

**HEARTLAND EDUCATION AND RESEARCH  
CENTER FOR OCCUPATIONAL SAFETY AND  
HEALTH**

**ANNUAL REPORT  
July 1, 2005 – June 30, 2006**

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**The University of Iowa  
Heartland ERC Annual Report  
July 1, 2005 – June 30, 2006**

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## Introduction and Executive Summary

The Heartland Center for Occupational Health and Safety, based at the University of Iowa, has served Federal region 7 (Iowa, Nebraska, Kansas, and Missouri) as a center of excellence in interdisciplinary training, education and research in occupational health and safety since 2000. Since its inception, the Center has grown from three academic training programs and a continuing education & outreach program to a Center with seven nationally recognized academic training programs, a strong regional continuing education & outreach program, and programs to support innovative student and new faculty research on National Occupational Research Agenda topics. The Center's work is supported by the National Institute for Occupational Safety and Health; the University of Iowa Hospitals and Clinics; and the Deere Foundation. The Center has benefited from strong support from workers, employers, and professionals. Highlights of how the Center has helped workers and businesses in the region and the nation include:

- Graduates are actively recruited to private and public sector positions, reflecting the great state, regional, and national need for professionals trained in occupational health and safety.
- For the first time, the state of Iowa has master's level trained Occupational Health Nursing graduates, a need met by the Heartland Center at the University of Iowa. These highly skilled nurses are preventing illness and injury in Iowa and regionally---- Cargill Meat Solutions, Ottumwa, IA; Palo Alto County Health System, Emmetsburg, IA; Winneshiek Medical Center, Decorah, IA; Mercy Hospital, Cedar Rapids, IA; Finley Business Health, Dubuque, IA; Home Health Corporation of America, Salisbury, MD; and State Farm Insurance, Lincoln, NE
- Our recent industrial hygiene graduates have been recruited to fill the national need for PhD trained educators and researchers in occupational health and safety. They are now on faculty at the University of Utah, Western Kentucky University, and Southeast Oklahoma State University.
- Students are carrying out research that will make a practical difference in the health, safety and productivity of working people. These include prevention of workplace injuries among military recruits, dairy farmers, agricultural production workers and prevention of illness in workers exposed to diesel exhaust, pesticides, and nanoparticles.
- Hundreds of professionals in the state and region are keeping up-to-date with current occupational health and safety knowledge and practices through the Center's continuing education programs.

Major innovations are the implementation of an updated curriculum in Industrial Hygiene, expansion of distance learning via *Illuminate Live* for continuing education, outreach and academic coursework, and the inception of the Occupational Epidemiology academic core.

Heartland Center website: <http://www.public-health.uiowa.edu/heartland/>

## **Program Progress Reports**

## Program Title: Center-Wide Programs – Progress Report

**Program Director: Nancy Sprince, MD, MPH**

### Center Administration

**Number of core programs:** The Center Administration Core has provided administrative support to the Heartland Center for Occupational Health and Safety over the past year. The Center is made up of six academic Training Cores (Industrial Hygiene, Occupational Health Nursing, Occupational Medicine, Ergonomics, Occupational Injury Prevention Research, and Occupational Epidemiology), a Core in Agricultural Safety and Health, Continuing Education and Outreach Cores, and Research Training Pilot Program and NORA Research Core. The Center and Training Program leadership have been stable over the past year.

**Multiple campus locations:** The Center has used distance education software overcome barriers of distance between campus locations. The required Occupational and Environmental Health Seminar (175: 185) and Occupational Health (175:230) is now available to off-campus Heartland Center distance learners via Elluminate Live virtual classroom in real time and in archived electronic format. .

**New program development:** We competed successfully for a new Training Core in Occupational Epidemiology, directed by Dr. William Field. The Center has been strengthened by the addition of this Training Program, which started in July, 2005 and has successfully recruited four students and implemented a new course in Occupational and Environmental Epidemiology this Spring.

**Meeting regional needs and evaluation of impact of programs:** Dr. Anne Wallis, Assistant Professor of Community and Behavioral Health and Director of the Iowa Center for Evaluation Research, works with the Center and Program Directors on evaluation. She has assisted in updating regional needs assessments and implementing a modified version of the regional “panel of opinion leaders” in occupational safety and health to provide longitudinal assessment of the Center’s impact on the region. Annual graduate surveys have been used to inform program improvements. She has implemented a web-based questionnaire for students and graduates that has increased the response rate for evaluation feedback.

