



**University Senate
TRANSMITTAL FORM**

Senate Document #:	16-17-17
PCC ID #:	16008
Title:	Establish a Ph.D. in Environmental Health Sciences
Presenter:	Andrew Harris, Chair, Senate Programs, Curricula, and Courses Committee
Date of SEC Review:	October 19, 2016
Date of Senate Review:	November 2, 2016
Voting (highlight one):	<ol style="list-style-type: none"> 1. On resolutions or recommendations one by one, or 2. In a single vote 3. To endorse entire report
Statement of Issue:	<p>The School of Public Health and the Maryland Institute for Applied Environmental Health (MIAEH) propose to offer a new Ph.D. in Environmental Health Sciences. Environmental health is a branch of public health centered on all aspects of the natural and built environment that may affect human health. This doctoral degree will focus on human health, environmental epidemiology, risk assessment, environmental justice, and occupational health. In recent years, national public health organizations such as the US Department of Health and Human Services and the Centers for Disease Control and Prevention have advocated for the increase in the number of environmental health experts.</p> <p>Currently, MIAEH offers a Ph.D. in Toxicology. Toxicology is defined as the study of the effects of chemicals and physical agents on living organisms. The Ph.D. in Toxicology is the focus area of only a small minority of the MIAEH faculty. The Toxicology degree is jointly administered with other University System of Maryland institutions. Most students that are enrolled in the Toxicology program are affiliated with the University of Maryland, Baltimore's Schools of Pharmacy and Medicine. The purpose for offering a Ph.D. in Environmental Health Sciences is to offer a broader doctoral degree that will better align with MIAEH faculty research areas, such as environmental</p>

	<p>epidemiology, risk assessment, environmental justice, and occupational health.</p> <p>The proposed program will require 24 credits of core courses that will cover areas such as environmental health, toxicology, risk assessment, environmental hazards, epidemiology, and biostatistics. The curriculum also requires 11-19 credits of supporting courses in public health topics. A specialization area of 12-15 credits is also required. MIEH899, Doctoral Dissertation Research, will be required for 12 credits. Students may be able to waive some course requirements based on their academic background.</p> <p>No additional resources are requested for this program. The existing administrative and faculty resources that exist in MIAEH are sufficient to offer this program.</p> <p>This proposal was approved by the Graduate School Programs, Curricula, and Courses committee on September 26, 2016, and was approved by the Senate Programs, Curricula, and Courses committee at its meeting on October 7, 2016.</p>
Relevant Policy # & URL:	N/A
Recommendation:	The Senate Committee on Programs, Curricula, and Courses recommends that the Senate approve this new degree program.
Committee Work:	The committee considered this proposal at its meeting on October 7, 2016. Stephen Roth, Associate Dean of the School of Public Health and Interim Director of MIAEH, presented the proposal and responded to questions from the committee. After discussion, the committee voted unanimously to recommend the proposal.
Alternatives:	The Senate could decline to approve this new program.
Risks:	If the Senate declines to approve this new program, the university will lose an opportunity to use existing resources and faculty expertise to address a national need for experts in environmental health.
Financial Implications:	There are no significant financial implications with this proposal.
Further Approvals Required:	If the Senate approves this proposal, it would still require further approval by the President, the Board of Regents, and the Maryland Higher Education Commission.

**University of Maryland PCC
Program/Curriculum/Unit Proposal**

PCC Log No: 16008

Program: Proposal for PhD program in Environmental Health Sciences

Department/Unit: Maryland Institute for Applied Environmental Health

College/School: School of Public Health

Proposal Contact Person (with email): Stephen Roth, sroth1@umd.edu

- Type of Action (check one):**
- Curriculum change (includes modifying minors, concentrations/specializations and creating informal specializations)
 - Curriculum change is for an LEP Program
 - Rename a program or formal Area of Concentration
 - Establish/Discontinue a formal Area of Concentration
 - Other:
- Establish a new academic degree/certificate program
 - Create an online version of an existing program
 - Establish a new minor
 - Suspend/Discontinue a degree/certificate program
 - Establish a new Master or Certificate of Professional Studies program
 - New Professional Studies program will be administered by Office of Extended Studies

Italics indicate that the proposal must be presented to the full University Senate for consideration.

Approval Signatures - Please print name, sign, and date. For proposals requiring multiple unit approvals, please use additional cover sheet(s).

1. Department Committee Chair Amy E. Sapkota [Signature] 2/22/14
2. Department Chair Stephen M Roth [Signature] 22 Feb 2016
3. College/School PCC Chair ROBIN SAWYER [Signature] 4/1/16
4. Dean JANE E. CLARK [Signature] 4/11/16
5. Dean of the Graduate School (if required) _____
6. Chair, Senate PCC Andrew Harris [Signature] 10/7/16
7. University Senate Chair (if required) _____
8. Senior Vice President and Provost _____

Instructions:
When approved by the dean of the college or school, please send the proposal and signed form to the Office of the Associate Provost for Academic Planning and Programs, 1119 Main Administration Building, Campus-5031, **and** email the proposal document as an MSWord attachment to pcc-submissions@umd.edu.

