

# **EHS**

# **PROGRAM**

# **CURRICULA**

*2009 - 2010 Academic Year*

*Department of Environmental Health Sciences  
The University of Michigan  
109 South Observatory  
Ann Arbor, Michigan 48109-2029*

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# SCHOOL OF PUBLIC HEALTH (SPH) REQUIREMENTS

All students regardless of degree program (i.e. M.S., M.P.H. and Ph.D. students) are required to demonstrate competency in Biostatistics and Epidemiology. Guidelines outlining the options available are listed below.

## A. Biostatistics

Options for fulfilling the biostatistics core requirement include satisfactory completion of one of the following three options:

- Option 1: The student will complete either Biostatistics 503 or 553 depending upon his/her preparation, offered only in the fall term.
- Option 2: The student will complete Statistics 400, an upper-level undergraduate course offered by the College of Literature, Science, and the Arts.
- Option 3: The student will complete both Biostatistics 650 and 651.

Most SPH students select option 1.

SPH students from departments other than Biostatistics may be exempted from the biostatistics requirement under the following procedures:

- Students who have satisfactorily completed one of the options above or Statistics 350 (B or better grade) at the University of Michigan within the last five years are exempt from this requirement.
- Students who pass an exemption examination offered and graded by the faculty of Biostatistics will be exempted from the requirement.
- Students who are enrolled in other degree programs on campus that have statistics requirements may be able to substitute such requirements, but only in consultation with and with prior approval from the current Biostatistics 503 faculty member.

If you qualify for an exemption on the basis of prior course work, you must obtain an exemption form from the student services staff member in your department and have it signed by your department curriculum committee chair. After the exemption form is prepared and signed, the Biostatistics 503 instructor will also sign the exemption.

For those students in departments that require more than one course in biostatistics, completion of one of the options above will satisfy the prerequisite for entry into the second-level course, Biostatistics 523, which is offered only in the winter term.

### **Choosing Between Biostatistics 503 and 553**

Biostatistics 503 and 553 are both introductory courses for non-majors that assume no prior course work in biostatistics or statistics. Either course satisfies the school-wide requirement for biostatistics. While both courses cover the same statistical topics and methods, 553 assumes stronger preparation in mathematics and goes into greater depth in statistics. The prerequisite for 503 is elementary (high school) algebra. Students taking 553 need to have had one term of calculus and be comfortable with function notation and algebra. The stronger mathematical prerequisite for 553 allows time for more detailed study. BIostat 553 is the preferred course for EHS students.

## **B. Epidemiology**

Options for fulfilling the epidemiology core requirement include satisfactory completion of one of the following two options:

- Option 1: Successful completion of Epidemiology 503 or Epidemiology 601.
- Option 2: Successful completion of the epidemiology exemption examination.

### **Choosing Between Epidemiology 503 and Epidemiology 601**

Epidemiology 503 is the preferred course for students in most departments. This 3-credit hour course is offered each winter term. The course provides a basic introduction to epidemiology, with review of fundamental principles and concepts, and application to selected examples of chronic, non-infectious diseases and infectious diseases.

Epidemiology 601 is a 4-credit hour course offered in fall term designed for epidemiology majors. It assumes concurrent enrollment in pathology and biostatistics or prior preparation. The course is targeted to an audience with prerequisites consistent with acceptance into the epidemiology masters' program, which assumes appropriate preparation in mathematics and biology.

# MASTER OF PUBLIC HEALTH (MPH) Environmental Health Sciences

## School of Public Health Core Requirements

*Select one of the following*

BIOSTAT 503	(4)	Introduction to Biostatistics
BIOSTAT 553	(4)	Applied Biostatistics
STAT 400	(4)	Applied Statistical Methods

*NOTE: U of Michigan STAT 350 will meet this requirement if it has been taken within the last 5 years and a B or better was achieved.*

*Select one of the following*

EPID 503	(3)	Strategies and Uses of Epidemiology
EPID 601	(4)	Principles and Methods in Epidemiology

### ***MPH School of Public Health Requirements\****

Competency in Biostatistics, Epidemiology, Environmental Health Sciences, Health Behavior and Health Education and Health Management and Policy (See SPH BIC requirements).

## Environmental Health Sciences Departmental Core Requirements

EHS 501	(2)	Occupational and Environmental Disease
EHS 506	(2)	Principles of Toxicology
EHS 507	(2)	Principles of Exposure Assessment
EHS 508	(2)	Principles of Risk Assessment
EHS 600	(2)	Professional Perspectives in Environmental Health
EHS 688	(1)	Topics in Environmental Health Sciences

*Select one of the following:*

BIOSTAT 513	(3)	Application of Regression Analysis to Public Health Studies
BIOSTAT 523	(3)	Biostatistical Analysis for Health-Related Studies

Field Experience (see EHS field experience guidelines)

Students who have selected one of the designated sub-plans (Environmental Quality and Health, Human Nutrition, Industrial Hygiene, Industrial Hygiene-Hazardous Substances, Occupational and Environmental Epidemiology, Risk Sciences and/or Toxicology) need to complete the required SPH core courses, EHS departmental core courses and the required subplan courses. Remaining courses to meet your credit hour requirement (i.e. 60 hrs) can be selected from other graduate courses in the department, school or university.

Students who do not select a designated sub-plan are required to complete the SPH core courses, EHS departmental core courses and a minimum of 20 additional credits within the department from Table 1. Of the 20 credit hours required, a maximum of 8 credit hours can be 500 level courses.

**TABLE 1 List of approved departmental courses for students who do not have a designated subplan:**

<b>Course No</b>	<b>Course Title</b>	<b>Credit Hrs</b>
EHS 509	Ecological Toxicology	3
EHS 550	Principles of Occupational & Environmental Health	3
EHS 570	Water Quality Management	3
EHS 572	Environmental Impact Assessment	2
EHS 574	Environmental Chemistry	3
EHS 576	Microbiology in Environmental Health	3
EHS 582	Principles of Community Air Pollution	3
EHS 608	Environmental Epidemiology	3
EHS 612	Biochemical & Molecular Toxicology	3
EHS 616	Toxicology Pathology	2
EHS 622	Mechanisms of Developmental Toxicology	2
EHS 623	Mechanisms of Reproductive Toxicology	2
EHS 624	Mechanisms of Neurotoxicology	2
EHS 625	Environment & the Immune Response	2
EHS 630	Principles of Nutritional Sciences	3
EHS 631	Metabolism of Vitamins and Minerals	3
EHS 639	Pathophysiology of Obesity	3
EHS 652	Evaluation of Chemical Hazards	3
EHS 653	Environmental Sampling and Analysis Laboratory	3
EHS 654	Control of Exposures to Airborne Contaminants	3
EHS 657	Advanced Exposure Assessment	3
EHS 672	Life Cycle Assessment: Human Health & Environ Impact	3
EHS 675	Data Analysis for Environmental Epidemiology	3
EHS 680	Environ Management Hazardous Substances	3

## EHS Subplan Core Requirements

### **Environmental Quality and Health**

EHS 550	(3)	Introduction to Occupational and Environmental Health
EHS 570	(3)	Water Quality Management
EHS 572	(2)	Environmental Impact Assessment
EHS 574	(3)	Environmental Chemistry
EHS 581	(1)	Principles of Radiological Health
EHS 582	(3)	Principles of Community Air Pollution
EHS 652	(3)	Evaluation of Chemical Hazards
EHS 653	(3)	Environmental Sampling and Analysis Laboratory

### **Human Nutrition**

BIOLCHEM 515	(3)	Introduction to Biochemistry
PHYSIO 502	(4)	Human Physiology
EHS 630	(3)	Principles of Nutritional Science
EHS 631	(3)	Metabolism of Vitamins and Minerals
EHS 639	(3)	Pathophysiology of Obesity
EHS 640	(3)	Nutrition Assessment
EHS 642	(3)	Community Nutrition

### **Industrial Hygiene**

EHS 550	(3)	Principles of Occupational and Environmental Health
EHS 556	(2)	Occupational Ergonomics
EHS 581	(1)	Principles of Radiological Health
EHS 652	(3)	Evaluation of Chemical Hazards
EHS 653	(3)	Environmental Sampling and Analysis Laboratory
EHS 654	(3)	Control of Exposures to Airborne Contaminants
EHS 658	(1)	Physical Hazards
EHS 668	(1)	Professional Seminars in Occupational Health
EHS 757	(2)	Occupational Health Aspects of Industrial Processes
IOE 539	(3)	Occupational Safety Engineering
NURS 606	(2)	Management of Occupational Safety and Environmental Health

### **Industrial Hygiene - Hazardous Substances**

EHS 550	(3)	Principles of Occupational and Environmental Health
EHS 556	(2)	Occupational Ergonomics
EHS 570	(3)	Water Quality Management
EHS 572	(2)	Environmental Impact Assessment
EHS 574	(3)	Environmental Chemistry
EHS 581	(1)	Principles of Radiological Health
EHS 652	(3)	Evaluation of Chemical Hazards
EHS 653	(3)	Environmental Sampling and Analysis Laboratory
EHS 654	(3)	Control of Exposures to Airborne Contaminants
EHS 658	(1)	Physical Hazards
EHS 668	(1)	Professional Seminars in Occupational Health
EHS 757	(2)	Occupational Health Aspects of Industrial Processes
IOE 539	(3)	Occupational Safety Engineering
NURS 606	(2)	Management of Occupational Safety and Environmental Health

*Must select two (2) of the following*

EHS 680	(3)	Environmental Management Hazardous Substances
ENSCEN 686	(2)	Environmental Sustainability
NRE 537	(3)	Industrial Ecology
NRE 595	(3)	Risk Benefit Analysis

### **Occupational and Environmental Epidemiology**

BIOSTAT 510	(3)	Statistical Computer Program Packages
BIOSTAT 523	(3)	Biostatistical Analysis for Health-Related Studies
BIOSTAT 560	(4)	Statistical Methods in Epidemiology
EHS 608	(3)	Environmental Epidemiology
EHS 668	(1)	Professional Seminars in Occupational Health
EHS 670	(3)	Applications in Environmental Epidemiology
EPID 600	(3)	Introduction to Epidemiology
EPID 656	(3)	Applied Epidemiology Data Analysis

*Must select one (1) of the following*

EHS 652	(3)	Evaluation of Chemical Hazards
EHS 657	(3)	Advanced Exposure Assessment

*Must select one (1) of the following*

EPID 514	(3)	Social Epidemiology
EPID 550	(3)	Reproductive Epidemiology
EPID 552	(3)	Epidemiology of Chronic Diseases
EPID 604	(3)	Cardiovascular Disease Epidemiology
EPID 605	(3)	Infectious Disease Epidemiology
EPID 616	(2)	Neuroepidemiology
EPID 617	(3)	Social Epidemiology II
EPID 621	(3)	Cancer Epidemiology
EPID 677	(3)	Epidemiology of Aging

## **Risk Sciences**

- EHS 572 (2) Environmental Impact Assessment
- EHS 574 (3) Environmental Chemistry
- EHS 672 (3) Life Cycle Assessment: Human health and environmental impacts
- NRE 595 (3) Risk Benefit Analysis
- PSYCH 449 (3) Decision Processes

*Must select two (2) of the following*

- EHS 612 (3) Biochemical and Molecular Toxicology
- EHS 652 (3) Evaluation of Chemical Hazards
- EHS 680 (3) Environmental Management Hazardous Substances

*Must select one (1) of the following*

- NRE 531 (4) Principles of GIS
- NRE 543 (3) Environmental Spatial Data Analysis
- PUBPOL 479 (3) Quantitative Decision Analysis

*Must select one (1) of the following*

- NRE 532 (3) Natural Resource Conflict Management
- NRE 550 (3) Systems Thinking for Sustainable Enterprise
- NRE 575 (3) Thinking Analytically for Policy and Decisions

## **Toxicology**

- BIOLCHEM 515 (3) Introductory Biological Chemistry

*Must select two (2) of the following*

- EHS 622 (2) Mechanisms of Developmental Toxicology
- EHS 623 (2) Mechanisms of Reproductive Toxicology
- EHS 624 (2) Mechanisms of Neurotoxicology
- EHS 625 (2) Environment and the Immune Response

- EHS 612 (3) Biochemical and Molecular Toxicology
- EHS 616 (2) Toxicologic Pathology
- EHS 628 (1) Toxicology Research Analysis and Presentation<sup>1</sup>
- EHS 697 (1) Readings<sup>1</sup>

*NOTE: <sup>1</sup>EHS 697 is taken concurrently with EHS 628 Toxicologic Research Analysis and Presentation in Toxicology. Students register under the faculty member who is assisting with preparation for the seminar*

# MASTER OF PUBLIC HEALTH (MPH) Human Nutrition (Dietetics)

## School of Public Health Core Requirements

Select one (1) of the following

BIOSTAT 503	(4)	Introduction to Biostatistics
BIOSTAT 553	(4)	Applied Biostatistics
STAT 400	(4)	Applied Statistical Methods

NOTE: U of Michigan STAT 350 will meet this requirement if it has been taken within the last 5 years and a B or better was achieved.