### Measures of Effectiveness Demonstrating the Accomplishment of the Objectives of Each Program:

Consistent with Heartland Center goals, we track several indicators of effectiveness. We have achieved most of these objectives, but still need to strengthen minority recruitment efforts and response rates to graduates’ survey. The indicators and the Center performance for each indicator for 2004-2005 follow:

1. In each one-year reporting period, have at least 5 graduate students in each of the program areas of IH, OHN, and OM
  - ▲ We achieved this goal for 2005-2006: 12 students in IH, 10 in OHN, and 5 in OM.
2. In each one-year reporting period, have at least 30 graduate students total in Heartland Center training programs
  - ▲ We exceeded this goal for 2005-2006: 38 students in the Fall semester 2005 and 44 students in the Spring semester 2006.
3. Reach at least 400 OHS professionals through our Continuing Education courses
  - ▲ We exceeded this goal for 2005-to date: The CE Program had 1513 trainees during 2004-2005 for 1746.51 person days.
4. Achieve a rate of at least 90% of Heartland Center graduate students who take positions as OHS professionals or doctoral/post-doctoral trainees upon graduation.
  - ▲ We have achieved a rate of 100% for those graduates for whom we have follow-up information. There are two graduates we are still trying to reach for employment information.
5. Receive at least 20% of research training pilot grant applications from regional institutions outside the University of Iowa

- ▲ We did not achieve this goal in 2005, since we only received applications from within the University of Iowa. We are making specific efforts this Spring to encourage high quality applications from the only TPG in our region, the one at Central Missouri State.
6. Each year focus recruitment efforts on at least two institutions that serve underrepresented minority students
- ▲ We have revised this goal to implementing diverse strategies to aid in increasing diversity. The measures we used included using GRE recruiting services to target minority applicants and working with current Heartland Center students from underrepresented minorities to strengthen our recruitment plan.
7. Maintain at least 2 occupational health and safety courses as requirements for all ERC students to enhance interdisciplinary interaction and training
- ▲ We achieved this goal; the courses are OEH Seminar (175:185) and Occupational Health (175:230).
8. Offer at least two postgraduate courses in each program area of IH, OHN and OM annually
- ▲ We achieved this goal for the 2005-2006 reporting period as follows:
- Interdisciplinary (IH, OM, OHN, Ergo, ASH, Injury Prevention, Occupational Epidemiology and Safety): Occupational Health Symposium (Spring 2006);
  - IH: Occupational & Environmental Epidemiology for the Industrial Hygienist, occupational & Environmental Health Professional (March 2006)
  - IH: Applied Epidemiology for Industrial Hygienists (May 2006);
  - OHN: NIOSH-approved Spirometry Training for Worker Screening (July 2005, November 2005, April 2006)
  - OHN: Case Management: Care of Work-Related Injuries (October 2005)
  - OM: WORKSAFE IOWA Occupational Medicine Associates Network Meeting & Seminar (biannual each Fall and Spring)
  - OM: CSOMA Occupational Medicine Conferences (biannual each Fall and Spring)
9. Offer at least one postgraduate course annually in Occupational Safety, which includes both Ergonomics and Agricultural Health and Safety
- ▲ We achieved this goal as follows:
1. Occupational Safety:
    - The Best Practices in Iowa: A Workplace Safety Conference (May 2006)
  2. Agricultural Safety and Health:
    - Midwest Rural & Agricultural Safety & Health Forum (Nov 2005)
    - Agricultural Occupational Health Training Session I (May 2006)
    - Agricultural Occupational Health Training Session II (June 2006)
  3. Ergonomics:
    - Bringing Research to Practice: A Colloquium of NIOSH Pilot Projects (May 2005)
  4. Content from the Occupational Injury Prevention Research and Occupational Epidemiology Program Areas were incorporated into to Occupational Health Symposium (March 2006)
10. Survey at least 90% of graduates one year following graduation to assess how well their education prepared them for their professional or post-graduate training positions
- ▲ We achieved this goal; sent surveys to 100% of graduates

## Outreach

### Program Description

The Heartland Center for Occupational Health & Safety (Heartland Center) has a very successful outreach program reaching well into Federal Region VII (Iowa, Kansas, Missouri and Nebraska). During the last five years, Heartland Center faculty and staff have incorporated educational development, presentations, consultation and many other activities into our Outreach program. The activities reach all disciplines of our Center including industrial hygiene, occupational medicine, occupational health nursing, ergonomics, agricultural safety and health, and injury prevention.

## Goals and Objectives

We will continue our ongoing efforts in these categories, while working toward three additional objectives. Because the WSI model meets the needs of practitioners so effectively, we now plan to expand it further into Region VII. We also want to extend our reach in the area of educational development, including developing a formal link with the only NIOSH Training Program Grant recipient in our region. With a continuing emphasis on outreach to ethnic minorities, we plan to explore OSH outreach needs of American Indians in Region VII.