Summary of Proposed Action (use additional sheet if necessary):
This proposal seeks to establish a PhD degree in Environmental Health Sciences for the School of Public Health, administered by the faculty within the Maryland Institute for Applied Environmental Health (MIAEH). The degree will focus on human health, environmental epidemiology, risk assessment, environmental justice, and occupational health consistent with the areas of expertise of the MIAEH faculty. MIAEH currently offers the Master of Public Health in Environmental Health Sciences as well as a PhD program in Toxicology that is administered by the USM. Because toxicology is the focus area of only a small minority of our faculty, student recruitment is a challenge (e.g., students are reluctant to be perceived as toxicologists when they are training and developing research foci within other areas of environmental health science). Thus, in order to better support the training of doctoral students and provide a better alignment of career aspirations with faculty expertise, we are proposing this new PhD program.

Unit Code(s) (to be entered by the Office of Academic Planning and Programs):

PROPOSAL FOR
NEW INSTRUCTIONAL PROGRAM
UNIVERSITY OF MARYLAND AT COLLEGE PARK, MARYLAND

Ph.D. in Environmental Health Sciences

School of Public Health

Dean Jane Clark

Ph.D. Fall 2016 (with new admits anticipated Fall 2017)

I. OVERVIEW and RATIONALE

A. Briefly describe the nature of the proposed program and explain why the institution should offer it.

This is a proposal to establish a Ph.D. program in Environmental Health Sciences within the School of Public Health, administered by the faculty of the Maryland Institute for Applied Environmental Health (MIAEH). The degree will focus on human health, environmental epidemiology, risk assessment, environmental justice, and occupational health, consistent with the areas of expertise of the MIAEH faculty. MIAEH currently offers students flexible and individualized programs of study that lead to the Master of Public Health in Environmental Health Sciences. In 2010, MIAEH also became the UMD home of the USM-wide doctoral program in Ph.D. Toxicology (Toxicology Ph.D. curriculum shown in Appendix 1). Because toxicology is the focus area of only a small minority of our faculty, student recruitment has been challenging: students are reluctant to be perceived as toxicologists when they are training and developing research foci within other areas of environmental health science. Thus, in order to better support the training of doctoral students and provide a better alignment of career aspirations with faculty expertise, we are proposing a new Ph.D. program better matched to the full range of research within MIAEH.

Clarifying the differences between toxicology and environmental health sciences is important to understanding the basis for the present proposal. *Environmental health* is a branch of public health centered on all aspects of the natural and built environment that may affect human health. In contrast, *toxicology* is the study of the effect of chemicals and physical agents on living organisms. While there is overlap between the two fields (e.g., the study of chemical agents on human health), the research foci are quite different. Environmental health research includes environmental epidemiology, risk assessment, environmental justice, occupational health, among others, while toxicology has a stronger linkage with chemistry and pharmacology. As an example, the USM-administered Ph.D. in Toxicology has its largest student base from the UMB Schools of Pharmacy and Medicine with research primarily aligned with pharmacology faculty. Revising the Ph.D. in Toxicology would not serve the needs of environmental health students or faculty, nor would it serve UMB's needs; the fields are different, and students will anticipate different career options. The breadth of research areas in environmental health sciences necessitates the establishment of a doctoral degree dedicated to the study and advancement of environmental health sciences, considered one of the five core elements of the field of public health.

MIAEH was established in 2006 with a mission to carry out research on a broad range of environmental factors and their effects on human health. Faculty members in MIAEH collaborate with state, federal, international and private agencies to develop research solutions that address pressing environmental and occupational health problems. Students will become experts in areas including exposure assessment, environmental epidemiology, environmental microbiology, children's environmental health, environmental justice, occupational health, and risk assessment. They will also obtain a broad appreciation of public health as required for students graduating from a School of Public Health accredited

by the Council on Education in Public Health.

This degree program is also quite distinct from the environmental science-related Ph.D. programs offered by AGNR and CMNS, which focus primarily on ecosystem health and environmental science (e.g., graduate programs in Environmental Science and Technology and the system program in Marine, Estuarine and Environmental Sciences currently offered by other colleges, AGNR and CMNS, respectively).

Nearly every top 40 School of Public Health in the U.S. offers a Ph.D. in Environmental Health Sciences, and UMD will be more competitive in attracting top doctoral students with such a degree. The only Ph.D. program in Environmental Health Sciences within the state of Maryland is offered by Johns Hopkins University, a private institution, with one of the largest programs in the U.S. (15-20 doctoral enrollments per year). The only other Environmental Health Sciences doctoral programs near the mid-Atlantic region are at the following locations (enrollment data included, as determined from accreditation reports): West Virginia University (enrolled 2 students per year AY2013 and 2014); University of Pittsburgh (program size of 11 students in 2014); University of North Carolina (reports 5-10 enrolled students per year); and Rutgers University (enrolled 1-4 students per year in AY2013-15 - 4-7 MPH). UMD has lost top-quality doctoral students to peer programs because of the lack of a Ph.D. program. Our unique focus areas in environmental justice, cumulative burden of exposure, water re-use innovations (USDA-funded CONSERVE Center of Excellence), and climate change consequences on health will continue to distinguish UMD from peer schools to ensure strong recruitment of top-quality students.