Select one (1) of the following

EPID 503	(3)	Strategies and Uses of Epidemiology
EPID 601	(4)	Principles and Methods in Epidemiology

## MPH School of Public Health Requirements

Competency in Biostatistics, Epidemiology, Environmental Health Sciences, Health Behavior and Health Education and Health Management and Policy (See SPH BIC requirements).

## Dept of Environmental Health Sciences Core Requirements

EHS 508	(2)	Risk Assessment
EHS 600	(2)	Professional Perspectives in Environmental Health
EHS 688	(1)	Topics in Environmental Health Sciences

Select one (1) of the following:

BIOSTAT 513	(3)	Application of Regression Analysis to Public Health Studies
BIOSTAT 523	(3)	Biostatistical Analysis for Health-Related Studies

Field Experience (see EHS field experience guidelines)

## Nutrition – Dietetics (DPD)

### Nutrition

BIOLCHEM 515	(3)	Introductory Biological Chemistry
PHYSIOL 502	(4)	Human Physiology
EHS 540	(2)	Maternal and Child Nutrition
EHS 547	(2)	Food Science
EHS 585	(2)	Food Safety
EHS 630	(3)	Principles of Nutritional Science
EHS 631	(3)	Metabolism of Vitamins and Minerals
EHS 636	(3)	Clinical Nutrition I
EHS 637	(2)	Clinical Nutrition II
EHS 639	(3)	Pathophysiology of Obesity
EHS 640	(3)	Nutrition Assessment
EHS 642	(3)	Community Nutrition
EHS 646	(1)	Nutrition Counseling

### Management

HMP 602	(3)	Medical Care Organization and Delivery Small Groups
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### Health Behavior

HBHE 600	(3)	Psychosocial Factors in Health Behavior
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# MASTER OF SCIENCE (MS) Environmental Health Sciences (EHS)

## SPH Core Requirements

Select one (1) of the following

BIOSTAT 503	(4)	Introduction to Biostatistics
BIOSTAT 553	(4)	Applied Biostatistics
STAT 400	(4)	Applied Statistical Methods

*NOTE: U of Michigan STAT 350 will meet this requirement if it has been taken within the last 5 years and a B or better was achieved.*

Select one (1) of the following

EPID 503	(3)	Strategies and Uses of Epidemiology
EPID 601	(4)	Principles and Methods in Epidemiology

## EHS Department Core Requirements

EHS 688	(1)	Topics in Environmental Health Sciences*
EHS 698	(6)	Research
EHS 699	(1)	Masters Thesis

Select one of the following:

BIOSTAT 513	(3)	Application of Regression Analysis to Public Health Studies
BIOSTAT 523	(3)	Biostatistical Analysis for Health-Related Studies

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\*Students enroll each Fall term.

## EHS Core Requirements

EHS 501	(2)	Occupational and Environmental Disease
EHS 506	(2)	Principles of Toxicology
EHS 507	(2)	Principles of Exposure Assessment
EHS 508	(2)	Principles of Risk Assessment
EHS 570	(3)	Water Quality Management
EHS 572	(2)	Environmental Impact Assessment
EHS 574	(3)	Environmental Chemistry
EHS 582	(3)	Principles of Community Air Pollution

**Electives** - Each student must take 6 credit hours of elective graduate courses. Electives should be approved by the student's advisor.

**Master Thesis** -- All MS students are required to perform a research project during the program, to write an acceptable thesis on the project, to present the research results in a seminar and to defend the thesis before a committee of the faculty (see thesis guidelines).

# MASTER OF SCIENCE

## Industrial Health (Industrial Hygiene)

### SPH Core Requirements

Select one (1) of the following

BIOSTAT 503	(4)	Introduction to Biostatistics
BIOSTAT 553	(4)	Applied Biostatistics
STAT 400	(4)	Applied Statistical Methods

*NOTE: U of Michigan STAT 350 will meet this requirement if it has been taken within the last 5 years and a B or better was achieved.*

Select one (1) of the following

EPID 503	(3)	Strategies and Uses of Epidemiology
EPID 601	(4)	Principles and Methods in Epidemiology

### EHS Department Core Requirements

EHS 688	(1)	Topics in Environmental Health Sciences*
EHS 698	(6-12)	Research
EHS 699	(1)	Masters Thesis

Select one (1) of the following:

BIOSTAT 513	(3)	Application of Regression Analysis to Public Health Studies
BIOSTAT 523	(3)	Biostatistical Analysis for Health-Related Studies

*NOTE: Students should elect EHS 698 in all terms but are required to complete a minimum total of 6 credits in this course to meet both departmental and program requirements.*

### IH Core Requirements

STAT 503	(3)	Applied Multivariate Analysis
EHS 501	(2)	Occupational and Environmental Disease
EHS 506	(2)	Principles of Toxicology
EHS 550	(3)	Principles of Occupational and Environmental Health
EHS 556	(2)	Occupational Ergonomics
EHS 652	(3)	Evaluation of Chemical Hazards
EHS 653	(3)	Environmental Sampling and Analysis Laboratory
EHS 654	(3)	Control of Exposures to Airborne Contaminants
EHS 658	(1)	Physical Hazards
EHS 668	(1)	Professional Seminars in Occupational Health
EHS 697	(1)	Readings

Select one (1) of the following

IOE 539	(3)	Occupational Safety Engineering
EHS 657	(3)	Advanced Exposure Assessment

**Electives** – Each student must choose at least **two electives** (minimum 2 credits per elective). One of these courses must be a course outside the EHS department. Electives should be approved by the student's advisor.

**Master Thesis** -- All MS students are required to perform a research project during the program, to write an acceptable thesis on the project, to present the research results in a seminar and to defend the thesis before a committee of the faculty (see thesis guidelines).

# MASTER OF SCIENCE (MS) Nutritional Sciences (NS)

## SPH Core Requirements

*Select one (1) of the following*

BIOSTAT 503	(4)	Introduction to Biostatistics
BIOSTAT 553	(4)	Applied Biostatistics
STAT 400	(4)	Applied Statistical Methods

*NOTE: U of Michigan STAT 350 will meet this requirement if it has been taken within the last 5 years and a B or better was achieved.*

*Select one (1) of the following*

EPID 503	(3)	Strategies and Uses of Epidemiology
EPID 601	(4)	Principles and Methods in Epidemiology

## EHS Department Core Requirements

EHS 688	(1)	Topics in Environmental Health Sciences
EHS 698	(6)	Research
EHS 699	(1)	Masters Thesis

*Select one (1) of the following:*

BIOSTAT 513	(3)	Application of Regression Analysis to Public Health Studies
BIOSTAT 523	(3)	Biostatistical Analysis for Health-Related Studies

*NOTE: Students may elect EHS 698 in any term but are required to complete a minimum total of 6 credits in this course to meet both departmental and program requirements.*

## NS Core Requirements

BIOLCHEM 515	(3)	Introduction to Biochemistry (or equivalent)
PHYSIO 502	(4)	Human Physiology (or equivalent)
EHS 630	(3)	Principles of Nutritional Science
EHS 631	(3)	Metabolism of Vitamins and Minerals

*Select two (2) of the following*

EHS 639	(3)	Pathophysiology of Obesity
EHS 640	(3)	Nutrition Assessment
EHS 642	(3)	Community Nutrition
EPID 623	(3)	Nutritional Epidemiology

**Master Thesis** -- All MS students are required to perform a research project during the program, to write an acceptable thesis on the project, to present the research results in a seminar and to defend the thesis before a committee of the faculty (see thesis guidelines).

# MASTER OF SCIENCE (MS) Toxicology (TOX)

## SPH Core Requirements

*Select one of the following*

BIOSTAT 503	(4)	Introduction to Biostatistics
BIOSTAT 553	(4)	Applied Biostatistics
STAT 400	(4)	Applied Statistical Methods

*NOTE: U of Michigan STAT 350 will meet this requirement if it has been taken within the last 5 years and a B or better was achieved.*

*Select one (1) of the following*

EPID 503	(3)	Strategies and Uses of Epidemiology
EPID 601	(4)	Principles and Methods in Epidemiology

## EHS Core Requirements

EHS 688	(1)	Topics in Environmental Health Sciences
EHS 698	(6)	Research
EHS 699	(1)	Masters Thesis

*Select one of the following:*

BIOSTAT 513	(3)	Application of Regression Analysis to Public Health Studies
BIOSTAT 523	(3)	Biostatistical Analysis for Health-Related Studies

*NOTE: Students may elect EHS 698 in any term but are required to complete a minimum total of 6 credits in this course to meet both departmental and program requirements.*

## TOX Core Requirements

EHS 506	(2)	Principles of Toxicology
EHS 612	(3)	Biochemical and Molecular Toxicology
EHS 616	(2)	Toxicologic Pathology

*Select one (1) of the following*

EHS 622	(2)	Mechanisms of Developmental Toxicology
EHS 623	(2)	Mechanisms of Reproductive Toxicology
EHS 624	(2)	Mechanisms of Neurotoxicology
EHS 625	(2)	Environmental and the Immune Response

EHS 628	(1)	Toxicology Research Analysis and Presentation <sup>1</sup>
EHS 697	(1)	Readings <sup>1</sup>
EHS 717	(1)	Toxicological Pathology Laboratory

*Select two (2) of the following*

CDB 530	(3)	Cell Biology
HUMGEN 541	(3)	Molecular Genetics
BIOLCHEM 550	(3)	Protein Structure and Function

**Master Thesis** -- All MS students are required to perform a research project during the program, to write an acceptable thesis on the project, to present the research results in a seminar and to defend the thesis before a committee of the faculty (see thesis guidelines).