Objective 1. Expand the existing WORKSAFE IOWA (WSI) Occupational Medicine Associate Network.

Objective 2. Two new partnerships for curriculum development will be cultivated, with Central Missouri State University and the University of Nebraska.

Objective 3. Work with the Aberdeen Area Tribal Chairmen's Health Board (AATCHB), the Aberdeen Area Indian Health Service, and Tribal Universities and Colleges to determine needs related to occupational health and safety and to share information on the types of outreach activities available through the Heartland Center.

## Program Plan

These three objectives will build on our established strengths. The proposed activities will broaden our impact in the region and further diversify the institutions, practitioners, and populations that we assist.

## Report on Specific Improvement in OS&H Resulting From ERC Programs

- Continuing Education – An Occupational Medicine physician member of the WORKSAFE IOWA Occupational Medicine Associate Network states information learned during a presentation at a meeting/seminar of Associate Network members was directly applicable to the care of workers at an ethanol manufacturing facility.
- Continuing Education – the presentation on lean manufacturing processing in an occupational medicine clinic prompted a clinic member to streamline internal processes using the lean concepts learned at the WORKSAFE IOWA meeting
- Continuing Education – Impact evaluation data from Case Management conference – 95% of respondees used the information on chronic pain in their daily practice of case management as a result of the training;
- Outreach – information dissemination related to DOT physicals directly impact daily practice of occupational medicine physicians
- Outreach – The speakers on depression in the workplace were asked to speak to employers in Waterloo, IA
- Outreach – Information on fire fighter and police physicals in Iowa is invaluable when carrying for these workers.
- Outreach – Six occupational medicine residents are now employed by WORKSAFE IOWA Occupational Medicine Associate Network member clinics
- Outreach – Information provided in the WORKSAFE IOWA monthly e-bulletin provides current and pertinent information for employers and workers.

## Interdisciplinary Coordination

An emphasis on interdisciplinary problem-solving in research and education characterizes interactions among faculty, among students, and between faculty and students in the Heartland Center ERC. Reflecting their educational contributions to other OHS disciplines, several Heartland Center faculty have joint appointments in the Colleges of Public Health and Nursing, in the College of Public Health and Engineering, and in the Colleges of Public Health and Medicine. Faculty from IH and OM co-direct key courses including Occupational Health (175:230 Drs. Sprince and Heitbrink) and Environmental Toxicology (175:260 Drs. Thorne and Fuortes). Faculty from the OM and IH programs serve on the Occupational Health Symposium planning committee and provide speakers for the annual event, which



is directed by the Occupational Health Nursing Training Program. Ergonomics faculty have lectured in key OM and IH courses, including Occupational Health, Occupational Safety, and Industrial Hygiene I: Recognition.

Opportunities for formal interdisciplinary interaction among Heartland Center graduate students and residents have been and will continue to be built into the required curriculum. Students are required to take two core courses. One is Occupational Health (175:230) co-directed by an OM and an IH faculty member (Drs. Sprince and Heitbrink). In summary, the course provides lectures, discussions and readings on:

- occupational safety
- occupational health nursing
- evaluation of a workplace
- worker compensation
- Federal regulations
- occupational health practice
- program management
- ethics
- agricultural workers
- construction workers
- special workplace populations including women and minorities
- industrial hygiene principles of recognition, evaluation, and control
- physical hazards in the workplace (including heat, noise and radiation)
- occupational diseases by organ system (including respiratory, musculoskeletal, skin, eye, neurologic, psychiatric, reproductive, cardiovascular, hematologic, renal, hepatic, and infections)

A second course required of students in all Heartland Center training programs serves to further enhance interdisciplinary interaction, promote understanding of research approaches, and introduce students to practical applications of their academic training. The Seminar in Occupational and Environmental Health (175:180) is designed with presentations by faculty and staff on issues of concern in OHS that alternate with journal club and research presentations by graduate students, faculty, and staff. In the last academic year, students chose topics and led discussions on:

- Carbon Monoxide Poisoning
- Characterization of Lab Employees' Exposures
- Novel Human Exposure Facility to Assess Health Effects of Exposures
- Lead Poisoning
- Pediatric Environmental Health
- Internship Experiences at OSHA
- Noise Exposure in a Large-Scale Swine Confinement Facility
- Occupational Factors Influencing Emergency Department Visits in an Iowa Hospital
- New Method for Assessing Risks for Musculoskeletal Disorders in the Construction Industry
- Endotoxin Exposure
- Agricultural Diseases and Injuries in Finland
- Ergonomics in Finland

The seminar provides a lively forum for interdisciplinary topics and discussion. In addition, the speakers from outside the University help introduce students to the real-world applications of their academic content. A popular interdisciplinary event held each year in the Seminar is "IH Jeopardy". For this activity, students work in pairs to quickly answer questions on topics of occupational health and safety interest that have been researched by student "quizmasters."