Development of the environmental health workforce has been a key concern of the U.S. Department of Health and Human Services for many years. For example, the *Healthy People 2010* publication articulated the concern that public health infrastructure in several areas, including environmental health, was lacking and that workforce development opportunities need to be expanded. In particular for the present proposal, the Centers for Disease Control and Prevention (CDC) has noted the paucity of leaders in environmental health and raised the concern that impending retirements and vacancies will leave the environmental health leadership ranks severely understaffed (supporting documents and statements can be found at <http://www.cdc.gov/nceh/ehs/activities/training.htm>). As such, the development of a doctoral program in environmental health sciences at a public land-grant university will help support the workforce development needs of the field.

B. How big is the program expected to be? From what other programs serving current students, or from what new populations of potential students, onsite or offsite, are you expecting to draw?

We expect a typical doctoral student population of approximately 15 students, with few if any students joining the existing Toxicology Ph.D. program into the future. As such, we are effectively transitioning our recruitment efforts away from the Toxicology Ph.D. program to the Ph.D. program in Environmental Health Sciences and foresee no substantial change in resource requirements or administrative burden with the establishment of this degree program. The Toxicology Ph.D. program currently has 7 students, reflecting the challenges

with recruitment into this program. The majority of faculty anticipate mentoring 1-3 doctoral students, based mainly on the ability to fund through extramurally funded research assistantships. Thus, we anticipate a slightly increased enrollment with higher quality students compared to our current program size, and enrollments will be matched to extramural funding to ensure adequate student funding support. We expect many existing Toxicology students will transition to the new Ph.D. program once available (especially those early in their programs), although we will maintain both degrees into the foreseeable future to ensure support for student completion.

II. CURRICULUM

A. Provide a full catalog description of the proposed program, including educational objectives and any areas of concentration.

Students in the doctoral program in Environmental Health Sciences at the Maryland Institute for Applied Environmental Health (MIAEH) in the School of Public Health will master an essential core of knowledge in environmental and occupational health, epidemiology and biostatistics. Elective courses and rotations with faculty field studies and laboratories will offer students the knowledge and skills needed to specialize within the broader area of environmental health and become independent researchers.

Degree Requirements

The Ph.D. program in Environmental Health Sciences consists of a minimum of 46 credit hours of graduate courses depending on the incoming student's previous coursework. In particular, students without an MPH degree will require additional coursework as required by the public health accrediting body (CEPH). Graduate courses include (1) core courses within environmental health, epidemiology and biostatistics; (2) supporting courses in environmental health research, ethics, public health, and grant writing; (3) specialized courses selected within the research foci; and (4) dissertation credits. Program requirements for a Ph.D. degree also include successful completion of a written and oral comprehensive exam, oral defense of a written dissertation research proposal, and a minimum of 12 credits of Ph.D. dissertation research, written dissertation, and a final dissertation defense. The program can be completed on either a full- or part time basis. It is anticipated that students will complete more than the minimum number of credits.

The curriculum for the Environmental Health Sciences Ph.D. program is designed to provide an essential core of knowledge in environmental and occupational health, together with elective courses that offer students the background needed to specialize within this broad area.

Students are able to customize their selection of courses and lab rotations based on their specific career objectives. Students must file a preliminary program of study with the graduate program director before registering for their first semester of classes. They will submit an amended, final plan of study before the start of their second semester, approved by a program of study committee.

All students will complete a comprehensive written and oral qualifying examination overseen by a committee of graduate faculty, of whom the majority of members will be from within MIAEH. After passing the qualifying examinations, the student will be advanced to candidacy. Generally, the examining committee will serve as the dissertation committee. The candidate will then write a dissertation research proposal in consultation with the committee, submit the written proposal to the committee at least two weeks prior to a scheduled oral defense of the proposal, and finalize the proposal following the oral defense. The procedures for the dissertation defense and examining committee are as specified in the Graduate School Catalog. In general, student committees are formed with three MIAEH graduate faculty, with additional committee members coming from supporting units across campus and occasionally off-campus. A graduate committee oversees admissions and ensures that faculty workload burdens around advising and committee support are equitably spread across research foci (in addition to considering extramural funding support).

B. List the courses (number, title, semester credit hours) that would constitute the requirements and other components of the proposed program. Provide a catalog description for any courses that will be newly developed or substantially modified for the program.