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<sup>1</sup>EHS 697 is taken concurrently with EHS 628 Intermediate Seminar in Toxicology. Students register under the faculty member who is assisting with preparation for the seminar

# DOCTOR OF PHILOSOPHY (Ph.D.) (Environmental Health Sciences)

## Departmental Course Requirements

*Select one (1) of the following*

- BIOSTAT 503 (4) Introduction to Biostatistics
- BIOSTAT 553 (4) Applied Biostatistics
- STAT 400 (4) Applied Statistical Methods

*Select one (1) of the following*

- EPID 503 (3) Strategies and Uses of Epidemiology
- EPID 601 (4) Principles and Methods in Epidemiology

*Select two (2) of the following:*

- BIOSTAT 513\* (3) Application of Regression Analysis to Health Studies
- BIOSTAT 523\* (3) Biostatistical Analysis for Health-Related Studies
- BIOSTAT 560 (3) Statistical Methods in Epidemiology
- STAT 401 (3) Applied Statistical Methods II
- STAT 503 (3) Applied Multivariate Analysis

*Statistics or Biostatistics course (determined with advisor and approval of doctoral committee)*

\*NOTE: Students select either BIOSTAT 513 or BIOSTAT 523. The two courses cannot be used to meet the upper level statistic course requirements.

Cognate Course – One 2-3 credit hour course outside the Department of Environmental Health Sciences (to be determined by advisor with approval of EHS Academic Degree Programs Committee)

- EHS 688 (1) Topics in Environmental Health Sciences<sup>1</sup>
- EHS 869 (1) Doctoral Seminar in Environmental Health Sciences<sup>2</sup>
- EHS 899 (≤6) Advanced Research (2 separate rotations required)<sup>3</sup>

<sup>1</sup>EHS 688 is a departmental seminar that spans the first 2 terms. It is expected that they will attend seminars throughout their doctoral program but they do not have to officially register.

<sup>2</sup>EHS 869 is a doctoral seminar that students register for until they have passed their Preliminary Exam. Prior to the Preliminary Exam, they will present a formal seminar in this class

<sup>3</sup>EHS 899 - Students complete two separate rotations with different faculty for a minimum of 1 credit each time

## Additional Course Requirements

*Select one (1) of the followings*

- EHS 501 (2) Occupational Diseases
- EHS 506 (2) Principles of Toxicology
- EHS 507 (2) Principles of Exposure Assessment
- EHS 508 (2) Principles of Risk Assessment

*Select one (1) of the following:*

- EHS 509 (3) Ecological Toxicology
  - EHS 550 (3) Principles of Occupational and Environmental Health
  - EHS 570 (3) Water Quality Management
  - EHS 572 (2) Environmental Impact Assessment
  - EHS 574 (3) Environmental Chemistry
  - EHS 576 (3) Microbiology in Environmental Health
- 500-level EHS course (determined with mentor and approval of doctoral committee)*

Select three (3) of the following courses (or 600-level courses in EHS added subsequently\*):

- EHS 608 (3) Environmental Epidemiology
- EHS 612 (3) Biochemical and Molecular Toxicology
- EHS 625 (2) Environment & the Immune Response
- EHS 630 (3) Principles of Nutritional Sciences
- EHS 631 (3) Metabolism of Vitamins and Minerals
- EHS 652 (3) Evaluation of Chemical Hazards
- EHS 653 (3) Environmental Sampling and Analysis Lab
- EHS 654 (3) Control of Exposures to Airborne Contaminants
- EHS 657 (3) Advanced Exposure Assessment
- EHS 672 (3) Life cycle assessment: Human health and environmental impacts
- EHS 675 (2) Data Analysis for Environmental Epidemiology
- EHS 680 (3) Environ Management Hazardous Substances

\*NOTE: For students who will be pursuing laboratory-based research, a laboratory is required. The laboratory course can be from another department.

# DOCTOR OF PHILOSOPHY (Ph.D.) (Toxicology)

## Departmental Course Requirements

*Select one (1) of the following*

- BIOSTAT 503 (4) Introduction to Biostatistics
- BIOSTAT 553 (4) Applied Biostatistics
- STAT 400 (4) Applied Statistical Methods

*Select one (1) of the following*

- EPID 503 (3) Strategies and Uses of Epidemiology
- EPID 601 (4) Principles and Methods in Epidemiology

*Select one (1) of the following:*

- BIOSTAT 513 (3) Application of Regression Analysis to Health Studies
- BIOSTAT 523 (3) Biostatistical Analysis for Health-Related Studies
- BIOSTAT 560 (3) Statistical Methods in Epidemiology
- STAT 401 (3) Applied Statistical Methods II
- STAT 503 (3) Applied Multivariate Analysis

*Statistics or Biostatistics course (determined with advisor and approval of doctoral committee)*

- EHS 688 (1) Topics in Environmental Health Sciences<sup>1</sup>
- EHS 869 (1) Doctoral Seminar in Environmental Health Sciences<sup>2</sup>
- EHS 899 (≤6) Advanced Research (2 separate rotations required)<sup>3</sup>

<sup>1</sup>EHS 688 is a departmental seminar that spans the first 2 terms. It is expected that they will attend seminars throughout their doctoral program but they do not have to officially register.

<sup>2</sup>EHS 869 is a doctoral seminar that students register for until they have passed their Preliminary Exam. Prior to the Preliminary Exam, they will present a formal seminar in this class.

<sup>3</sup>EHS 899 - Students complete two separate rotations with different faculty for a minimum of 1 credit each time

## Additional Course Requirements

- EHS 506 (2) Principles of Toxicology
- EHS 612 (3) Biochemical and Molecular Toxicology
- EHS 616 (2) Toxicologic Pathology
- EHS 717 (1) Toxicological Pathology Laboratory

*Select one (1) of the followings*

- EHS 622 (2) Mechanisms of Developmental Toxicology
- EHS 623 (2) Mechanisms of Reproductive Toxicology
- EHS 624 (2) Mechanisms of Neurotoxicology
- EHS 625 (2) Environment & the Immune Response

*Select two (2) of the followings*

- BIOLCHEM 550(3) Macromolecular Structure and Function
- HUMGEN 541 (3) Molecular Genetics
- CDB 530 (3) Cell Biology

**SCHOOL OF PUBLIC HEALTH  
ENVIRONMENTAL HEALTH SCIENCES**  
*Breadth, Integration and Capstone Requirements*  
for the degree  
**MASTER OF PUBLIC HEALTH**  
**2009-2010**

**I. INTRODUCTION**

The Breadth, Integration and Capstone Requirements in Public Health (BIC) are designed to prepare public health professionals to be knowledgeable and able to cope with current and emerging health problems and to work effectively with other public health professionals, citizens in the community, and with political leaders. It is the aim of BIC that course work in one area will support and reinforce course work in other areas and that the faculty and students will continually attempt to build linkages among the several areas. The BIC curriculum and relevant courses are defined in terms of minimum exit level competencies. These requirements represent the knowledge and skills needed by individuals to demonstrate excellence in the practice of public health. Individuals graduating with the MPH degree are expected to be capable of advanced practice in their specialty areas and the broad field of public health. The BIC requirements were adopted by the faculty beginning in the 1997-98 academic year.

Students enrolled for the MPH degree must complete the BIC in addition to the departmental or program requirements.

**II. SCOPE OF THE REQUIREMENTS IN PUBLIC HEALTH**

There are three separate areas with selected course options that fulfill the Requirements in Public Health:

- A. Methodological Core
  - Biostatistics
  - Epidemiology
- B. Breadth and Integration
  - Health Behavior and Health Education
  - Health Management and Policy
  - Environmental Health Sciences
- C. Capstone

### III. COMPETENCIES EXPECTED OF GRADUATES WITH THE MPH DEGREE

There are five separate areas of expected competencies within the Requirements in Public Health:

**Biostatistics** - the development and application of statistical reasoning and methods in addressing, analyzing and solving problems in public health; health care; and biomedical, clinical and population-based research

**Epidemiology** - the study of patterns of disease and injury in human populations and the application of this study to the control of health problems

**Environmental health sciences** - the study of environmental factors including biological, physical and chemical factors that affect the health of a community

**Health services administration** - a multidisciplinary field of inquiry and practice concerned with the delivery, quality and costs of health care for individuals and populations

**Social and behavioral sciences** - the behavioral, social and cultural factors related to individual and population health and health disparities over the life course

### IV. COURSES REQUIREMENTS IN PUBLIC HEALTH

#### A. Methodological Core

##### 1. Biostatistics (select one of the following)

BIOSTAT 503	(4)	Introduction to Biostatistics
BIOSTAT 553	(4)	Applied Biostatistics
STAT 400	(4)	Applied Statistical Methods

##### 2. Epidemiology (select one of the following)

EPID 503	(3)	Strategies and Uses of Epidemiology
EPID 601	(4)	Principles and Methods of Epidemiology

B. Breadth and Integration

1. Health Behavior and Health Education (select one of the following)

HBHE 600	(3)	Psychosocial Factors in Health Related Behavior
HBHE 632	(3)	Racial/ Ethnic Health Disparities Research and Interventions
HBHE 678	(3)	Critical Histories, Critical Moments in HBHE

2. Health Management and Policy (select one of the following)

HMP 602	(3)	Medical Care Organization and Delivery Small Groups
HMP 653	(3)	Law and Public Health
HMP 685	(3)	The Politics of Health Policy

3. Environmental Health Sciences (select one of the following)

EHS 508	(2)	Principles of Risk Assessment
EHS 550	(3)	Occupational and Environmental Hygiene

C. Capstone

EHS 600	(2)	Professional Perspectives in Environmental Health
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## V. PROCEDURES FOR EXEMPTIONS OR SUBSTITUTION OF COURSES IN BIC

To help students avoid any repetition of prior academic work and to make the most of learning opportunities within the BIC offering, the faculty has developed specific exemption and substitution procedures.

Before taking an exemption examination or requesting substitution, students should consult with their departmental faculty advisors.

The specific exemption and substitution procedures for the key BIC areas are as follows:

### A. Methodological Core

#### 1. Biostatistics

SPH students from departments other than Biostatistics may be exempted from the biostatistics requirement under the following procedures:

- Students who have satisfactorily completed one of the options above or Statistics 350 (B or better grade) at the University of Michigan within the last five years are exempt from this requirement.
- Students who pass an exemption examination offered and graded by the faculty of Biostatistics will be exempted from the requirement.
- Students who are enrolled in other degree programs on campus that have statistics requirements may be able to substitute such requirements, but only in consultation with and with prior approval from the current Biostatistics 503 faculty member.

If you qualify for an exemption on the basis of prior course work, you must obtain an exemption form from the student services staff member in your department and have it signed by your department curriculum committee chair. After the exemption form is prepared and signed, the Biostatistics 503 instructor will also sign the exemption.

For those students in departments that require more than one course in biostatistics, completion of one of the options above will satisfy the prerequisite for entry into the second-level course, Biostatistics 523, which is offered only in the winter term.

## 2. Epidemiology

Exemption from the Epidemiology component of BIC may only be attained by the successful completion of the Epidemiology Exemption Examination.

### B. Breadth and Integration

Exemption from these areas (Health Behavior and Health Education, Health Management and Policy and Environmental Health Sciences) will be based on individual reviews of related courses completed for credit and/or by exemption examination. The EHS Curriculum Committee Chair is authorized to grant exemption requests in the above areas of study with consultation of the student's advisor. Please obtain an exemption form from the student services staff, review the request with you advisor, and then return it to the student services staff for review by the EHS Curriculum Committee Chair.

### C. Capstone

Exemption from the capstone can only be obtained through petition to the EHS Curriculum Chair.