## **Pilot/Small Projects**

The Pilot Project Research Training Program at the Heartland Center ERC began in July 2001 and has completed five rounds of competition and funding. Over the past year, there have been no changes in the program announcement, methods of scientific review, or program recordkeeping.

The Heartland Center ERC serves Federal Region VII, which includes Iowa, Nebraska, Kansas and Missouri. The Research Pilot Grant Program has continued collaboration with regional academic institutions that provide training in occupational health and safety.

### **Summaries of the five pilot projects funded this budget period:**

Principal Investigator: Rebecca Heick, MS; Doctoral candidate in the Occupational Injury Prevention Research Training Program; Title: Occupational Injury in Emergency Medical Service Providers (EMS). Funding period: July 1, 2005-June 30, 2006.

Principal Investigator: Thomas M. Peters, PhD, Assistant professor, Industrial Hygiene Training Program; Collaborator: Brian Hartz, MD, Occupational medicine resident; Title: Airways response to mixed exposures of endotoxin and diesel exhaust particles using exhaled breath condensate methodology. Funding period: July 1, 2005-June 30, 2006.

Principal Investigator: Risto Rautiainen, PhD, Assistant professor, Agricultural Health and Safety and Industrial Hygiene Training Programs; Title: Region VII Tractors in Fatal Overturn Events. Funding period: July 1, 2005-June 30, 2006.

Principal Investigator: Hope M. Tiesman, MSPH, doctoral candidate in the Occupational Injury Research Prevention Training Program; Title: Traumatic Injury, Subsequent Injury, Disability, and Discharge in the US Army; Funding period: July 1, 2005-June 30, 2006.

Principal Investigator: Nate Fethke, MSE; Doctoral candidate, Ergonomics Training Program Title: The electromyographic sampling duration required to precisely estimate individual exposure to forceful exertions; Funding period: July 1, 2005-June 30, 2006.

### **NORA Research**

Supplemental funds to support NORA-related research have strengthened research training infrastructure and research training opportunities for Heartland Center students in several areas. In the areas of assessment of dust and gas exposures in industrial and agricultural environments and evaluation of methods to control these exposures, NORA funds were used to purchase direct-reading particle and gas monitors used by IH graduate students in a variety of research projects. Working under the direction of IH faculty, students gained useful experience with monitoring techniques and used the equipment to assess several occupational environments: Students

- evaluated differences between particles and gases from high-sulfur and low-sulfur diesel fuel exhausts and compared the particulate concentrations collected by passive dust collectors vs. other methods for measuring airborne particle concentrations.
- evaluated exposures of workers in the Portland cement industry, determining factors that affected exposure concentrations.
- completed research on controlling silica exposures during mortar removal.
- evaluated dust and gas exposures in swine, poultry, and dairy facilities.
- evaluated indoor-air exposures, learning how to conduct air-quality evaluations
- investigated fatalities associated with work in swine confinement and municipal sewer repair.

Supplemental funding was also used to build a new ventilation laboratory. A variable-speed, industrial fan was purchased along with duct work and ventilation hoods. This laboratory improves our faculty and students' ability to conduct ventilation and control research and to build research training skills in design of ventilation controls.

In the area of exposure assessment and musculoskeletal disorders, NORA monies have been used to strengthen research training and support for graduate students in the Ergonomics Training Program. The purchase of a data acquisition interface has allowed students to sample data with newer computers, removing some of the technical difficulties encountered with the previous systems. NORA support will continue to be used for research training in novel methods of assessment physical factor exposures and in prevention of musculoskeletal disorders.

NORA funds have been used to strengthen research capacity in the Occupational Health Nursing Core in the areas of traumatic injury prevention in the meatpacking industry, para-occupational activities in the older worker, and occupational health services delivery and organization.

In the area of prevention of traumatic injury, NORA funds have strengthened research training and productivity in the Occupational Injury Prevention Research Core (OIP). Dr. Corinne Peek-Asa, PI of the OIP Core, serves on the NORA Traumatic Injury Team. NORA funds were used to conduct studies addressing hearing impairment and occupational injury, and sleepiness and injury risk. NORA funds are also partially being used to support collaborative work with Drs. Zwerling, Sprince, and Peek-Asa to examine occupational motor vehicle injuries on rural roads.

