

# **Final Progress Report**

## **GRADUATE TRAINING PROGRAMS**

July 1, 1999 – June 30, 2004

Grant Number: T01/CCT410462-04

Howard Frumkin, MD, DrPH – Program Director

Emory University  
Rollins School of Public Health  
Environmental & Occupational Health Department  
1518 Clifton Road, NE  
Atlanta, Georgia 30322

September 28, 2004

## Table of Contents

<b>Occupational and Environmental Medicine</b>	
Abstract	1
Report	2
Training Facilities	2
Program Leadership and Faculty	2
Detailed Curriculum and Rotations	5
Evaluation	5
Trainees	7
Publications	7
<b>Occupational and Environmental Epidemiology</b>	
Report	8
Training Facilities	8
Program Leadership and Faculty	8
Detailed Curriculum	10
Evaluation	12
Trainees	12
Publications	12

## ABSTRACT

The Environmental and Occupational Medicine Residency Program is a two-year program that trains physician specialists for productive careers in Occupational and Environmental Medicine (OEM). The program provides the academic and clinical skills necessary to identify, prevent, and treat work-related illnesses and injuries, and to perform effectively in rapidly changing legal and social environments. During the academic year, residents earn an MPH degree with concentration in Environmental and Occupational Health (EOH). The program develops academic skills in epidemiology, biostatistics, toxicology, industrial hygiene, behavioral sciences, and health education, health policy and management, occupational health practice, clinical occupational medicine, and environmental health sciences.

During the practicum year, residents select from diverse occupational medicine rotations in Atlanta and in other parts of the country as well as the full range of clinical specialty rotations offered by Emory HealthCare. The practicum rotations offered by the Occupational Medicine Residency include two multi-client private practices, aircraft manufacturing, commercial automobile manufacturing, passenger air transportation, automobile manufacturing, paper production, government science and regulatory agencies. Popular clinical specialty rotations include dermatology, pulmonary medicine, rehabilitation medicine, ophthalmology, and orthopedics. Residents complete a practicum year research project in addition to the MPH year research project. Residents also participate in several continuity experiences. These include the Occupational and Environmental Consultation Service, the Georgia Poison Control Center, the DeKalb County Occupational Health Clinic, and weekly seminars and conferences in the EOH department.

The Occupational and Environmental Epidemiology MSPH program prepares graduates to function as occupational epidemiologists in public health practice settings (in government, non-profit or private sector), as assistant researchers, or to continue their training at the doctoral level. Epidemiologic methods have emerged as perhaps the most widely used tool in the evaluation and control of the health effects of occupational and environmental exposures. For each of the disease and injury priority research areas in the NIOSH National Occupational Research Agenda (NORA), epidemiologic research is an essential tool. Emory's program combines training in epidemiologic skills with knowledge of the substantive area of occupational and environmental health to prepare graduates for careers in occupational epidemiology.

The curriculum for the joint MSPH degree provides a rigorous foundation in analytical epidemiology and biostatistics. It also provides a strong foundation in occupational and environmental health; graduates are familiar with the principles of exposure assessment and industrial hygiene, occupational health policy, and toxicology. In addition to coursework, the joint MSPH requires a thesis documenting competence in mastering the concepts of epidemiology and the content area of occupational/environmental health. The student is required to conduct original publishable research that applies analytic epidemiologic methods to an occupational/environmental health question. In general students are directed to ongoing research projects, or existing databases, and are assisted by their faculty advisor in defining and carrying out independent analyses using these resources.

## **Occupational and Environmental Medicine**

### **REPORT**

The Occupational and Environmental Medical residency eligibility requirements include graduation from medical school and completion of an accredited internship with six months of direct patient care experience. The Residency Advisory Committee has shown preference in the past to applicants who have completed a residency program in another related specialty prior to applying for occupational medicine training. Criteria for selection of trainees include academic excellence, extent and quality of previous clinical training, work experience, demonstrated interest and commitment to environmental and occupational health, and potential to contribute to the field. The residency program has been especially attractive to physicians in the southeastern United States. Special effort has been made to recruit and train minority candidates, given the large minority communities in the metropolitan Atlanta area and Emory's strong relationship with Morehouse School of Medicine and Spelman College.