# APPENDIX A

## Masters Thesis Guidelines

# **GUIDELINES AND PROCEDURES FOR MASTER OF SCIENCE THESIS**

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## **Preamble**

The Master of Science degree at the University of Michigan is administered by the Rackham School of Graduate Studies. In the Department of Environmental Health Sciences, students registering for the Master of Science degree are required to undertake a program of didactic coursework (subject matter and amount depending on the area of specialty, both of which lie outside the scope of this paper), together with original research culminating in a masters thesis.

## **Definition and scope of the research**

Upon enrollment, each student will be assigned an Academic Advisor. The student will work with his/her academic advisor to identify a Research Advisor with interests compatible with their own, and who will work with them to develop a research project that falls within the area of the defined specialty. The research will take the form of an original investigation leading to an outcome that reflects new knowledge in the area in question, having the potential for publication in the peer-reviewed literature. The work itself may take any of the following forms:-

- A laboratory study, yielding experimental data that will be analyzed and interpreted in terms of new or existing mechanisms and/or natural scientific models.
- A field study, yielding experimental data that will be analyzed and interpreted in terms of new or existing natural scientific models.
- A survey of opinions of individuals, or groups of individuals, yielding empirical data that will be analyzed and interpreted in terms of new or existing social scientific models.
- A study of the behaviors of individuals, or groups of individuals, similarly yielding empirical data that will be analyzed in terms of new or existing social scientific models.
- A paper study of previous work that integrates existing knowledge, re-analyzes existing data, and adds new knowledge.

or any combination of these. In any of one of the above, analysis may involve any combination of statistics, mathematics or other scientific procedure aimed at elucidating the subject of the enquiry, while interpretation may involve any philosophical or intellectual process aimed at making a clear articulation of what new knowledge has been gained. Individual specialty areas may specify a particular combination of the research options listed.

The scale – in terms of a combination of amount and depth – of the research undertaken should be equivalent to that described by a good intra-agency or corporate technical report, or commensurate with the work required to produce a single peer-reviewed publication.<sup>1</sup> So it is likely to be quite narrowly focused. This is to be compared to the expectation – typically equivalent to three or more peer-reviewed publications – for doctoral level research, which reflects significantly greater amount, depth and (usually) breadth.

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<sup>1</sup> Note, however, that a peer-reviewed publication, while desirable, it is *not a requirement*.

## **Research committee**

For each student, a Committee will be appointed to aid in supervision of the research, assisting in its setting up, execution and completion. It will comprise three faculty members, including a Research Advisor from the Department of Environmental Health Sciences, another faculty member of the same Department and one other (Cognate) from another department which may or may not be in the School of Public Health. The Research Advisor will be appointed as soon as possible after the student has enrolled (with the assistance of the appointed academic advisor), after he/she has had the opportunity to explore options (including areas of potential matching interest, resources, etc.) that might be available. The student will then work with the Research Advisor to identify the other two committee members (based on considerations of matching or complementary interests), so that the Committee will be appointed as early as possible during preparation of the research Proposal (see below) and it is submitted.

## **Research proposal**

The Proposal will take the form of a written document that includes:-

- Introduction and statement of the problem to be studied.
- Objectives of the research and articulation of its hypothesis.
- Background summary.
- Identification of methods to be used and type of results to be expected.
- Summary of analytical methods or modeling procedures to be applied.
- Identification of expected outcomes.
- Summary of IRB and other special procedures to be followed.
- Identification of resources needed and indication of how these will be realized.
- Outline of tasks and time-line of execution.

This will be presented to the Committee for comments, suggestions for improvements and –ultimately – approval. The Committee will evaluate the Proposal in terms of:-

- Content, breadth, depth and scope commensurate with graduate work in the environmental health sciences at the master's level.
- Clarity of aims and objectives.
- Quality of the background learning by the student as reflected in the document.
- Study design.
- Feasibility of the research itself and its relevance to environmental health.
- Availability of the resources in order to allow successful execution of the research.

Any gaps that remain will be identified by the Committee and conveyed to the student. When the Committee is satisfied that the proposed research meets the defined standards according to these criteria, approval will be given for the research to proceed.

After formal approval, the work may begin. It is expected that completion of the proposal and its approval will take place before the end of the first Winter Term of the student's enrollment.

## **Conduct of the research**

The time-line for the research may be flexible. But guidelines are offered towards helping the student manage the effort required to initiate and complete the research, and write the thesis, in time for graduation at the end of the second academic year after enrollment. It is suggested that the main body of the research should be carried out during the summer following the end of the first Winter Term, and should continue into the second year of the student's enrollment. The experimental, field or other data-

gathering part of the work should be completed by early in the following (second) Winter Term, and work should begin on analysis and interpretation of the results, followed by preparation of the Thesis, to be completed before the end of the (second) Winter Term. In preparation of the Thesis, the student will work mainly with his/her research advisor. The completed Thesis will be submitted to the Committee, who will then convene – with the student – for a private oral presentation and question-and-answer session. The research requirement of the Master of Science degree will be considered to be complete upon approval of the Thesis by the Committee.

Evaluation of the student's progress in their research will be monitored continuously by the Research Advisor, with input from Committee members as appropriate.

### **Masters thesis**

The Thesis will be a document written by the student that may contain the following:-

- Abstract
- Introduction, including preamble and identification of the problem, articulation of the primary and secondary objectives of the work, and statement of the hypothesis to be addressed.
- Background, including a review of relevant literature, and identification of gaps in knowledge.
- Approach and methods to be adopted.
- Presentation of the results.
- Discussion of the results, including description of analyses of raw data to reveal important effects, trends or tendencies.
- Conclusions and implications of the research.
- Acknowledgements to individuals or supporting parties.
- List of references.

With the approval of the Research Advisor and Committee, the same information may be presented in any format considered to be customary or acceptable in the description of scientific enquiry.

The Thesis will be presented to the Committee in an appropriate closed format (face-to-face meeting or some form of electronic communication), and the Committee will examine the work in all its aspects in a question-and-answer forum. The Thesis will be evaluated in terms of:-

- Content, breadth, depth and scope commensurate with graduate work in the environmental health sciences at the masters' level.
- Clarity of aims and objectives.
- Quality of the background learning by the student as reflected in the document.
- Study design
- Execution of the research and the clarity of its exposition.
- Quality of the data.
- Style and quality of the analysis and interpretation.
- Lucidity of the discussion and conclusions.
- Identification and expression of any importance of the results to environmental health.
- Responses of the student to questions posed by the Committee.

The Committee will discuss the Thesis, and the overall effort on the part of the student, and will arrive at a consensus on one of the following:-

- Satisfactory overall performance, approve with no further work needed.
- Generally satisfactory performance but some minor work needed on the Thesis.
- Generally satisfactory work, but some major work needed on the Thesis.
- Unsatisfactory, so the student needs to do more work in order to complete the thesis requirement.

The Committee will prepare a written summation of its evaluation according to these guidelines.

### **Time-line**

As mentioned above, it is desirable that the research should be completed by the end of the Winter Term of the student's second year, in order that the student may graduate on schedule. However, delays may occur in some cases due to circumstances beyond the control of the student. In such cases, final completion may take place within one year of the end of the student's second year of enrollment (end of Winter Term of the third year). Extensions beyond that shall be considered exceptional and will be allowed only upon petition to, and approval by, the Chair of EHS, and consistent with any overarching rules or requirements of the Rackham School of Graduate Studies.

# APPENDIX B

## EHS Doctoral Guidelines

**Department of  
Environmental Health Sciences  
Doctoral Program Guidelines**

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## 1. Introduction

The Department of Environmental Health Sciences (EHS) offers the Doctor of Philosophy (Ph.D.) degree in Environmental Health Sciences and in Toxicology.<sup>1</sup> These degrees are officially conferred by the Horace H. Rackham School of Graduate Studies, and the broad requirements for completing a Ph.D. program at the University of Michigan are described in the Student Handbook issued by Rackham. Additional requirements and specific procedures for fulfilling all degree requirements are typically provided by each school and department within the university. All students should be thoroughly familiar with those sections of the current Rackham Student Handbook, School of Public Health catalogue, and EHS documents pertaining to doctoral programs.

This document (PhD Guidelines) summarizes the procedures for meeting the doctoral degree requirements in the EHS Department. It is intended to elaborate on Rackham requirements, with guidance specific to the EHS PhD degree program. Although most of the information provided is directly relevant to the Toxicology PhD degree program also, students pursuing the latter are encouraged to meet with their advisor to review any requirements specific to that program. It is the responsibility of each student to consult all relevant documents and to ensure that all of their doctoral requirements are met.

Doctoral students ordinarily follow the sequence shown in Table 1. Although there are firm deadlines for some of the required tasks, particularly within the first two years, others are more open-ended (see below). The time necessary to complete the dissertation research depends upon many factors due to the inherent uncertainty of the research process, the varied backgrounds of students entering the degree program, and many other extenuating factors. Nonetheless, students are encouraged to progress as diligently as possible toward completion of their degree. Progress is monitored by the primary faculty mentor, the EHS Academic Degree Programs Committee, the EHS Department and by the EHS faculty as a whole. Evidence of a persistent lack of progress will trigger an inquiry into the situation.

The EHS Academic Degree Programs Committee is charged with the responsibilities of administering the program, interpreting and revising policy, conducting the Pre-Candidacy Review (described below), monitoring doctoral student progress, and serving as liaison body between students and faculty. The EHS Academic Degree Programs Committee is composed of four or more EHS instructional faculty members whose backgrounds represent the diverse areas of departmental expertise.

## 2. Major Area of Study and Study Plan

1. The major areas of study within the EHS Department are Toxicology, Environmental Health, Industrial Hygiene, Environmental & Occupational Epidemiology, Risk Assessment, and Human Nutrition. These are currently organized under the broader headings of Toxicology, Environmental/Occupational Exposures and Hygiene, and Environmental/Occupational Epidemiology and Medicine and Human Nutrition. Interdisciplinary research is encouraged both within the department and between EHS and other departments on campus.

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<sup>1</sup> A Dr.P.H. (Doctor of Public Health) is no longer offered

- Students should declare a major area of study prior to enrollment in the program or as soon thereafter as possible.

**Table 1: Milestone chart for the doctoral program.**

	Year 1			Year 2			Year 3			Year 4			
Orientation and enrollment	x												
Appointment of academic advisor	x												
Draft of study plan	x												
Completion of coursework, rotations, etc.	x	x	x	x	x	x							
Completion of PEERRS training			x										
Preparation for Pre-Candidacy Review		x	x										
Selection of primary research mentor			x										
Pre-Candidacy Review (DQE, etc.)				x									
Selection of dissertation topic				x	x								
Preparation of dissertation proposal				x	x	x	x						
Establishment of dissertation committee						x	x						
Preliminary Examination						x	x						
Completion of research							x	x	x	x	x		
Data Meeting											x	x	
Initial drafts of dissertation											x	x	x
Dissertation defense													x
File final dissertation with Rackham													x

- Although there is considerable flexibility in the selection of required courses (see below), certain courses may be specifically recommended for students in a given major area of study. Students may wish to take a sequence of courses in an area to establish a ‘minor concentration’. Course selections will also be dictated by the student’s research interests. The EHS Curricular Guide, which is revised and re-issued annually at the start of the academic year, should be consulted for EHS course offerings, and decisions should be made in consultation with the academic advisor.
- Students should review the required curriculum and other milestones with their academic advisor and submit the sequence of courses they plan to take to the Student Services Office by the third week of the first semester in residence. The EHS Academic Degree Programs Committee is responsible for reviewing/approving the proposed course of study.