See Table 1: Ph.D. Program in Environmental Health Sciences

The only newly developed course will be MIEH700 (bold in Table 1), planned as a follow-up (advanced) course after MIEH600. VPAC for MIEH700 will be submitted in tandem with this PCC proposal. The catalog description for MIEH700 is as follows:

MIEH700: (Pre-req: MIEH600) Advanced analysis of the chemical, physical and biological hazards present in our living and working environment and their effects on human health. A focus on analysis of recent research and development of new hypotheses. Topics include: exposure assessment, environmental justice, occupational health and safety, children's environmental health, ambient and indoor air pollution, food-borne diseases, solid and hazardous wastes, water resources, risk assessment, ecological issues and environmental laws.

Table 1: Ph.D. Program in Environmental Health Sciences		
	Course Title	Credits
Core Courses (24 Required Credits)*	MIEH 600 Foundations of Environmental Health	3
	MIEH 700 Applied Environmental Health	3
	MIEH 720 Principles of Toxicology	3
	MIEH 740 Risk Assessment	3
	MIEH 771 Exposure Assessment of Environmental Hazards	3
	EPIB 610 Epidemiology I	3
	EPIB 650 Biostatistics I	3
	EPIB 651 Biostatistics II	3
Supporting Courses (11 to 19 Required Credits)*	MIEH 609 Methods in Toxicology and Environmental Health (1 or 2 rotations)**	3 to 6
	EPIB 641 Ethics in Public Health	1
	MIEH 688 Environmental Health Seminar**	3
	Course(s) that will expose the student to concepts in health behavior and health services administration (This could include HLTH 665, HLSA 601 or a survey course that covers all five foundation areas of public health.)	1 to 6
	KNES 771 Grant Writing or Equivalent	3
Specialization Area (12 to 15 Credits)***	<i>The specialization area would be created by and tailored to each student. If the student takes 2 lab rotations, s/he would take 12 credits of specialization. If s/he takes 1 lab rotation, s/he would take 15 credits of specialization.</i>	12 to 15
Dissertation (12 Required Credits)	MIEH 899 Doctoral Dissertation Research	12
* Students could waive out of some of these courses with coursework taken at UMD or in previous master's programs.		

<p>** Students would not be able to waive out of all rotations or the seminar requirements. Rotations can be in physical labs or with faculty conducting non-laboratory based research. At least 1 rotation must be outside of the students focus area.</p>		
<p>***Students would not be able to waive out of any of the 12 to 15 credits required for the specialization area. No more than 6 credits of MIEH 898 could be taken as part of the specialization area.</p>		

Table 2: Typical Program Plan for Ph.D. in Environmental Health Sciences (for a B.S. degree holder)		
Academic Year	Course Title	Credits
Year 1	MIEH 600 Foundations of Environmental Health	3
	MIEH 609 Methods in Toxicology and Environmental Health	3
	EPIB 650 Biostatistics I	3
	MIEH 688 Environmental Health Seminar	1
	MIEH 700 Applied Environmental Health	3
	EPIB 610 Epidemiology I	3
	MIEH 688 Environmental Health Seminar	1
	HLTH 665 – Health Behavior	3
Year 2	MIEH 740 Risk Assessment	3
	MIEH 771 Exposure Assessment of Environmental Hazards	3

	MIEH 688 Environmental Health Seminar	1
	MIEH 609 Methods in Toxicology and Environmental Health	3
	EPIB 651 Biostatistics II	3
	MIEH 720 Principles of Toxicology	3
Year 3	EPIB 641 Ethics in Public Health	1
	HLTH 665 - Health Behavior I	3
	MIEH 688 Environmental Health Seminar	1
	Specialization Course	3
	Specialization Course	3
	Specialization Course	3
	HLSA 601 - Introduction to Health Systems	3
	MIEH 689 - Independent Study	3
Year 4	KNES 771 Grant Writing or Equivalent	3
	MIEH 688 Environmental Health Seminar	1
	Specialization Course	3
	Specialization Course	3
	MIEH 689/898 Independent Study	3-4
	MIEH 899 Doctoral Dissertation Research	6
Year 5	MIEH 899 Doctoral Dissertation Research	6
	MIEH 899 Doctoral Dissertation Research	6

C. Describe any selective admissions policy or special criteria for students selecting this field of study.

Admission to the program is limited to Ph.D. students. We plan to admit both BS and MS (or equivalent) degree holders depending on their qualifications. Applicants will typically hold degrees in biology, environmental sciences, engineering, public health, chemistry, or related fields. While we are submitting a separate MS program in Environmental Health Sciences, we will not actively recruit students into the MS program. The MS program is offered as an exit path for doctoral candidates who cannot or choose not to complete the Ph.D., or to those students who successfully complete the requirements and opt to obtain the additional credential.

Program requirements for the MS degree include a minimum of 31 course credits, including completion of either a non-thesis project or MS thesis.

Application Requirements:

1. Minimum 3.0 undergraduate GPA; 2. Undergraduate transcripts; 3. GRE scores taken within the past 5 years; 4. 3 letters of recommendation that address the applicant's academic capabilities and probability of success in graduate school; 5. Statement of goals and interests and their congruence with those of the program; 6. Relevant academic/work experience, including previous coursework in biology, chemistry, mathematics, statistical methods, and/or statistical software packages.