### **Training Facilities**

The primary training site is the Rollins School of Public Health at Emory University. The school has 80 full-time faculty and over 700 students. It is the sole occupant of a ten-floor building on the Emory University campus. It has ample classroom, computer lab, and office space to support the MPH program and the residency program. It is less than ¼ mile from the Health Sciences Library, and from national headquarters of the Centers for Disease Control and Prevention and the American Cancer Society.

### **Program Leadership and Faculty**

Dr. Moorhead is an Assistant Professor of Environmental and Occupational Medicine and the Director of the Residency Program. He began in this position in August, 2002. Dr. Moorhead is board certified in Occupational and Environmental Medicine and Physical Medicine and Rehabilitation, and has a joint appointment in the Department of Physical Medicine and Rehabilitation at the Emory University School of Medicine. He has responsibility for teaching two courses required of the residents enrolled in the academic year, Clinical Occupational Medicine (EOH551) and Occupational Health Practice (EOH550). These courses were highly rated by students. Dr. Moorhead is completing the research and dissertation requirements for a PhD in Public Health at Rutgers University/University of Medicine and Dentistry of New Jersey. His research interests are in evaluation of diagnostic tests in the absence of a gold standard. Dr. Moorhead's clinical interests are in helping patients to function at home, at work, and in the community in spite of chronic illness or persistent symptoms. He has authored or co-authored 13 papers in the peer-reviewed medical literature. Dr. Moorhead is active in the clinical program at Emory University and serves as attending physician for the Rehabilitation Medicine consultation service at Emory University Hospital as well as at the Emory University Environmental and Occupational Medicine Consultation Service.

Dr. Howard Frumkin is a Professor of Environmental and Occupational Health at the Rollins School of Public Health. He was Director of the Residency Program from its inception, and served in that position for many years. Dr. Frumkin is Chair of the Department of Occupational

and Environmental Health at the Rollins School of Public Health. He is board certified in Occupational and Environmental Medicine and Internal Medicine and has a joint appointment in the Department of Medicine at the Emory University School of Medicine. Dr. Frumkin is an internationally recognized physician, investigator, and author. His professional interests include heavy metal toxicity, solvent toxicity, and asbestos exposure. He has been active in occupational and environmental health policy issues related to recent free-trade agreements and is also active in the area of environmental justice. Dr. Frumkin has over 100 papers in the peer-reviewed medical literature. Dr. Frumkin is active in the education of residents and medical students, and lectures regularly at the Emory University School of Medicine on occupational health issues.

Considerable expertise relevant to Occupational and Environmental Medicine resides with other faculty of the Rollins School of Public Health as well as with the preceptors of the Practicum Rotations.

The Residency Advisory Committee (RAC) meets twice yearly in open meetings attended by residents and program faculty. Residents have an opportunity to meet with the Committee privately during part of each meeting so that individual residents can offer evaluation of training experiences, preceptors, and residency policies and procedures in an anonymous and supportive setting. The RAC submits recommendations for program improvement to the program director after each RAC meeting. Each practicum year preceptor is a member of the RAC, and preceptor attendance at RAC meetings has been excellent.

### **Detailed Curriculum and Rotations**

Emory's Occupational Medicine Residency is a rigorous training program in Occupational and Environmental Medicine, including both academic and practicum years.

The academic year consists of a fully accredited MPH program at the Rollins School of Public Health with an emphasis on Environmental and Occupational Health. In brief, residents are required to take survey classes in each of the major public health disciplines (epidemiology, biostatistics, health education and behavioral sciences, health policy and management) in addition to an in-depth concentration of courses in occupational and environmental health. Some elective time is also available to residents to pursue personal interests. Grading is on a letter basis with no special consideration given to the residents. Residents must meet all School of Public Health requirements in order to graduate with an MPH degree. The academic year provides the knowledge and information needed to practice modern occupational medicine.