### 3. Academic Advising

An academic advisor is assigned to each student when he/she begins the Ph.D. program. The advisor is a faculty member in the student's major area of study who is responsible for guiding the student during the first two years of the program. The academic advisor may or may not ultimately serve as the primary research mentor (dissertation committee chair), in which case they would continue to guide the student through the program. The student should consult with the advisor to establish a study plan that defines coursework to be taken, research rotation advisors, and possible areas of research appropriate for dissertation topics. Students are strongly

encouraged to get to know, and to seek advice from, other faculty and their fellow students as well.

#### **4. Course Requirements and Performance Criteria**

1. Doctoral students must be registered for at least nine credit hours of classes to be considered full-time. Eight credits is considered full-time when a student reaches candidacy.
2. Doctoral students must maintain a GPA of 6.0. Students with GPAs that drop below 6.0 are placed on probation and cannot sit for the DQE. Failure to raise the GPA above 6.0 by the end of the following semester is grounds for dismissal from the program. Appeals can be addressed to the Chair of the EHS Academic Degree Programs Committee.
3. As shown in Attachment 1, for the EHS PhD degree students must take a minimum of three statistics or biostatistics courses (TOX PhD students are required to complete two courses), one course in epidemiology, a cognate course outside of the department, the doctoral seminar course, the departmental seminar course, two 500-level EHS courses, and three 600-level EHS courses.
4. Those students pursuing research involving laboratory work must take a laboratory course from within EHS or elsewhere.
5. Students must complete two research rotations in two different groups, one in each of their first two terms. The number of credit hours can range from 1-3, and should reflect the amount of work to be accomplished. A report is required at the end of each rotation.
6. Students are encouraged to start defining possible research topics for the dissertation as soon as possible, since they will need to identify a primary research mentor by the end of the first academic year and ideas for topics will most likely evolve over the course of the first year.
7. The sequencing of courses is decided in consultation with the academic advisor. However, in order to sit for the DQE (part of the Pre-Candidacy Review, described in next section), the student must take a minimum of 22 credit hours, including the following:
  - a. Two biostatistics/statistics courses (one can be waived with proper justification)
  - b. One epidemiology course
  - c. Two research rotations
  - d. Two 500-level EHS courses
  - e. Two 600-level EHS courses

#### **5. Pre-Candidate Review (PCR)**

At the end of the first academic year, students undergo their Pre-Candidacy Review (PCR). The PCR is administered by the EHS Academic Degree Programs Committee. If a student has completed an MS or MPH degree in EHS and has been admitted to PhD program, the PCR can take place at the end of their Master's program (i.e., prior to the official start of their doctoral program). The review consists of the following:

1. Confirmation of completion of sufficient coursework and two research rotations (MPH/MS students are not be subject to this requirement).

2. Completion of training on responsible conduct of research (PEERRS). Students are required to complete the following modules: (1) Foundations of Good Practice, (2) Research Administration, (3) Conflict of Interest and (4) Authorship, Publication and Peer Review. The following modules may be required depending on your research focus (1) Human Subjects – Biomedical & Health Sciences; (2) Human Subjects – Social & Behavioral Sciences and (3) Animal Subjects
3. Doctoral Qualifying Examination (DQE)
4. Assessment of overall performance in classes, research experiences, and any other relevant academic or professional activities.
5. Confirmation of primary research mentor selection and agreement to serve on their part.

### **5.1. Submission of required materials**

In April, the student must submit the following materials:

- a. A summary indicating that sufficient coursework has been completed in preparation for the DQE and that the GPA is 6.0 or higher.
- b. *Curriculum vitae* that includes a listing of educational institutions attended, relevant undergraduate and graduate courses taken, degrees completed, relevant work experience, and other appropriate information
- c. Certification of successful PEERRS training in the appropriate modules
- d. Any additional relevant materials they wish to submit
- e. A letter from a faculty member agreeing to serve as the primary research mentor for the student.

### **5.2. Doctoral Qualifying Examination (DQE) (see Attachment 2)**

1. Passing the DQE is an important milestone. A student is eligible to sit for the DQE if they have maintained a GPA of 6.0 or better in required courses. The GPA is calculated on the basis of didactic courses and up to 6 credit-hours of independent study courses (e.g., research, readings).
2. Preparation, scheduling, administration, and decisions about ultimate outcome of the DQE are the responsibility of the EHS Academic Degree Programs Committee.
3. The DQE is a written examination taken at the end of the second academic term (second or third week of May) in the doctoral program. Students who have completed a Master's degree in the department are expected to take the examination upon completion of that degree. If there are extraordinary circumstances and compelling reasons why a doctoral student would not be prepared to take the DQE at this point in their career, a written request to postpone taking the DQE must be submitted to the EHS Student Services Office two months prior to the examination. It will be reviewed by the EHS Academic Degree Programs Committee and a judgment rendered.
4. Details about the DQE are provided in Attachment 2 of this document.

### **5.3. Selection of Primary Research Mentor (Dissertation Chair)**

1. Prior to the PCR it is the responsibility of the student to discuss potential areas of dissertation research with members of the faculty who might serve as his/her primary research mentor and dissertation committee chair, to explore and, ideally, define a topic suitable for the dissertation research, and to obtain agreement from a faculty member to serve in the role of primary mentor.
2. The primary mentor must be a full-time or jointly appointed member of the department faculty and of the Graduate School Faculty, qualified to guide the student in research, and capable of taking on the responsibility of mentorship without incurring an excessive burden. Adjunct faculty do not qualify to serve as a sole dissertation chair. For those exceptional cases where a student finds a faculty member outside of the department who agrees to play a primary role in mentorship, that faculty member may be allowed to serve as co-chair of the dissertation committee as long as a member of the departmental instructional faculty member who also serves as co-chair. These cases must meet with the approval of the EHS Academic Degree Programs Committee, and should be brought to the attention of the committee at the PCR.
3. The primary mentor (or co-mentor) assumes the functions of the academic advisor and responsibility for guiding the student through the program.
4. The primary research mentor often assumes responsibility for supporting the student financially, typically by hiring the student as a GSRA. Financial support of this nature is not an entitlement to the student, however, and sustained satisfactory performance is generally expected in order to maintain such support. Even under such circumstances, it is not generally possible to guarantee financial support for the duration of the dissertation due to the vagaries of research funding. That said, every effort is made to do so. Students will also be expected to work with the Student Administrative Coordinator and faculty advisor to take advantage of other potential sources of financial support.

### **6. Preliminary Examination**

1. The doctoral Preliminary Examination has two components: (1) a formal written research proposal, and (2) an oral examination by the preliminary examination committee of the quality and scope of proposed research and the student's preparation to conduct the research.
2. The Preliminary Examination should be taken no sooner than three months and no later than 12 months after completing the Pre-Candidate Review, ideally at the end of the second academic year in the program. Petitions to postpone the Preliminary Examination beyond this point in time must be submitted in writing to the departmental Student Services Office and approved by the EHS Academic Degree Programs Committee. Students must have maintained a GPA of 6.0 or better and be in good standing to sit for the examination.

3. The student must establish a Preliminary Examination Committee in collaboration with the primary research mentor. Requests to faculty members who are deemed appropriate for the Preliminary Examination Committee are made by the student. Participation is voluntary. Once agreements to serve are received by the student from all committee members, the committee composition is submitted to the Student Services Office and forwarded to the EHS Academic Degree Programs Committee for approval (approval is presumed and notification will only be sent by the Doctoral Committee if there is a problem). In most cases, this committee also serves as the Doctoral Dissertation Committee. Therefore, the committee membership must meet the Rackham requirements for a Doctoral Dissertation Committee (see below for EHS rules on dissertation committee composition).
4. To be able to take the Preliminary Examination, the form entitled "Request for Student to Take Preliminary Examination" (Attachment 3) must be obtained from the EHS Student Services Office, completed, and returned for approval. This form must be completed and approved no later than 4 weeks before the scheduled preliminary examination. The student must have passed the Doctoral Qualifying Examination at least three months prior to the planned Preliminary Examination date, completed any conditions as part of the Pre-Candidate Review, and completed all coursework.
5. The research proposal that is required for the Preliminary Examination must be distributed to the Preliminary Examination Committee three weeks prior to the examination date. Exceeding this deadline constitutes automatic grounds for rescheduling the examination. Permission to hold to the original examination date must be obtained from all committee members if the deadline is exceeded.
6. The research proposal should be formatted like a standard NIH grant proposal, with an abstract, sections on specific goals, background and significance, preliminary data (if any), research methods that include milestones, and literature citations used in preparation of the proposal. A timeline for completion of major tasks and milestones must be included as well. The length of the proposal text (excluding abstract, literature citations, and time line) must be no more than 20 pages (double-spaced, 12-pt font, 1" margins all around, strictly enforced).
7. It is expected that the primary advisor will work with the student during the development of the proposal, and that it will be of high quality technically and literarily. This normally means a fair amount of editing prior to the final version being circulated to the committee.
8. In addition to circulating copies to committee members, the student must submit a copy to the Student Services Office for archiving by the EHS Academic Degree Programs Committee.
9. All Preliminary Examinations are announced to the EHS faculty at least one week prior to the examination. Students must provide an abstract of the research proposal to the Student Services Office for distribution to departmental faculty two weeks before the examination.

10. The examination is conducted by the Preliminary Examination Committee, with a member other than the primary research mentor presiding. The primary mentor is present only to provide a brief review of the student's record to date, to confirm that the student is qualified to proceed, to clarify matters of a factual nature, and to resolve issues that would otherwise stall the proceedings. They are not to serve as an advocate for the student and should refrain from intervening unless it is deemed necessary by the other committee members.
11. The Preliminary Examination Committee, as a whole, is responsible for the evaluation of the student's qualifications and promise for a successful dissertation. All members of the committee must be present (or actively participating via video- or tele-conference) in order for the examination to be valid. The examination evaluates the student's knowledge in her/his chosen area of research, the feasibility and adequacy of the dissertation proposal, and the student's preparation and capability to complete the proposed research.
12. The Preliminary Examination should be structured to be completed within a time limit of two hours (one hour and 50 minutes by Michigan standards). It is up to the presiding faculty member to ensure that the examination is held to the time limit. Following a brief closed-door conference among the committee members at the outset, typically up to 45 minutes are allotted to the formal presentation by the student (if uninterrupted) and up to 50 minutes are allotted to questions by the committee members. An additional 15 minutes is then allotted for the committee to deliberate and come to a decision about the outcome. The student is informed immediately of the results and any prescribed remedial actions. Follow-up by the primary research mentor with the student at the conclusion of the examination is customary.
13. The Preliminary Examination is closed to non-faculty participants. Only the student, the members of the committee, and any other interested faculty are allowed to participate. No other students may be present during the examination and there will be no recording of the proceedings.
14. A student passes the Preliminary Examination only upon approval of all of the members of the Preliminary Examination Committee. A form is signed by all committee members attesting to the outcome of the examination. Any conditions placed on the student by any member of the committee in order to receive a favorable decision (i.e., "pass") are also written on this form and they must be completed within six months of the examination date (or sooner if so required by the committee).
15. Students who fail the examination may petition to retake the examination once, no sooner than six months after the initial examination. This would normally entail submission of a revised proposal and scheduling of another presentation. Students who fail the examination twice will be dismissed from the PhD program.
16. Results of the examination, along with the documentation (i.e., the signed form) are provided by the primary research mentor to the Student Services Office, which will notify the Department Chair and the EHS Academic Degree Programs Committee.
17. If there are significant changes in direction, depth, or scope of research subsequent to the Preliminary Examination, the nature of such changes should be approved by the Preliminary Examination Committee and reported by the student to the Student Services Office for archiving by the EHS Academic Degree Programs Committee.

