.*

- *How will this information be presented to and discussed among the faculty?*
- *How might this data or these discussions result in review and possible revision of course or program learning outcomes and pedagogical strategies?*