The practicum year offers a wide variety of placements, including five industry rotations (in aerospace manufacturing, automobile manufacturing, paper and consumer goods manufacturing, commercial airline operations and beverage bottling and distribution), two government rotations (Agency for Toxic Substances and Disease Registry (ATSDR) and Occupational Safety and Health Administration (OSHA), two rotations in private multi-client occupational medicine practices (Concentra and Toco Hills Urgent Care) and rotations in hospital-based employee health and organized labor (North Georgia Business Trade Council). New rotations added within the past five years include Orthopedic Sports Medicine, Emory University Employee Health, and UnumProvident Corporation, Chattanooga, TN: Disability Evaluation. In addition, one of our

residents completed elective rotations in Medical Genetics at Yale University and Duke University last year.

The full spectrum of traditional clinical rotations in specialties related to occupational medicine are also available and often taken by residents (pulmonary medicine, dermatology, neurology, rehabilitation medicine, and office orthopaedics are most commonly selected). Every rotation includes appropriate supervision by an occupational medicine physician or preceptor with appropriate expertise. The practicum year allows residents to apply knowledge gained during the academic year to the practice of occupational medicine. For example, basic coursework in OSHA policy (EOH 570) is reinforced by participation in the OSHA rotation; basic instruction in occupational musculoskeletal illnesses (EOH 551) is reinforced by rotations that offer extensive clinical experience with these diagnoses. In addition, due to the breadth of experiences, residents also have the opportunity during the practicum year to assess the relative merits of work in the academic, industrial, private, and government sectors.

The residency program also includes four longitudinal experiences that run through both the academic and the practicum years: 1) clinical evaluation and care of patients at the Emory Clinic Environmental and Occupational Medicine Consultation Program, 2) clinical duty at the DeKalb County Board of Health Occupational Health Clinic, 3) service with Georgia Regional Poison Control Center, and 4) weekly seminars at the School of Public Health. These experiences each make important contributions to the quality of education and training. During the clinical experience at the Emory Clinic, residents work with academic occupational medicine physicians as well as with an academically oriented pulmonologist and toxicologists. They perform evaluations at a greater level of detail than usually performed in the private sector, an important skill. In addition to this learning experience, the core faculty is able to directly observe and assess the resident's clinical skills and target educational efforts towards weak areas. The Dekalb County Board of Health Occupational Health Clinic experience allows residents to apply basic knowledge of assessment of workers "fitness for duty" and to experience, first hand, the sometimes difficult interactions between this task and federal and state laws intended to protect certain classes of persons from employment discrimination (*e.g.*, the Americans With Disabilities Act). The Georgia Poison Control experience gives residents experience in management of exposure cases early in their clinical evolution. The weekly seminars maintain an academic perspective on occupational health practice and encourage a lifelong habit of maintaining currency with the clinical literature. Finally, the residents receive research training, both as sophisticated users of published research and as investigators performing applied research.

**Required Curriculum for Occupational and Environmental Medicine Residents**

**MPH Core Courses**

<b>Course Number</b>	<b>Course Title</b>	<b>Credits</b>
BIOS 500	Quantitative Methods	4.0
HPM 500	Introduction to Public Health	2.0
HPM 500	Introduction to Public Health	2.0
HPM 502	Introduction to Health Care	2.0
EPI 530	Fundamentals of Epidemiology	4.0
BSHE 504	Social Behavior in Public Health <i>or</i>	2.0
BSHE 500	Behavioral Sciences in Public Health	2.0

**EOH Required Courses**

EOH 500	Perspectives in Environmental Health	2.0
EOH 510	Recognition, Assessment, and Control of Occupational & Environmental Hazards	3.0
EOH 520	Occupational and Environmental Toxicology	3.0
EOH 530	Occupational & Environmental Epidemiology	2.0
EOH 550	Occupational Health Practice	3.0
EOH 551	Clinical Occupational Medicine	3.0
EOH 570	Occupational and Environmental Health Policy	3.0
EOH 595R	Practicum	0.0
EOH 598R	Special Study Project <i>or</i>	3.0-6.0
EOH 599R	Thesis	3.0-6.0

**EOH Electives**

EOH 523	Neurotoxicology	2.0
EOH 524	Risk Assessment I	3.0
EOH 525	Risk Assessment II	2.0
EOH 537	Methods in Occupational and Environmental Epidemiology	2.0
EOH 545	Water Pollution and Health	3.0
EOH 546	Environmental Microbiology	2.0
EOH 581	Public Health Issues and Disasters	2.0
EOH 591R	Environmental Case Studies	3.0
EOH 597R	Directed Study	Variable

**Evaluation**

In accordance with NIOSH performance goals, the OEM residency provides information dissemination, knowledge transfer, and training to enable Occupational Medicine residents to create safer and healthier work environments for all Americans. The effectiveness of resident training in this program is evaluated in the following specific ways:

Each rotation is evaluated by each resident. Action is taken to correct or eliminate experiences that fail to provide residents with a valuable and high quality learning experience. One rotation has been eliminated by this process within the past several years.