18. Once the Preliminary Examination is passed, the student advances to candidacy. A certificate of admission to candidacy is issued by the Graduate School when all requirements are met.
19. The composition (membership) of the Dissertation Committee should be finalized as soon as possible after the Preliminary Examination. Unless a request to change the dissertation committee is submitted, the department will submit to the Rackham Graduate School, the members of the preliminary examination committee as the dissertation committee. The necessary forms will be submitted by the department to the Rackham Graduate School within 2 months after advancement to candidacy.

## **7. Preliminary Examination Committee and Doctoral Dissertation Committee**

1. The Doctoral Preliminary Examination Committee and Doctoral Dissertation Committee must meet the following criteria:
  - a. A minimum of four members.
  - b. A minimum of two members must have faculty appointments in EHS (may include one faculty member with a primary appointment in a department other than EHS but who has an officially recognized/approved joint appointment in EHS) and be members of the Rackham Graduate Faculty.
  - c. The chair or co-chair must have a primary faculty appointment ( $\geq 50\%$  paid appointment) in EHS. Adjunct faculty cannot serve as co-chairs without explicit approval from the EHS Academic Degree Programs Committee. Petitions for such approval must be accompanied by a statement of justification signed by the EHS Co-chair and submission of a completed Rackham Special Nomination Form."
  - d. The committee must include at least one cognate member from the Rackham Graduate Faculty with a primary appointment in another department (EHS Faculty, including adjunct and joint appointments, are ineligible) and with an active interest in the research.
  - e. Thus, at least three members of the Committee, including the cognate, must be Rackham Graduate Faculty (see Rackham Student Handbook). Other committee members can be members of the Graduate Faculty or "special appointees." The additional committee member(s) may be scholars from other departments or from other institutions where scholarly work is performed.
  - f. Any other criteria imposed by the Rackham Graduate School or School of Public Health.
2. The Dissertation Committee is responsible for the evaluation of the student's progress toward completing the dissertation research. The committee composition is usually the same as the Preliminary Examination Committee.
3. Members of the Dissertation Committee should play a central role in the student's PhD program and should be consulted regularly for academic and technical advice. Meetings of the committee members (with or without the student, at their discretion) may be called as needed. A report is put in the student's file after each meeting.
4. Once a Dissertation Committee has been established, any changes to the committee membership need to be approved by the EHS Academic Degree Programs Committee. A memo should be generated by the student, endorsed by the dissertation chair, and submitted to the Student Services Office. The memo should indicate what changes are being requested, justification for the changes, and the revised committee membership. The request is reviewed by the EHS Academic Degree Programs Committee for approval and then forwarded to the appropriate offices for processing.

## **8. The Research Program**

1. After advancing to candidacy, students are expected to register for EHS 995 for any term they draw upon University resources, which includes faculty and staff time.
2. By definition, the work performed for the PhD should be original and scientifically significant. It should contribute to the field of study in a way that advances the state-of-the-art. Generally, it should be hypothesis-driven, meaning that it sets forth along a series of well-defined paths defined by well-formulated postulates, and attempts to prove or disprove the hypotheses by means of data collection, analysis and interpretation. It should be guided by rigorous principles of scientific inquiry and ethics.
3. Original research requires capabilities that differ from those required for didactic courses. Accordingly, an emphasis is placed on developing such capabilities in the student. Skills to be imparted and developed include reviewing the literature and placing the student's work in the context of what others have done before and the state-of-the-art, writing and speaking effectively and articulately, developing and perfecting technical and methodological skills, generating high-quality data with proper quality control measures, managing samples and data, analyzing the data, interpreting and presenting the results, drawing conclusions, and recognizing the shortcomings of the work and the nature of any future studies needed to build upon that which has just been completed.
4. Advice and assistance should be sought whenever necessary from members of the Dissertation Committee, from other members of the EHS faculty, or from any other qualified scholars with insights or experience that could be brought to bear. The student, however, is responsible for the originality of study, the progress of the research, the quality of the results, the soundness of the interpretations, and the style and clarity of its presentation as a written document.
5. Students must submit a written progress report to the Student Services Office for review by the EHS Academic Degree Programs Committee every year (in May). A form is available for this purpose from the Student Services Office (Attachment 3). It is filled out by both the student and primary research mentor, discussed between them, and signed prior to submission. Should the student not be making satisfactory progress toward the degree, certain actions are triggered (see form).
6. Students are expected to give at least one departmental seminar describing their research and pertinent findings prior to the dissertation defense.
7. Students are expected to co-author at least one peer-reviewed publication based upon their research prior to graduation. They should be listed as first author to acknowledge that they were the primary researcher for the work.
8. Students are also expected to assimilate and adopt proper study habits, ethical integrity, and professional attitudes commensurate with the scholarly nature of their pursuit.

## **9. Data Review Meeting (Data Meeting)**

1. At least four months (no exceptions!) prior to scheduling the defense of the dissertation, a data review meeting must be held with members of the dissertation committee. This is an extremely important meeting. The defense cannot be scheduled prior to a successful data review. In fact, the outcome of a successful data meeting is permission by the dissertation committee to proceed with writing and, ultimately, defending the dissertation.
2. Preferably all, but a minimum of three committee members (including cognate), should attend this meeting. If there are committee members off-campus who cannot attend, alternative means of communicating with those members should be arranged in order to obtain their input.
3. The purpose of the data meeting is for the committee to critically assess the following:
  - quality and quantity of research performed by the student
  - extent to which the research has met the goals set forth in the research proposal submitted as part of the student's Preliminary Examination (note: legitimate changes in research goals are allowable)
  - progress the student has made toward an advanced understanding of the methodology, importance and implications of the research, and critical interpretation of the results
  - ability to organize, present, and discuss material in a professional manner and demonstration of mastery of the topics to be included in the dissertation
4. The student should give a formal presentation to the committee that summarizes the work performed and includes methodological details, key results and their implications, remaining work to be completed and included in the dissertation, conclusions, and recommendations for future research.
5. A member of the dissertation committee other than the chair should preside, and the chair should intercede only for reasons of clarification.
6. The committee deliberates immediately following the presentation and completes the Pre-Defense Data Form (Attachment 3). The committee chair informs the student whether he/she can proceed to schedule the dissertation defense. If a student is deemed not ready to defend the thesis because the material presented is inadequate or there is a need for additional analysis, the committee will provide the student with detailed suggestions on what needs to be done.
7. Official notification is provided to the EHS Academic Degree Programs Committee by the dissertation committee chair via the Pre-Defense Data Form when the student has received dissertation committee approval to write and defend the dissertation.

## **10. The Dissertation**

1. The dissertation represents the culmination of several years' worth of work by the student. It is an important document.
2. Since it serves as a permanent record of the contributions made by the student, the dissertation should be written carefully and coherently with proper regard for technical and literary style and quality. Students are advised to consult previous dissertations, which are available from the primary research mentor or through the university library system, to obtain a sense of acceptable style and content.
3. Typical dissertations are 180-250 pages long. Often the substantive chapters (which typically follow one or two introductory chapters), each of which describes a component of the broader body of work performed over the course of the student's career, have been or could be published in the peer-reviewed literature in slightly revised form. In fact, one approach taken by many primary research mentors is to encourage students to think of chapters and publications in a similar vein, and to organize the chapters in the dissertation accordingly. Although it is technically a violation of copyright regulations to re-publish peer-reviewed articles verbatim as dissertation chapters (or vice versa), the content will invariably be very similar – unlike archival publications, dissertation chapters are not restricted in length and could contain data and analyses too lengthy to include in a published paper.
4. Another purpose of the dissertation is to serve as a resource for other students working in the same area who might build upon the research performed to date. It is useful to keep this in mind as the student writes the dissertation, particularly the conclusions and topics requiring additional study.
5. Rackham places very specific formatting requirements on the dissertation. The student should visit the appropriate Rackham webpage or office to obtain guidance documents on this subject.
6. It is customary to provide copies (bound) to the members of the committee after the final version is submitted to Rackham. More recently, a complete and searchable PDF file is also provided.

## **11. Defense of the Dissertation and Filing of Final Version**

1. The student must be officially registered (and their tuition paid) in order to defend the dissertation. The (oral) defense is normally scheduled during the fall or winter semester, unless special arrangements are made for a Spring/Summer defense and agreement is obtained by all dissertation committee members.
2. Permission for the student to set the date for the final oral examination is given by the primary mentor on the basis of the comments obtained from the dissertation committee at the Data Meeting and progress made by the student since that meeting. It reflects the judgment of the mentor that the dissertation research is complete or virtually so.
3. Once permission is granted to set the date of the defense, the student must notify the Student Services Office so that forms can be ordered and a check can be made that all other degree requirements have been met.

4. The defense is held only after all members of the dissertation committee have had adequate time to review a near-final version of the written dissertation. Rackham requires a minimum of two weeks be afforded the committee to review the dissertation prior to the defense. Since this deadline has been routinely exceeded in recent years, in fairness to the committee members, EHS requires that the committee be given three weeks to review the dissertation prior to the defense. Exceeding this deadline automatically voids the originally scheduled defense date and demands that the student reschedule or get permission from all committee members to hold to the original date.
5. The primary mentor (dissertation committee chair) is responsible to the other members of the committee for ensuring that the draft that they receive has been reviewed, edited, and revised sufficiently to be considered in 'near-final' form prior to distribution for their evaluation.
6. The defense of the dissertation is considered the final oral examination of the candidate's mastery of the subject matter covered in the dissertation. It is open to the public, and notices of the event are posted ahead of time with an open invitation to interested parties. The candidate gives a formal presentation, typically 40-45 minutes in length, that describes the major findings of the research and the implications in relation to the current state of knowledge in that field. Following the presentation, the candidate answers questions from the audience and then from the Dissertation Committee. The latter part of the defense is a closed session.
7. All members of the Dissertation Committee must be present for the defense.
8. The Dissertation Committee may at the time of the defense require alterations or corrections to the dissertation. The 'Report of the Final Oral Examination' is submitted at the conclusion of the defense. Any changes requested in the dissertation must be made prior to final filing, and it typically falls to the primary research mentor to ensure that such changes are made.
9. The final form of the dissertation must be taken to a local bindery and then be registered with the Rackham Graduate School (see Rackham Graduate School Handbook). Once Rackham accepts the dissertation, the student has officially completed the program and earned their PhD degree. The celebrations can then commence!

## **ATTACHMENTS**

Attachment 1 - Required Courses

Attachment 2 – Doctoral Qualifying Examination (DQE)

Attachment 3 - Forms

# ATTACHMENT 1 – Required Coursework

## DOCTOR OF PHILOSOPHY (Ph.D.) (Environmental Health Sciences)

### Departmental Course Requirements

*Select one (1) of the following*

- BIOSTAT 503 (4) Introduction to Biostatistics
- BIOSTAT 553 (4) Applied Biostatistics
- STAT 400 (4) Applied Statistical Methods

*Select one (1) of the following*

- EPID 503 (3) Strategies and Uses of Epidemiology
- EPID 601 (4) Principles and Methods in Epidemiology

*Select two (2) of the following:*

- BIOSTAT 513\* (3) Application of Regression Analysis to Health Studies
- BIOSTAT 523\* (3) Biostatistical Analysis for Health-Related Studies
- BIOSTAT 560 (3) Statistical Methods in Epidemiology
- STAT 401 (3) Applied Statistical Methods II
- STAT 503 (3) Applied Multivariate Analysis

*Statistics or Biostatistics course (determined with advisor and approval of doctoral committee)*

\*NOTE: Students select either BIOSTAT 513 or BIOSTAT 523. The two courses cannot be used to meet the upper level statistic course requirements.