To apply to the Ph.D. program in Environmental Health Sciences, applicants must complete their application in SOPHAS: www.sophas.org

III. STUDENT LEARNING OUTCOMES AND ASSESSMENT

A. List the program's learning outcomes and explain how they will be measured.

B. Include a general assessment plan for the learning outcomes. (In lieu of a narrative for both IIIA and IIIB, you may attach the program's learning outcomes assessment forms.)

Competencies, Outcomes, and Assessments

1. Synthesize environmental health knowledge, including explaining and analyzing key theories, principles, methods and controversies, and identify opportunities to advance the field of environmental health.

Measure: Successful completion of the qualifying examination.

Criterion: 100% of graduates will pass the examination.

Assessment: Student comprehensive examination performance will be assessed yearly.

2. Develop testable hypotheses that will advance the field of environmental health.

Measure: Successful completion of the qualifying examination, dissertation research proposal, and oral defense of the dissertation proposal.

Criterion: 100% of graduates will pass the examination, and prepare and defend a research proposal.

Assessment: The rigor and quality of the research proposal components of these activities will be assessed for each student and compiled annually.

3. Design and conduct research studies, analyze data and test hypotheses that advance the science of environmental health.

Measure: Successful completion of dissertation research and submission of a completed dissertation.

Criterion: 80% of graduates will successfully defend and submit a dissertation within 5 years and 95% within 6 years of matriculation.

Assessment: The time to graduation will be assessed after there are at least six graduates from the program and annually thereafter.

4. Effectively communicate results of environmental health research to the scientific community.

Measure: Successful publication of research in peer reviewed journals and acceptance of abstracts at scientific conferences.

Criterion: 100% of graduates will present research either as posters or podium presentations at scientific meetings; 100% will have submitted three research papers to peer reviewed journals; 80% will have at least one paper accepted; and 50% will have two papers accepted for publication prior to defending their dissertation.

Assessment: Student CVs will be reviewed at program completion and publications and presentations will be confirmed by the advisor or other faculty.

IV. FACULTY AND ORGANIZATION

A. Who will provide academic direction and oversight for the program?

The Maryland Institute for Applied Environmental Health (MIAEH) will provide academic direction and oversight for the program, in collaboration with our colleagues in SPH and across campus.

B. If the program is not to be housed and administered within a single academic unit, provide details of its administrative structure.

N/A

V. OFF CAMPUS PROGRAMS

Not applicable.

VI. OTHER ISSUES

A. Describe any cooperative arrangements with other institutions or organizations that will be important for the success of this program.

None.

B. Will the program require or seek accreditation? Is it intended to provide certification or licensure for its graduates? Are there academic or administrative constraints as a consequence?

No.

VII. COMMITMENT TO DIVERSITY

Identify specific actions and strategies that will be utilized to recruit and retain a diverse student body.

The MIAEH faculty are a diverse group (e.g., 50% women; 50% underrepresented minorities) committed to recruiting, retaining, and graduating a diverse student body. Many of the faculty focus their research efforts on issues that impact health disparities. The faculty will use their networks of colleagues and professional organizations to ensure a diverse pool of applicants from which to recruit, retain, and graduate a diverse and excellent student body.

VIII. REQUIRED PHYSICAL RESOURCES

- A. *Additional library and other information resources required to support the proposed program. You must include a formal evaluation by Library staff.*

No additional library resources are required, as evaluated by the UMD Libraries staff.

- B. *Additional facilities, facility modifications, and equipment that will be required. This is to include faculty and staff office space, laboratories, special classrooms, computers, etc.*

None required.

- C. *Impact, if any, on the use of existing facilities and equipment. Examples are laboratories, computer labs, specially equipped classrooms, and access to computer servers.*

Because we anticipate that nearly all of our future Ph.D. students will matriculate into the Ph.D. program in Environmental Health Sciences rather than the Ph.D. program in Toxicology, we foresee little impact on existing facilities. Student numbers should be very close to those anticipated for the Ph.D. in Toxicology. The School of Public Health and MIAEH have adequate desk space for funded students and the research staff of our faculty.

IX. RESOURCE NEEDS and SOURCES

Describe the resources that are required to offer this program, and the source of these resources. Project this for five years. In particular:

- A. *List new courses to be taught, and needed additional sections of existing courses. Describe the anticipated advising and administrative loads. Indicate the personnel resources (faculty, staff, and teaching assistants) that will be needed to cover all these responsibilities.*

MIAEH will offer MIEH700, the only new course required for the proposed curriculum, every 2-3 semesters as needed to ensure student progress to degree completion. Any of our MIAEH faculty would be able to teach this course and we anticipate a rotation of faculty instructors. We anticipate no significant change in enrollments of our other courses due to these changes. MIEH700 would be a potential elective course for students in other SPH and campus master's and doctoral programs; we expect as many as 20% of seats would come from such students.