Each resident is evaluated for proficiency in specific Occupational and Environmental Medicine competencies by each rotation preceptor on a 1-9 Likert scale, with 9 indicating highest proficiency. Clinical competencies are evaluated and rated. Competencies for this evaluation tool were selected from the May 1998 ACOEM Report “Occupational and Environmental Competencies – v. 1.0” [JOEM40(5), May 1998] and from the American Council for Graduate Medical Education (ACGME) Outcome Project, as in the following example:

	Unsatisfactory			Satisfactory			Superior			
	1	2	3	4	5	6	7	8	9	
<b>Hazard Recognition, Evaluation, and Control</b>										NA
Characterize existing and potential environmental hazards within a defined population	<input type="checkbox"/>									
Evaluate and interpret the results of industrial hygiene surveys	<input type="checkbox"/>									

Evaluation Methods:  Global Rating  Patient Survey  Procedure/Case Long  Portfolio  Chart-Stimulated Recall  360  Evaluation  Other \_\_\_\_\_

Preceptors are expected to indicate by which method the resident has been evaluated for each competency. The **Global Rating** is an assessment of broad categories of skills. Preceptors are provided with pocket cards on which they can record their observations of resident performance and rate that performance on a 1-9 Likert scale as above. The **Patient Survey** conducted by reviewing evaluation forms that patients complete after receiving care from individual residents. The **Procedure/Case log** is a listing of procedures or challenging cases which the resident maintains in his or her Portfolio notebook. The resident’s description of what he or she has learned from the experience is assessed by the preceptor and program director to assess depth and breadth of experience as well as for evidence of practice-based learning. The **Portfolio** is a notebook with a separate section for each academic course and each practicum or longitudinal experience. In each section, the resident records lessons learned on an on-going basis. The Portfolio is evaluated by the preceptor and by the program director for evidence of practice-based learning. The Portfolio is also an opportunity for the resident to demonstrate that he or she has applied the knowledge gained in his or her academic coursework to real world situations requiring specialized knowledge of environmental or occupational medicine. **Chart-Stimulated Recall** is a technique by which the resident’s progress in developing competencies is assessed by asking questions relating directly to patients that the resident has seen. The **360 Degree Evaluation** provides an opportunity for the resident to see the way in which he or she is viewed by other team members.

**Trainees**

Graduates typically sit for the American Board of Preventive Medicine certifying examination during the year after program completion. While it is voluntary for examination candidates to authorize disclosure of their scores to their training programs, program graduates are encouraged to do so. Previous graduates who have authorized disclosure of their scores have generally done well on the certifying examination. The first table below indicates how many physicians applied to the residency, how many were accepted, and how many enrolled in the program. The second table indicates how many graduates of the program took the Preventive Medicine Boards.

**Occupational and Environmental Medicine 1998 - 2004**

	1998	1999	2000	2001	2002	2003	2004
<b>Total number of applicants</b>	20	17	20	16	17	16	17
<b>Number of applicants offered admission</b>	4	5	3	3	5	3	5
<b>Number of applicants who accepted offer and enrolled in program</b>	4	3	3	2	2	2	3

<b>Year</b>	<b>Number of Graduates</b>	<b>Took the Board Exam</b>
1999-2000	2	2
2000-2001	2	2
2001-2002	4	2
2002-2003	1	1
2003-2004	3	Not yet known

**Publications**

None

## **Occupational and Environmental Epidemiology MSPH Program**

### **REPORT**

Since funding for this MSPH program was granted in July of 1998, it has supported a total of 14 outstanding students. Out of the 14 students enrolled only one dropped out of the program. A total of 13 students have graduated from the program and seven of them were nominated for the prestigious Shepard Award for best thesis in the School of Public Health. One former student was recently awarded a prestigious award from the National Environmental Health Association.