Cognate Course – One 2-3 credit hour course outside the Department of Environmental Health Sciences (to be determined by advisor with approval of doctoral committee)

- EHS 688 (1) Topics in Environmental Health Sciences<sup>1</sup>
- EHS 869 (1) Doctoral Seminar in Environmental Health Sciences<sup>2</sup>
- EHS 899 (≤6) Advanced Research (2 separate rotations required)<sup>3</sup>

<sup>1</sup>EHS 688 is a departmental seminar that spans the first 2 terms. It is expected that they will attend seminars throughout their doctoral program but they do not have to officially register.

<sup>2</sup>EHS 869 is a doctoral seminar that students register for until they have passed their Preliminary Exam. Prior to the Prelim exam, they will present a formal seminar in this class.

<sup>3</sup>EHS 899 - Students complete two separate rotations with different faculty for a minimum of 1 credit each time

### Additional Course Requirements

*Select one (1) of the followings*

- EHS 501 (2) Occupational Diseases
- EHS 506 (2) Principles of Toxicology
- EHS 507 (2) Principles of Exposure Assessment
- EHS 508 (2) Principles of Risk Assessment

*Select one (1) of the following:*

- EHS 509 (3) Ecological Toxicology
- EHS 550 (3) Principles of Occupational and Environmental Health
- EHS 570 (3) Water Quality Management
- EHS 572 (2) Environmental Impact Assessment
- EHS 574 (3) Environmental Chemistry
- EHS 576 (3) Microbiology in Environmental Health

*500-level EHS course (determined with mentor and approval of doctoral committee)*

*Select three (3) of the following courses (or 600-level courses in EHS added subsequently)\*.*

- EHS 608 (3) Environmental Epidemiology
- EHS 612 (3) Biochemical and Molecular Toxicology
- EHS 625 (2) Environment & the Immune Response
- EHS 630 (3) Principles of Nutritional Sciences
- EHS 631 (3) Metabolism of Vitamins & Minerals
- EHS 652 (3) Evaluation of Chemical Hazards
- EHS 653 (3) Environmental Sampling and Analysis Lab
- EHS 654 (3) Control of Exposures to Airborne Contaminants
- EHS 657 (3) Advanced Exposure Assessment
- EHS 672 (3) Life cycle assessment: Human health and environmental impacts
- EHS 675 (2) Data Analysis for Environmental Epidemiology
- EHS 680 (3) Environ Management Hazardous Substances

\*NOTE: For students who will be pursuing laboratory-based research, a laboratory is required. The laboratory course can be from another department.

## DOCTOR OF PHILOSOPHY (Ph.D.) (Toxicology)

### Course Requirements

*Select one(1) of the following*

- BIOSTAT 503 (4) Introduction to Biostatistics
- BIOSTAT 553 (4) Applied Biostatistics
- STAT 400 (4) Applied Statistical Methods

*Select one (1) of the following*

- EPID 503 (3) Strategies and Uses of Epidemiology
- EPID 601 (4) Principles and Methods in Epidemiology

*Select one (1) of the following:*

- BIOSTAT 513 (3) Application of Regression Analysis to Health Studies
- BIOSTAT 523 (3) Biostatistical Analysis for Health-Related Studies
- BIOSTAT 560 (3) Statistical Methods in Epidemiology
- STAT 401 (3) Applied Statistical Methods II
- STAT 503 (3) Applied Multivariate Analysis

*Statistics or Biostatistics course (determined with advisor and approval of doctoral committee)*

- EHS 688 (1) Topics in Environmental Health Sciences<sup>1</sup>
- EHS 869 (1) Doctoral Seminar in Environmental Health Sciences<sup>2</sup>
- EHS 899 (≤6) Advanced Research (2 separate rotations required)<sup>3</sup>

---

<sup>1</sup>EHS 688 is a departmental seminar that spans the first 2 terms. It is expected that they will attend seminars throughout their doctoral program but they do not have to officially register.

<sup>2</sup>EHS 869 is a doctoral seminar that students register for until they have passed their Preliminary Exam. Prior to the Prelim exam, they will present a formal seminar in this class.

<sup>3</sup>EHS 899 - Students complete two separate rotations with different faculty for a minimum of 1 credit each time

### Additional Course Requirements

- EHS 506 (2) Principles of Toxicology
- EHS 612 (3) Biochemical and Molecular Toxicology
- EHS 616 (2) Toxicologic Pathology
- EHS 717 (1) Toxicology Pathology Laboratory

*Select one (1) of the followings*

- EHS 622 (2) Mechanisms of Developmental Toxicology
- EHS 623 (2) Mechanisms of Reproductive Toxicology
- EHS 624 (2) Mechanisms of Neurotoxicology
- EHS 625 (2) Environment & the Immune Response

*Select two (2) of the followings*

- BIOLCHEM 550 (3) Macromolecular Structure and Function
- HUMGEN 541 (3) Molecular Genetics
- CDB 530 (3) Cell Biology

## ATTACHMENT 2

### EHS Doctoral Qualifying Examination

1. The DQE is a written examination comprising two components intended to assess a student's aptitude for doctoral-level work.

- a. The first component is given *in class* and typically spans two four-hour time periods (e.g., morning and afternoon of the same day or mornings on two different days). It is closed-book (no notes, published materials, electronic access or aids, other than a calculator will be allowed) and there is a time limit for completion.

The in-class component of the DQE is intended to explore the student's grasp of core principles and their application to a specific field of study.

The examination consists of one or more general questions addressing the understanding of general environmental health issues, methodologies and models, including areas of biostatistics and epidemiology where appropriate. It usually comprises less than half of the total content of the examination.

The major portion of the in-class examination contains questions from subject matter covered in the more advanced courses taken by the student in their chosen major area of study.

- b. At the conclusion of the last in-class component the student begins the *take-home* component, which is completed within 3-4 days. Specific instructions are provided. For this component, students are expected to work independently but can utilize notes, textbooks, literature, and other appropriate resources.

The take-home portion provides an opportunity for students to more carefully consider and present their answers. Questions for this section will focus on the student's ability to synthesize information, compare and contrast different views on a subject, devise rational and well-supported conclusions, provide constructive critique of published work, and devise appropriate hypotheses and experiments to support them. The use of verbatim descriptions from previously published materials (including course notes, internet resources, journal articles, books, etc.) is not allowed. Students should identify previously published materials, ideas, and/or experimental designs used to prepare their answers and provide citations to the sources of such material in their responses. Responses from the take-home portion of the examination are to be typed, double-spaced, single-sided and neatly presented. Specific instructions for format, length, content and timetable for completion will be included with the examination.

***Evidence of collaboration, consultation with other individuals, verbatim use of reference materials, or plagiarism will result in a failure of the exam and a recommendation for dismissal from the doctoral program.***

## 2. Question Format

The questions in the DQE will differ for each student, depending on the major area of study in which the student is enrolled and the specific courses taken prior to the examination. At least three (typically more) different faculty members contribute questions to any given exam.

The DQE is not intended to be a re-evaluation of the coursework but will be derived from them and should reflect the outcomes expected from those courses. Students should be able to demonstrate an understanding of the basic principles underlying environmental health sciences and his/her major area of study, as well as the ability to apply such principles to problem-solving.

The questions are intended to evaluate the ability to synthesis information, develop hypotheses, devise experiments to test hypotheses, interpret data, and to express these outcomes in writing. Acceptable responses to questions should demonstrate an understanding of concepts, methodologies and practices germane to the subject areas.

Specific questions for the qualifying examination are solicited from the appropriate departmental faculty. Students can expect questions related to core courses in biostatistics, epidemiology and general environmental health as well as questions based on subject matter from higher-level courses that they have taken.

The in-house and take-home portions of the examination will not differ significantly in their overall attempt to evaluate the student's ability to think critically, synthesize information, and apply principles. Some questions may not have a single "correct" answer but instead will challenge students to propose possible solutions and support them with appropriate facts and rational arguments.

The questions are scored by the faculty members who devised them and the scores are tallied and reviewed by the EHS Academic Degree Programs Committee.

3. All examinees are identified using a double-blind system. Each answer is evaluated by the faculty member who wrote the question and assigned a numerical score from 0-100 (100 being a perfect score). A score of 70% is considered the minimum required to get full credit for any specific question. It is expected that a student will achieve an average score of at least 80% on all questions to pass the DQE unconditionally. Faculty members will submit graded exams questions to the EHS Academic Degree Programs Committee within two weeks of the exam. Where a student has done particularly poorly on a question, the faculty member is expected to provide explanatory text. Numerical scores are collated and assessed individually and collectively by the Doctoral Committee and the student is assigned one of the following DQE outcomes:
  - a. **Pass** – Meets expectations for the exam
  - b. **Conditional Pass** – Deficiencies or errors noted, but overall response may be acceptable pending supplemental evaluation.
  - c. **Fail** – Does not meet expectations for doctoral level work due to critical deficiencies or errors

The Committee may take supplementary information into account such as independent studies, research reports, papers, references, or any other supportive documentation determining the potential for doctoral study. The final decision requires consensus among all members of the EHS Academic Degree Programs Committee. DQE scores and the Committee's decision should be communicated to the student within four weeks of completing the exam.

## **ATTACHMENT 3 - FORMS**

Request to Take Preliminary Examination (Ph.D.)

Preliminary Examination Recommendation (Ph.D.)

Pre-Defense Data Meeting

Doctoral Progress Report

## Request to Take Preliminary Examination (Ph.D.)

---

Date of Examination: \_\_\_\_\_ Time: \_\_\_\_\_ Place: \_\_\_\_\_

---

Name: \_\_\_\_\_ I.D. No: \_\_\_\_\_

Address (home): \_\_\_\_\_

Major Area: \_\_\_\_\_

Proposal Title: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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Summary of Proposed Research (attach copy and provide a disk/electronic version):

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	Name	Rank	Dept/Unit
Chair/Co-Chair:	_____	_____	_____
Chair/Co-Chair:	_____	_____	_____
Cognate:	_____	_____	_____
Member*	_____	_____	_____
Member*	_____	_____	_____
Member*	_____	_____	_____

---

\*If a member is not a regular member of the graduate faculty, please attach the special nomination form found on the Rackham degree website. Include all attachments.

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Approved By:

\_\_\_\_\_  
Dissertation Advisor                      Date

\_\_\_\_\_  
EHS Academic Degree Programs Committee Chair                      Date

## Preliminary Examination Recommendation (Ph.D.)

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Name: \_\_\_\_\_ I.D. No.: \_\_\_\_\_

Address (home): \_\_\_\_\_

Major Area: \_\_\_\_\_ Degree: \_\_\_\_\_

Preliminary Exam Date: \_\_\_\_\_

Proposal Title: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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The above student's dissertation proposal is \_\_\_ APPROVED \_\_\_ NOT APPROVED.

The above student \_\_\_ PASSED \_\_\_ CONDITIONALLY PASSED \_\_\_ DID NOT PASS  
the oral preliminary exam on the above date. Explain 'conditionally passed' or 'did not pass'.

The undersigned faculty participated in the examination.