MIAEH has the necessary faculty to teach the necessary courses and advise doctoral candidates. No new resources are requested.

- B. *List new faculty, staff, and teaching assistants needed for the responsibilities in A, and indicate the source of the resources for hiring them.*

None anticipated or needed.

- C. *Some of these teaching, advising, and administrative duties may be covered by existing faculty and staff. Describe your expectations for this, and indicate how the current duties of these individuals will be covered, and the source of any needed resources.*

Our current faculty are in a position to add MIEH700 to our existing course schedule by minor shifting of some elective course offerings. We anticipate no significant burden with this course addition.

- D. *Identify the source to pay for the required physical resources identified in Section VIII above.*

Not applicable.

- E. *List any other required resources and the anticipated source for them.*

None.

- F. *Provide the information requested in [Table 1](#) and [Table 2](#) (for Academic Affairs to include in the external proposal submitted to USM and MHEC).*

See attached.

Appendix 1: Toxicology Ph.D. curriculum requirements

The doctoral program in Toxicology is a 58-credit (minimum) professional degree. Dependent upon entry level qualifications, all Ph.D. students will complete a minimum of:

- 12 credits in Toxicology and Environmental and Occupational Health
- two Laboratory Rotations for 3 credits each
- 3 credits of Environmental Health seminar
- 6 credits each to cover the Basic Biostatistics and Epidemiology courses
- 1 credit in Scientific Ethics
- 6 credits in each of two specialized areas:
 - Advanced Epidemiology and Biostatistics
 - Analytical Chemistry
 - Pharmacology
 - Pathology/Immunology/Microbiology
 - Environmental Science/Ecology/Climate
 - Environmental Justice

TABLE 1: RESOURCES

Resources Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Reallocated Funds	\$736,820	\$906,874	\$934,080	\$962,102	\$990,965
2. Tuition/Fee Revenue (c+g below)	\$121,115	\$124,748	\$128,491	\$132,346	\$136,316
a. #FT Students	13	13	13	13	13
b. Annual Tuition/Fee Rate	\$8,315	\$8,564	\$8,821	\$9,086	\$9,359
c. Annual FT Revenue (a x b)	\$108,095	\$111,338	\$114,678	\$118,118	\$121,662
d. # PT Students	2	2	2	2	2
e. Credit Hour Rate	\$651	\$671	\$691	\$711	\$733
f. Annual Credit Hours	10	10	10	10	10
g. Total Part Time Revenue (d x e x f)	\$13,020	\$13,411	\$13,813	\$14,227	\$14,654
3. Grants, Contracts, & Other External Sources	\$698,750	\$606,591	\$624,788	\$643,532	\$662,838
4. Other Sources	\$0	\$0	\$0	\$0	\$0
TOTAL (Add 1 - 4)	\$1,556,685	\$1,638,213	\$1,687,359	\$1,737,980	\$1,790,120

TABLE 2: EXPENDITURES

Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b+c below)	\$585,200	\$753,445	\$776,048	\$799,330	\$823,310
a. #FTE	4.0	5.0	5.0	5.0	5.0
b. Total Salary	\$440,000	\$566,500	\$583,495	\$601,000	\$619,030
c. Total Benefits	\$145,200	\$186,945	\$192,553	\$198,330	\$204,280
2. Admin. Staff (b+c below)	\$75,810	\$75,345	\$77,605	\$79,933	\$82,331
a. #FTE	1.0	1.0	1.0	1.0	1.0
b. Total Salary	\$57,000	\$56,650	\$58,350	\$60,100	\$61,903
c. Total Benefits	\$18,810	\$18,695	\$19,255	\$19,833	\$20,428
3. Total Support Staff (b+c below)	\$75,810	\$78,084	\$80,427	\$82,840	\$85,325
a. #FTE	1.0	1.0	1.0	1.0	1.0
b. Total Salary	\$57,000	\$58,710	\$60,471	\$62,285	\$64,154
c. Total Benefits	\$18,810	\$19,374	\$19,956	\$20,554	\$21,171
4. GA stipends	\$442,635	\$342,792	\$353,076	\$363,668	\$374,578
5. GA health benefits	\$135,000	\$139,050	\$143,222	\$147,518	\$151,944
5. Tuition Remission	\$121,115	\$124,748	\$128,491	\$132,346	\$136,316
6. Equipment	\$0	\$0	\$0	\$0	\$0
7. Library	\$0	\$0	\$0	\$0	\$0
8. New or Renovated Space	\$0	\$0	\$0	\$0	\$0
9. Other Expenses: Operational Expenses	\$0	\$0	\$0	\$0	\$0
TOTAL (Add 1 - 9)	\$1,435,570	\$1,513,464	\$1,558,868	\$1,605,634	\$1,653,804



UNIVERSITY OF MARYLAND

1426 An. Sci./Ag. Eng. Bldg.
College Park, MD 20742
Phone 301-405-1306
FAX 301-314-9023

Department of Environmental Science and Technology

February 29, 2016

Dr. Stephen Roth
Professor and Interim Director
Maryland Institute for Applied Environmental Health
School of Public Health
University of Maryland
College Park, Maryland 20742

Dear Dr. Roth,

The faculty of the Department of Environmental Science and Technology in our Ecosystem Health and Natural Resource Management Graduate Program have reviewed both the MS and PhD Program Proposals in Environmental Health Sciences. We strongly support the development of these two degree programs and will collaborate fully with you in ensuring that they are a success.