All of the graduates who have sought employment or acceptance into doctoral level programs have been successful. We currently have four students enrolled in the program with GPAs ranging from 3.7 to 4.0.

### **Training Facilities**

The Rollins School of Public Health provides a rich environment for this program. Computer facilities are state-of-the-art. An excellent faculty in epidemiology and environmental and occupational health is available to support training and research of the students in the program. The School of Public Health is connected by tunnel to the Health Sciences library, and is less than a quarter mile from the national headquarters of the Centers for Disease Control and Prevention and the American Cancer Society.

### **Program Leadership and Faculty**

Drs. Michele Marcus, Paige Tolbert and Kyle Steenland are co-directors of this core program.

**Dr. Michele Marcus** has over fifteen years of experience as a reproductive and occupational epidemiologist. A principal interest of Dr. Marcus is the intersection of environmental and reproductive epidemiology. Her work includes an evaluation of neonatal intensive care for premature infants; the health consequences of adolescent pregnancy; the physiology of menopause; and risk factors for spontaneous abortion, very early loss of pregnancy, infertility and congenital malformations. She pioneered the use of pubertal development as an outcome sensitive to putative endocrine disrupters and published the first study linking earlier menarche with an occupational exposure to the mother. She has studied environmental influences on reproduction and women's health utilizing biological markers of reproductive function and other health outcomes. She has published extensively in this field and has co-authored two book chapters reviewing the effects of environmental and occupational exposures on reproductive function. In the Department of Environmental and Occupational Medicine at Mount Sinai School of Medicine, Dr. Marcus served as Director of the Epidemiology Core of the Environmental Health Sciences Center. She joined the Emory faculty in 1992. She served as coordinator of endocrine disrupter research for the National Center for Environmental Health of the Centers for Disease Control and Prevention. She was a panelist for the ATSDR/CDC workshop that recommended appropriate biological markers of adverse reproductive outcome to be used in communities exposed to putative reproductive toxins. She is currently principal investigator of a federally-funded (NIEHS and EPA) study of endocrine-sensitive endpoints

among PBB-exposed women, in collaboration with Dr. Tolbert. She teaches a course in Reproductive Epidemiology (EPI 746) at the School of Public Health, recommended for all students in the occupational epidemiology program. A second major interest of Dr. Marcus has been the health effects of computer use. She has served on an expert panel that reviewed the possible reproductive effects of video display terminal use, and was Co-Principal Investigator of a NIOSH-funded five year prospective study of musculoskeletal disorders among computer users and is currently Principal Investigator of a NIOSH-funded intervention study aimed at reducing the risk of musculoskeletal injury among computer users. Dr. Marcus has also conducted research in other areas of occupational epidemiology including the health effects of exposures to polycyclic aromatic hydrocarbons, solvents, and lead. She has served on national panels evaluating the health effects of electromagnetic field exposure and service in the Persian Gulf War. Thus, Dr. Marcus brings a broad background in occupational and environmental epidemiology.

**Dr. Paige Tolbert** is an occupational and environmental epidemiologist, with primary experience in etiologic studies of chemical exposures in relation to chronic disease. Prior to joining the Emory faculty in 1993, Dr. Tolbert worked as a research associate at the Harvard School of Public Health, analyzing cancer mortality data on 40,000 automotive manufacturing workers exposed to machining fluids and designing an NIEHS-funded study assessing serum levels of PCBs, DDE, and heavy metals in relation to perinatal and neurobehavioral outcomes. In the ten years since joining Emory, she has established an active research program. In 1996, she received an NIH FIRST award (R29) to study the patterns of risk in subtypes of lymphoma and sarcoma in relation to occupational exposures such as meat processing and chlorophenol exposure. She recently completed a study assessing the hypothesis that organochlorine exposure is associated with pancreatic cancer, supported by the American Cancer Society. She is currently PI of several studies investigating associations of various cardiorespiratory outcomes with air pollution, supported by US EPA, NIEHS and EPRI. Drs. Tolbert and Marcus are currently collaborating on a thirty-year follow-up study of the possible endocrine disrupting effects of PBB exposure (Marcus, PI; Tolbert, co-PI). Dr. Tolbert is also collaborating with Dr. Steenland on a pilot project on gene-environment interactions in Parkinson's disease and on a study of emergency department visits. Dr. Tolbert developed and directs Methods in Occupational and Environmental Epidemiology (EOH 537 / EPI 747), a key component of the curriculum of the joint MSPH program.

