

Program Mission and Goals

The mission of the Microbial Risk Assessment (MRA) Fellowship program is to train the next generation of homeland security professionals in microbial risk assessment. Students in the program will earn Masters degrees and gain expertise in the fields of microbiology, infectious disease, and bio-security through course work, research, and internship opportunities. The goals of the MRA Fellowship include the following:

- Provide students with a multi-disciplinary education, intersecting traditional programs from public health, epidemiology, microbiology, and environmental engineering with risk assessment and bio-security.
- Develop student expertise in quantitative approaches.
- Develop individual research projects for each student toward a thesis in this interdisciplinary arena.
- Provide opportunities for professional internships at national laboratories and agencies with homeland security missions.

The program will be administered through a partnership between Drexel University, Michigan State University (MSU), and the Center for Advancing Microbial Risk Assessment (CAMRA). CAMRA is a research Center of Excellence jointly funded by the Department of Homeland Security (DHS) and the Environmental Protection Agency (EPA). The MRA Fellowship program will leverage the existing DHS investment in CAMRA to provide relevant research experiences for the participating students in addition to the training they will receive through the proposed academic program. The program will also draw on an existing weeklong intensive summer course in quantitative microbial risk assessment and a wealth of existing courses which will allow the two institutions to offer a wide range of specialized courses on homeland security, safety and health. As a novel part of the proposed effort, a certificate program (Drexel) and specialization (MSU) will be developed. This program will provide students with both the disciplinary tools and the exposure to homeland security issues needed to be successful in this field.

Integrated Career Development Program

The programs that will be offered at the two universities are shown in Table 1. Students will enroll in existing degree programs at the two institutions with students at Drexel receiving a certification in MRA and Public Health, and students at MSU receiving a degree specialization in MRA and Public Health.

Table 1. Educational Programs at the Two Universities

University	POSSIBLE DEGREES	CERTIFICATION OR SPECIALIZATION
Drexel	M.S. in Environmental Engineering Master of Public Health, and others	Certification in MRA and Public Health
Michigan State University	M.S. in Environmental Engineering M.S. in departments within the College of Agriculture and Natural Resources M.S. in Epidemiology Master of Public Health	Specialization in MRA and Public Health

The MRA fellowship program will integrate academic coursework and research with two professional internships at a Homeland Security Science Technology Engineering Mathematics (HS-STEM) site. Figure 1 shows an example schedule for an M.S. student. This remainder of this section describes in detail the program that fellows will pursue from recruitment to job placement.

Figure 1. Example Schedule for M.S. Student

Program Component	Year 1				Year 2				Year 3			
	F	W	Sp	Su	F	W	Sp	Su	F	W	Sp	Su
University (coursework, form advisory committee)	■	■	■									
Internship #1				■	■							
University (begin thesis)						■	■					
Internship #2								■	■			
University (complete thesis)										■	■	■

Coursework

Graduate students will complete the first academic year at their institution during which they will form their advisory committee, complete the bulk of the coursework, and begin to pursue research as part of the CAMRA Center of Excellence. Fellows will complete a sequence of courses providing specialized background in risk assessment for homeland security as part of their program of study. Completion of a year of calculus will be a pre-requisite for the program, but students will be allowed to complete this pre-requisite while enrolled in the program. However, completion of this pre-requisite will not count toward the certificate/specialization program. At Drexel, students will be awarded a certificate in Microbial Risk Assessment and Health upon completion of the coursework, while at MSU students will obtain a specialization within their degree program. Table 2 summarizes the course requirements for the program, consisting of one 3-credit course in each of five areas: homeland security, risk assessment, risk communication, microbiology, and epidemiology.

Certification/Specialization in MRA and Public Health

Certification programs at Drexel and specializations at MSU are both interdisciplinary programs of thematically related courses separate from the major. Both specializations and certifications are designed to complement existing programs at the university or to provide an interdisciplinary perspective on a topic of interest. Students complete the requirements for the specialization or certification as a part of or in addition to their degree requirements, and both specializations and certifications appear on a student’s transcripts. Specializations and certifications commonly require 12-18 credit hours of course work. The MRA and Public Health specialization builds upon existing programs and coursework at the two institutions (Tables 1 and 2).

Table 2. Certificate/Specialization Program: Required Areas and Available Courses

Requirement	Drexel Courses	MSU Courses
Homeland Security	MFSP 525 NBC Terrorism MFSP 519 Introduction to Basic Forensic Engineering PBHL 608 Fundamentals of Disaster Management	CJ 809 Issues in Terrorism* CJ Homeland Security* CJ Analytic Thinking and Intelligence CJ Counterterrorism and Intelligence CJ Law Enforcement Intelligence
Risk Perception and Communication	EGMT 504 Engineering Management Communications* COM 610 Theories of Communication COM 620 Message Design PBHL 672 Health Communication	CAS 825 Mass Communication and Public Health CAS 826 Health Communication for Diverse Populations
Microbiology	ENVR 516 Sanitary Microbiology ENVR 670 Microbial Ecology	MMG 801 Integrative Microbial Biology MMG 833 Microbial Genetics ENE 804 Biological Processes in Environmental Engineering
Epidemiology	ENVR 621 Epidemiology PBHL 701 Descriptive Epidemiology and Biostatistics PBHL 702 Analytic Epidemiology and Biostatistics PBHL 703 Epidemiological Study Design and Analysis	EPI 810 Intro to Epidemiology EPI 812 Causal Inference in Epidemiology EPI 813 Investigation of Disease Outbreaks EPI 817 Communicable Disease Epidemiology EPI 818 Zoonotic Disease Epidemiology EPI 819 Spatial Epidemiology and Medical Geography EPI 822 Environmental Epidemiology
Risk Assessment	ENVE 727 Risk Assessment*	CAMRA weeklong summer course in quantitative microbial risk assessment ENE/ANS 827 Risk Assessment of Environmental Hazards

*Course is offered online and may be taken by students at either institution.

Internships

Over the first summer, students will begin an internship at a DHS-approved HS-STEM facility and this internship will continue through the fall term (6 months for Drexel students, 7.5 months for MSU students). Drexel has an established record of placing students in professional internships through its cooperative education program, and preliminary discussions have already begun with HS-STEM facilities. This first internship will constitute the initial portion of the one-year service commitment required of all fellows. In accordance with DHS's requirements, fellows will not be supported financially by the program during these internships but will instead be paid a salary by their host HS-STEM institution. Upon conclusion of the internship, these students will return to their respective academic institutions for the winter and spring of the second year to complete any remaining coursework. During the first month of this second period of residence at the university, M.S. students will be expected to select an appropriate thesis topic. By the end of this period they should have completed their coursework and be close to the completion of their thesis research. Students will then begin a second internship during which they will complete the remainder of their service commitment (two quarters or six months will remain for Drexel students, one semester or 4.5 months for MSU students). During this second internship students may finish writing their thesis. In this case, they will finish their academic

program while employed at an HS-STEM site, which will facilitate their transitioning to permanent employment with that institution if there is a good match. However, as required by the program funding announcement, funds for a full third year of student support are budgeted, to allow students time to return to university studies and finish their requirements.