Please contact me if you have any further questions or need assistance at wbowerma@umd.edu or by phone at 301-405-1306. Good luck.

Sincerely,

A handwritten signature in black ink that reads "William W. Bowerman".

William W. Bowerman, Ph.D.
Professor and Chair

Subject: Re: FW: PhD Proposal for Env Health Sci

Date: Sunday, February 28, 2016 at 10:29:20 PM Eastern Standard Time

From: Wolfgang Losert

To: Robert L. Infantino Jr, Stephen M. Roth

Dear Steve

the proposal has CMNS support. No concerns were raised by the CMNS graduate program directors.

best regards

Wolfgang Losert

On 2/19/2016 8:38 AM, Robert L. Infantino Jr wrote:

Hi Steve,

I am forwarding this proposal to Wolfgang Losert. He is serving as my fellow Associate Dean for faculty affairs/research and graduate programs. Wolfgang has been shepherding PCC related grad program matters. I suspect he will consult with our grad directors about your proposal to see if they have any inputs, and then will get back to you with support.

Bob

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Robert L. Infantino, Ph.D.

Associate Dean

College of Computer, Mathematical, and Natural Sciences

2300 Symons Hall

University of Maryland College Park, MD 20742-5511

Phone: (301) 405-6892 FAX: (301) 314-9949

email: rinfanti@umd.edu

<http://biology.umd.edu/faculty/robertinfantino>

From: Stephen M. Roth

Sent: Friday, February 19, 2016 8:35 AM

To: Robert L. Infantino Jr <rinfanti@umd.edu>

Cc: Stephen M. Roth <sroth1@umd.edu>

Subject: PhD Proposal for Env Health Sci

Dear Bob,

Please find attached a forthcoming PCC proposal for a PhD program in Environmental Health Sciences coming from SPH. Though CMNS doesn't have anything that really crosses over this program, having

your CMNS approval would be valuable as we move into the PCC process. I would appreciate very much your support of this program. Please contact me with any questions.

Thank you,
Steve

Stephen M. Roth, Ph.D.
Professor & Interim Director
Maryland Institute for Applied Environmental Health
School of Public Health
University of Maryland
College Park, MD 20742
301-405-2504; fax 301-405-8397
<http://www.sph.umd.edu/miaeh>

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Wolfgang Losert, Professor of Physics
Interim Associate Dean
Director, Partnership for Integrative Cancer Research
College of Computer, Mathematical, and Natural Sciences
University of Maryland

Physical Sciences Complex Room 1147, p: 301-405-0629
<http://www.ireap.umd.edu/losertlab/>

DATE: April 15, 2016

TO: Stephen M. Roth, Professor, Applied Environmental Health (MIAEH), Kinesiology, Office of the Dean & Associate Dean for Educational Innovation; Interim Director of the Maryland Institute for Applied Environmental Health

CC: Daniel Mack, Associate Dean for Collection Strategies and Services, Libraries
Margaret Saponaro, Interim Head, Collection Development, Libraries

FROM: Nedelina Tchangalova, Physical Sciences & Public Health Librarian

RE: Library Resources to Support New Instructional Program – PhD in Environmental Health Sciences

The University of Maryland (UM) Libraries' mission is "to enable the intellectual inquiry and learning required to meet the education, research and community outreach mission of the University." Currently they support undergraduate and graduate students in a variety of face-to-face, online and distance learning programs, as well faculty working collaboratively with internal and external partners. The University of Maryland Libraries collections will continue adequately support the instruction and research needs of the newly proposed PhD program in Environmental Health Sciences.

As a department with strong ties with other departments/schools on and off campus, the Maryland Institute for Applied Environmental Health is confident that library resources are readily available and accessible. Ease of access and flexible availability of library materials is paramount, and researchers, as well students expect this flexibility to be coupled with high academic quality and integrity. The current purchasing practices and available collections at the UM Libraries will ensure that these two goals can be met, both now and for the life of the department. In addition, the establishment of the new Collaborative School of Public Health provides even greater access and flexible availability; the School of Public Health (SPH) students and faculty at the University of Maryland—College Park (UMCP) have access to the Health Sciences and Human Services Library at the University of Maryland—Baltimore (UMB). Thus, the broader medical and global health journals available there are a part of UM Libraries available resources without additional expenditures. Moreover, UM Libraries' existing public health and collections of journals and databases will continue to support the research and teaching needs of the Maryland Institute for Applied Environmental Health.