**Dr. Kyle Steenland** joined the Emory faculty in August 2002. He has appointments in the Departments of Environmental and Occupational Health and Epidemiology. Prior to coming to Emory, he had a twenty-year career at NIOSH conducting occupational epidemiology. Dr. Steenland is editor of two texts, Case Studies in Occupational Epidemiology, and Topics in Environmental Epidemiology (Oxford Univ Press 1993, 1997). He has also authored over 70 first-authored articles. His interests have centered primarily on occupational cancer in relation to ethylene oxide, dioxin, silica, diesel fumes, beryllium, welding, and acid mists. He has also worked on neurological damage in relation to pesticide exposure, heart disease in relation to stress, shift work, and environmental tobacco smoke, and mortality in relation to education and occupation. His work has been instrumental in the classification of ethylene oxide, beryllium, and acid mists as Class 1 carcinogens by IARC, and the classification of diesel fumes as a

probable carcinogen by EPA. Dr. Steenland has worked extensively on epidemiologic methods, including publications on measurement error, the healthy worker effect, methods of matching in control selection, multiple-cause mortality analysis, development of the NIOSH life table, the degree of confounding of occupation by smoking, and Bayesian methods to adjust for multiple comparisons. Dr. Steenland has recently submitted an RO1 grant on the relation of education to cancer survival, and is now working on developing grants in relation to Parkinson's disease and dementia. He has received funding for a pilot study to develop a case-control study of Parkinson's disease. He is also a co-investigator on a Fogarty grant to train researchers in occupational and environmental health in Peru and Chile.

In addition to the co-directors, an extensive faculty is available to support student training and research in occupational epidemiology. The faculty interests encompass a wide variety of areas relevant to occupational and environmental epidemiology; exposures under study include workplace chemicals, ergonomic stressors, ambient air pollution, diet, and viruses, while outcomes of interest range from cancer to neurologic endpoints, injuries, reproductive outcomes, respiratory health effects, and infectious disease. Some of the faculty specialize in methods development while others conduct more applied research. Types of etiologic research being conducted by the faculty range from classical epidemiology studies to laboratory-based molecular epidemiology, with gene-environment interactions becoming a major focus.

### **Detailed Curriculum**

The curriculum for the MSPH degree is designed to provide a rigorous foundation in analytical epidemiology, and requires the most quantitative epidemiology and biostatistics course sequences at the school. It is also designed to provide a strong foundation in occupational and environmental health; graduates are expected to be familiar with the principles of exposure assessment and industrial hygiene (essential for evaluating exposure assessment in epidemiologic studies), occupational health policy (essential in understanding, and influencing, the uses of epidemiologic data), and toxicology (essential in relating epidemiologic results to toxicologic evidence).

A two-semester sequence in epidemiology methods with corollary courses in biostatistics form the foundation of the epidemiologic component of the degree. Epidemiologic training is further developed by an advanced epidemiologic methods course, an epidemiologic modeling course, a SAS computing course, and a data analysis course. Further epidemiologic coursework is substantive. An advanced occupational and environmental epidemiology course is required of all students in the program, and uses a case study approach to demonstrate design and analysis issues involved in applying epidemiologic methods to occupational health questions. Additional substantive epidemiology courses are on the list of selectives from which students must select a minimum of two courses. Required coursework to complete training in the occupational health component of the degree includes courses in exposure assessment and industrial hygiene, occupational health policy, toxicology, and injury prevention and control. The program generally requires full-time students two years to complete.

In addition to coursework, the joint MSPH requires a thesis that meets the expectations of both departments. The thesis is the final documentation of competence in mastering the concepts of

epidemiology and the content area of occupational/environmental health. The student is required to conduct original research that applies analytic epidemiologic methods to an occupational/environmental health question. The final product is expected to be of a quality that it is suitable for publication. In general, students are directed to ongoing research projects, or existing databases, and are assisted by their faculty advisor in defining and carrying out independent analyses using these resources.