\_\_\_\_\_  
Chair/Co-Chair                      Dept/Unit                      Signature                      Date

\_\_\_\_\_  
Chair/Co-Chair                      Dept/Unit                      Signature                      Date

\_\_\_\_\_  
Cognate                                  Dept/Unit                      Signature                      Date

\_\_\_\_\_  
Member                                  Dept/Unit                      Signature                      Date

\_\_\_\_\_  
Member                                  Dept/Unit                      Signature                      Date

\_\_\_\_\_  
Member                                  Dept/Unit                      Signature                      Date

## Pre-Defense Data Meeting

Student Name: \_\_\_\_\_ UMID: \_\_\_\_\_ Date: \_\_\_\_\_

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**Evaluation of the research results presented by the candidate:**

Objectives/Aims of Research	_____ Satisfactory	_____ Unsatisfactory
Command of topics	_____ Satisfactory	_____ Unsatisfactory
Novelty of research	_____ Satisfactory	_____ Unsatisfactory
Quality/Quantity of research	_____ Satisfactory	_____ Unsatisfactory

Suggestions/Comments:

**The Dissertation Committee recommends the student  
write his/her dissertation:**

\_\_\_\_\_ **YES**      \_\_\_\_\_ **NO**

If no, provide list of major concerns, Specific recommendations for further research work, other requirements set by Dissertation Committee (attach additional sheets if necessary)

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*Signatures of all Committee members indicate approval of the requirements listed above.*

	<i>Name Printed</i>	<i>Signature</i>
Chair/Co-Chair	_____	_____
Chair/Co-Chair	_____	_____
Cognate	_____	_____
Member	_____	_____
Member	_____	_____
Member	_____	_____

## **Procedures for Annual Feedback of EHS Doctoral Students**

As part of the EHS Departmental guidelines, an annual progress report is required. The goal of this report is to provide annual and specific feedback to graduate students on their progress toward the Ph.D. and to facilitate increased interactions between students and their thesis committee members throughout their tenure at Michigan. Annual reports will be required for all students in the doctoral program beginning in their first year. The following procedures will be used to provide feedback to assess graduate student progress toward their degree.

1. By May 1 of each year, faculty mentors and their students will complete the attached form describing the progress of each student. Students will write a short summary of their research progress and goals for the following year to be submitted with the form.
2. For students making MARGINAL progress toward the doctoral degree, the student and mentor will reassess progress using the same form by November 1.
  - a. If at that time, good progress is still not being made, the student must meet immediately (within 1 month) with his/her committee. For students who have not pass there preliminary examination, the departmental doctoral committee will act as the committee.
3. For those students NOT making good progress toward the degree
  - a. The student should meet immediately (within one month) with his/her thesis committee. For students who have not passed their preliminary examination, the departmental doctoral committee will serve as the committee. The student will present the research that he/she has accomplished and the committee (including the faculty mentor) will determine whether the student's progress indicates that the student should be considered in good standing or not in good standing the doctoral program. The committee in conjunction with the student may also identify a list of goals that the student must achieve by a given date (within 4 months of the first meeting). Immediately after this deadline, the committee will re-convene to discuss with the student the progress toward those goals and whether the student is now making good progress toward the Ph.D. degree  
  
The faculty mentor and the committee will be required to submit a summary of the committee meeting to the doctoral committee chair. Each member of the committee and the student will receive a copy of this document.
4. A faculty mentor and/or a student may choose to complete this form at any date other than May 1<sup>st</sup> if they feel that it is necessary or important. Submission of a year-end evaluation will still be required by May 1<sup>st</sup> of that year.

NAME: \_\_\_\_\_

STUDENT I.D.: \_\_\_\_\_

MENTOR: \_\_\_\_\_

ACADEMIC YEAR: \_\_\_\_\_

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**I. Candidate Information** *(to be completed by candidate and mentor)*

- A. Year Started PhD Program: \_\_\_\_\_
- B. Date of Satisfactory Completion of DQE: \_\_\_\_\_
- C. Date (or projected date) of Preliminary Exam: \_\_\_\_\_
- D. Date (or projected date) of Data Meeting \_\_\_\_\_
- E. Projected Semester and year of dissertation defense: \_\_\_\_\_

**II. Research Progress** *(to be completed by candidate as an attachment)*

- F. Summarize briefly, in bullet style, your major research accomplishments. Include a list of publications and presentations
- G. Describe how these research accomplishments fit within the goals of the previous year's plan and how they relate to your thesis objectives (two page double spaced limit).
- H. Summarize in bullet style your primary research goals for the upcoming year. Under each goal describe its importance to your thesis and future publications and include a strategy on how to plan to accomplish that goal.
- I. Describe any obstacles that may hinder your progress.

**III. Funding** *(to be completed by mentor):*

- J. Type of funding (i.e. GSRA, GSI, Fellowship) and source of funding

Current (2009-2010) year funding

Fall 2009 \_\_\_\_\_

Winter 2010 \_\_\_\_\_

Spr/Sum 2010 \_\_\_\_\_

Proposed (2010-2011) year funding

Fall 2010 \_\_\_\_\_

Winter 2011 \_\_\_\_\_

Spr/Sum 2011 \_\_\_\_\_

**IV. Evaluation by Mentor** *(to be completed by mentor as an attachment)*

K. Describe the candidate's research progress and performance during the past year. Please provide specific comments on the following to the extent possible:

1. research skills (literature background, experimental design, focus, technique, ingenuity, productivity)
2. communication (written, oral)
3. presentation (informal, formal)
4. teaching/mentorship of fellow students
5. coursework (sufficient foundation for research?)
6. leadership (consensus building, decision making, etc.)

L. Does the candidate have deficiencies or other obstacles that could hinder progress toward obtaining her/his degree? If so, describe them as well as the suggested remedial action.

**V. Progress toward Degree**

M. Is the student making good progress towards compiling their doctoral degree?

YES

MARGINAL

NO

*If you indicated that the student is not making good progress ('NO'), then the student's committee must meet within one month to discuss the student's progress and standing in the Department and submit a report to the ADP Committee. If you indicated 'MARGINAL' progress, the student must be re-evaluated by November 1 and a updated report by the mentor submitted to the ADP Committee. If at this time progress is still marginal or unsatisfactory, then a committee meeting must be convened within one month and a report submitted to the ADP Committee*

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*To be signed after both student and faculty mentor have reviewed the completed report.*

\_\_\_\_\_  
*Signature of Student*

\_\_\_\_\_  
*Date*

\_\_\_\_\_  
*Signature of Faculty Mentor*

\_\_\_\_\_  
*Date*

# APPENDIX C

## Additional Forms

BIC Plan

BIC Request for Exemption or Special Substitution Form

Departmental Request for Exemption or Special Substitution Form

**DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCES  
SCHOOL OF PUBLIC HEALTH  
BREADTH, INTEGRATION AND CAPSTONE (BIC)**

Student's Name \_\_\_\_\_ Date \_\_\_\_\_

I.D.# \_\_\_\_\_ Enrolled (First Term) \_\_\_\_\_  
TERM      YR

Advisor \_\_\_\_\_ Sub-Plan     EQH     HN     IH     IH-HSAT  
 OEE     TX     RS     Dietetics

Original Plan \_\_\_\_\_ Student's Signature \_\_\_\_\_

Revised Plan \_\_\_\_\_ Advisor's Signature \_\_\_\_\_

**METHODOLOGICAL CORE**

Select one from each of the following areas:

***Biostatistics***

- \_\_\_\_\_ BIostat 503 Introduction to Biostatistics
- \_\_\_\_\_ BIostat 553 Applied Biostatistics
- \_\_\_\_\_ STAT 400 Applied Statistical Methods
- \_\_\_\_\_ OTHER (attach exemption form)

***Epidemiology***

- \_\_\_\_\_ EPID 503 Strategies & Uses of Epidemiology
- \_\_\_\_\_ EPID 601 Principles and Methods of Epidemiology

**BREADTH AND INTEGRATION and CAPSTONE (BIC)**

Select one from each of the following areas:

***Environmental Health Sciences***

- \_\_\_\_\_ EHS 508 Principles of Risk Assessment
- \_\_\_\_\_ EHS 550 Principles of Occupational & Environmental Hygiene
- \_\_\_\_\_ OTHER (attach exemption form)

***Health Management and Policy***

- \_\_\_\_\_ HMP 602 Medical Care Organization and Delivery
- \_\_\_\_\_ HMP 653 Law and Public Health
- \_\_\_\_\_ HMP 685 The Politics of Health Policy
- \_\_\_\_\_ OTHER (attach exemption form)

***Health Behavior and Health Education***

- \_\_\_\_\_ HBHE 600 Psychosocial Factors in Health Related Behavior
- \_\_\_\_\_ HBHE 632 Racial/ Ethnic Health Disparities Research and Interventions
- \_\_\_\_\_ HBHE 622 Critical Histories, Critical Moments in Health Behavior and Health Education

***Capstone***

- \_\_\_\_\_ EHS 600 Professional Perspectives in Environmental Health

APPROVED: \_\_\_\_\_  
EHS Department      Date

**DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCES  
SCHOOL OF PUBLIC HEALTH  
BREADTH, INTEGRATION AND CAPSTONE (BIC)**

**REQUEST FOR EXEMPTION OR SPECIAL SUBSTITUTION**

Student's Name \_\_\_\_\_ Date \_\_\_\_\_

I.D.# \_\_\_\_\_ Enrolled (First Term) \_\_\_\_\_  
TERM      YR

Advisor \_\_\_\_\_ Sub-Plan     EH     HN     IH     IH-HSAT  
 OEE     TX     RS     Dietetics

Area in which exemption or special substitution is requested:

- \_\_\_\_\_ *Biostatistics*
- \_\_\_\_\_ *Health Behavior and Health Education*
- \_\_\_\_\_ *Health Management and Policy*
- \_\_\_\_\_ *Environmental Health Sciences*
- \_\_\_\_\_ *Capstone*

Student's Signature \_\_\_\_\_

Advisor's Signature \_\_\_\_\_

**Complete all relevant parts (attach additional materials as required):**

**A. Relevant courses(s) completed or courses(s) to be substituted**

Institution	Department	Course No	Title	Credit Hrs Semester or Qtr	Grade	Year Taken

**B. Exemption by examination**

Department	Course No	Title	Date of Examination	Grade

**C. Other**

\_\_\_\_\_ Approved  
 \_\_\_\_\_ Disapproved

\_\_\_\_\_ EHS Professional Degree Program Chair

\_\_\_\_\_ Date

**DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCES**

**REQUEST FOR EHS COURSE  
EXEMPTION OR SPECIAL SUBSTITUTION**

Student's Name \_\_\_\_\_ Date \_\_\_\_\_

I.D.# \_\_\_\_\_ Degree \_\_\_\_\_ Enrolled (First Term) \_\_\_\_\_  
TERM      YR

Advisor \_\_\_\_\_ Sub-Plan     EH     HN     IH     IH-HSAT  
 OEE     TX     RS     Dietetics

Student's Signature \_\_\_\_\_

Advisor's Signature \_\_\_\_\_

Course in which exemption or special substitution is requested:

Department	Course No	Title	Instructor

**Complete all relevant parts (attach additional materials as required):**

**A. Relevant courses(s) completed or courses(s) to be substituted**

Institution	Department	Course No	Title	Credit Hrs Semester or Qtr	Grade	Year Taken

**B. Exemption by examination**

Department	Course No	Title	Date of Examination	Grade

**C. Other**

\_\_\_\_ Approved  
 \_\_\_\_ Disapproved

\_\_\_\_\_  
 EHS Academic/Professional Degree Committee Chair

\_\_\_\_\_  
 Date