Public & Environmental Health Science Library Collections

While the Maryland Institute for Applied Environmental Health is part of the School of Public Health, many of their faculty members have secondary appointments to other UMCP departments and UMB. McKeldin Library supports the undergraduate and graduate students in SPH, housing the majority of the monographs and serials pertaining to public health in general, and environmental health in particular. A significant portion of these collections are electronically accessible, both on and off campus, and therefore are not location dependent.

1. Monographs

The Libraries' current collection of books related to environmental health is sufficient to meet the needs of the department. The ongoing acquisition of scholarly books is expected to be adequately covered through existing acquisition practices and budgeting. As a land grant institution, the University of Maryland already has a tradition of emphasizing public health, including environmental health, epidemiology, environmental justice,

and occupational health, and current collection development practices in the Libraries already support these topics.

At this time, UM Libraries have access to several multidisciplinary ebook collections related to human and environmental health, and health policy and law (*Credo Reference, ebrary, EBSCO ebook collection, Gale Virtual Reference Library, Springer, World Scientific eBooks* and more). Due to the UM Libraries' purchasing preference for electronic materials, especially prevalent across the STEM fields, the number of electronic book collections is expected to continue to increase significantly in the coming years.

2. Electronic Resources: Journals and Databases

The Libraries' current list of subscriptions includes both core and related journals that support research and teaching in public and environmental health, and policy.

A search was performed in *Journal Citation Reports 2014* (JCR), a database that uses citation data to rank and determine the impact factor of journals in an academic field. To support the existing courses, at the present time the Libraries provide access to all of the top ten ranked journals from the JCR categories of *Environmental Sciences*, and *Public, Environment & Occupational Health*.

While other aspects of public and environmental health, and policy do not fall as neatly into a JCR-specified category, the UM Libraries provide access to numerous highly ranked journals from cross-sections of the JCR categories of Agricultural Economics & Policy, Behavioral Sciences, Family Studies, Law, Political Science, Public Administration, as well as the majority of top ten ranked journals from all engineering disciplines.

Relevant top-ranked titles include:

- *Energy & Environmental Science*
- *Nature Climate Change*
- *Global Change Biology*
- *Environmental Health Perspectives*
- *Frontiers in Ecology and the Environment*
- *Lancet Global Health*
- *International Journal of Epidemiology*
- *Epidemiologic Reviews*
- *Annual Review of Public Health*
- *Epidemiology*

In addition to journal subscriptions, the UM Libraries subscribe to the following significant databases, that will support the department by providing access to the previously mentioned journals as well as other relevant resources:

- *Academic Search Complete (EBSCO)*
- *Congressional Publications (ProQuest)*
- *Environmental Science Collection (ProQuest)*
- *Environmental Studies in Video*
- *Environment & Energy Daily*
- *Health Reference Policy Center (EBSCO)*
- *Public Health (ProQuest)*
- *PubMed*

At this time, the UM Libraries' purchasing preference is for electronic materials (i.e. those that can be accessed online), a trend that will serve to enhance research and teaching experience. This is especially relevant to the collaboration initiatives, where online flexibility is presented with no reduction in educational and research quality. The UM Libraries purchasing and access priorities are in line with this goal.

Interlibrary Loan & Article Express

With the admission of the University of Maryland into the Committee for Institutional Cooperation (CIC), the academic arm of the Big Ten, our faculty and students are able to take advantage of a number of new materials access options in the coming years. The Libraries joined the CIC UBorrow¹ program, which allows rapid access to the collections of other CIC member libraries.

When resources are not part of our holdings within the sixteen University System of Maryland and Affiliated Institutions (USMAI) libraries, the Interlibrary Loan unit can obtain materials from other libraries at no charge to the student or faculty. Most recent journal articles can be provided through electronic delivery, allowing students and faculty to make the most flexible use of their time.

Additionally, through the auspices of the Interlibrary Loan unit, graduate students and faculty can make use of Article Express, an electronic document delivery service for in-house materials. Article Express allows graduate students and faculty to place requests for book chapters and journal and/or conference papers that are available in print in the Libraries, and have them scanned and delivered electronically within three business days. This service is also free of charge.

Conclusions

At the present time, UM Libraries holdings are adequate to support the proposed new PhD program in environmental health sciences, and current purchasing preferences and trends are especially beneficial for collaborative projects and programs. While it is anticipated that this will continue, the Libraries collections are vulnerable to budget and market fluctuations. Journal collections and other continuing resources remain particularly vulnerable. The level of future support is thus dependent upon ongoing funding and other circumstances affecting continuing subscriptions.

Statement from Associate Dean, Collection Strategies and Services

Nedelina Tchangalova, Physical Sciences and Public Health Librarian, has prepared this report according to standard practices for collection assessment in research libraries. I have reviewed Ms. Tchangalova's report and I concur with her findings.

Daniel C. Mack



¹ <http://www.cic.net/projects/library/reciprocal-borrowing/uborrow>