One of the elements that characterize both the coursework and thesis completion is computer literacy. By the end of their training, students will be proficient not only in word processing, spreadsheet, and statistical software but also the use of on-line data sources, such as the NIOSH Health Hazard Evaluation Summaries, toxicology summaries, and the National Library of Medicine's MEDLINE, to obtain the most current information on occupational epidemiology topics.

#### MSPH Required Courses

Course Number	Course Title	Credits
EPI 530	Epidemiologic Methods I	4.0
EPI 534	Epidemiologic Methods II	3.0
BIOS 500	Statistical Methods I	4.0
BIOS 501	Statistical Methods II	4.0
EPI 533	Programming in SAS	2.0
EPI 536	Applied Data Analysis	2.0
EPI 538	Advanced Epidemiologic Methods I	2.0
EPI 740	Epidemiologic Modeling	3.0
EOH 510	Recognition, Assessment, and Control of Occupational and Environmental Hazards	3.0
EOH 520	Occupational and Environmental Toxicology	3.0
EOH 537/EPI 747	Methods in Occupational and Environmental Epidemiology	2.0
EOH 570	Occupational and Environmental Health Policy	3.0
EOH 580	Injury, Prevention, and Control	2.0
EPI 599R/EOH599R	Thesis	4.0
BSHE 500 or	Behavioral Sciences in Public Health	2.0
BSHE 504 or	Social Behavior in Public Health	2.0
BSHE 516	Behavioral Epidemiology	3.0
EOH 551	Clinical Occupational Medicine – Clinicians Only	3.0

#### At least 5 credit hours from the following “Selectives”

EPI 537	Epidemiology of Chronic Disease	2.0
EPI 552	Genetic Epidemiology	3.0
EPI 743	Cancer Epidemiology	2.0
EPI 744	Perinatal Epidemiology	2.0
EPI 746	Reproductive Epidemiology	2.0
EOH 500	Perspectives in Environmental Health	2.0
EOH 524	Risk Assessment	3.0
EOH 550	Occupational Health Practice	2.0
<b>48 credit hours needed to graduate</b>		

## Evaluation

The joint MSPH program has been evaluated in several ways to determine its effectiveness at recruiting, training and ultimately placing high caliber applicants in positions as occupational and environmental epidemiologists. The applicant pool was evaluated, comparing the GRE scores and GPA to the student pool for the EPI department. In the table on page 12 the mean scores and GPAs for these two groups of students are shown. The students in our program appear to be stronger on each of these measures, demonstrating that our program has been able to attract and train high-caliber students.

### **Comparison of Occupational Epidemiology MSPH students with Epidemiology MPH students at Rollins School of Public Health of Emory University, 1998-2002**

	Mean GRE Scores				Mean Undergraduate GPA	Mean Rollins SPH GPA
	Verbal	Quantitative	Analytical	Total		
Epidemiology MPH	533	650	656	1840	3.3	3.7
Occ Epi MSPH	591	693	705	1985	3.5	3.8

The quality of the research training received by students in the program is evidenced by the fact that seven out of 13 graduates were nominated for the prestigious Shepard Award for best thesis in the school of Public Health. Thus 50% of our students were nominated compared to approximately 2% for the School as a whole.

Of the 13 graduates, five have gone on to pursue doctoral training in epidemiology (Harvard, Johns Hopkins, University of Illinois, and two at UNC-Chapel Hill), one is in medical school, four are employed as environmental/occupational epidemiologists (e.g. CDC, ACS, county board of health), two are seeking employment, and one is staying home with her child.

## Trainees

Year	1 <sup>st</sup> year students	2 <sup>nd</sup> year Students	Graduates
1998-1999	0	1	0
1999-2000	2	2*	1
2000-2001	2	1	3
2001-2002	2	3**	3
2002-2003	4	2	2
2003-2004	5	4	4
<b>Total Graduates</b>			<b>13</b>

\* One student transferred out of program and two students transferred into program in 2000

\*\* One student transferred into the program as a second year student in 2001

## Publications

None