NORA research funding has allowed OM residents to develop research skills in the areas of injury prevention, agricultural dust diseases, and surveillance. Recent publications and reports that have resulted include the following:

- Hartz MB, Kline JN, Sprince NL. Agricultural-Induced Lung Disease. In: Rom WN. Environmental and Occupational Medicine, 4<sup>th</sup> edition. Lippincott, Williams, and Wilkins. Philadelphia, PA In press.
- Sanderson W, Epp R, Rautiainen, Madsen M. Hog farmer dies from asphyxiation after manure pit agitation. The University of Iowa, Iowa City, Iowa. Iowa FACE Program Report, Case No. 031A58, (June 2005)
- Jones M, Sanderson W, Epp R, Rautiainen R, Madsen M. Anhydrous ammonia nurse tank rupture kills agricultural cooperative worker. The University of Iowa, Iowa City, Iowa. Iowa FACE Program, Case No. 031A27 (June 2005).

NORA: Funds were used to strengthen the Continuing Education and Outreach Core's ability to implement research-to-practice into professional training. Funds are being used for a consultant to provide instructional design assistance in expanding the universe of learners through an electronic distance format. This change enables us to bring the results of NORA-related research to practicing occupational safety and health professionals regionally and nationally.

**Program Title: Agricultural Safety & Health – Progress Report****Program Director: Kelley Donham, MS, DVM, Director****Program Description**

The program currently has four components: academic (MS and enrichment) training, continuing education and outreach, and PhD research training.

The overall aim is to produce effective agricultural health practitioners, leaders and researchers, enhance the knowledge and skills of current health care practitioners who deal daily with the agricultural population, and enhance the capacity of regional institutions and organizations to deliver agricultural health and safety information. Specialized training is essential for preparing a competent occupational health professional in ASH, because agriculture is very different from other occupations, in regards to work processes and practices, social factors, health and safety regulations, family involvement and varied and mixed exposures. Furthermore, we aim to increase the knowledge and skills of these students in research and policy issues of agricultural health.

**Academic Training****Objectives**

- a. Recruit and retain sufficient students with agricultural health career interests in order to matriculate at least five yearly (after three years).
- b. Develop at least three new preceptorship sites for agricultural health trainees that will likely lead to employment.
- c. Develop a recognized specialty track (with a certificate) in agricultural health for occupational medicine physicians, nurses, industrial hygienists, and professionals in occupational and environmental health, ergonomics, injury epidemiology and veterinary public health.
- d. Provide introductory training in ASH to students in various health sciences programs.

**ASH Core Curriculum**

The following courses are required for the MS in ASH (11 – 18 semester hours):

- Rural Health and Agricultural Medicine (175:209) – 3 hrs
- Agricultural Safety: Theories and Practice (175:196) – 2 hrs
- Current Topics in Agricultural Health (175:210) – 2 – 4 hrs
- Preceptorship in Occupational and Environmental Health – (175:203) – 1 – 3 hrs
- Thesis in Agricultural Safety and Health – (175:300) – 3 – 6 hrs

The preceptorship is designed to provide practical experience at, for example, machinery manufacturers, swine production firms, or one of our affiliated AgriSafe Network Clinics. Every student is expected to complete a thesis in an ASH topic. The number of credit hours is arranged according to the particular circumstances. Examples of recent MS thesis research topics include a noise exposure assessment in swine confinement buildings, and a musculoskeletal injury survey in a Kansas farm population. In addition to defending the written thesis, the student is expected to publish at least one paper from their research in a peer-reviewed journal.

The ASH core curriculum is to be taken in conjunction with the academic training in one of the following occupational health specialty areas: Industrial Hygiene, Occupational and Environmental Health, Occupational Health Nursing, Occupational Medicine, Ergonomics, Injury Epidemiology, or Veterinary Public Health.

## Continuing Education

### Objectives

- a. Expand the Agricultural Occupational Health certification program throughout the region and to other collaborating centers.
- b. Conduct (in conjunction with cooperating states) at least one cycle of this program for NIOSH centers in Illinois, Kentucky, and North Carolina, over the first three years of the program.
- c. Grant at least 20 new agricultural health nurse certificates or provide certificate training to at least 10 physicians over the next three years.
- d. Provide at least three hours of agricultural occupational medicine training to at least 100 physicians over the first three years of the program.

The continuing education component of the training program is directed mainly to nurses and physicians but also includes physician assistants, nurse practitioners, emergency medical technicians, respiratory therapists, physical therapists and rural mental health professionals.

The Agricultural Occupational Health Certification Program is the centerpiece of the continuing education portion of this proposal. To date, we have taught this course eight times in Iowa, and we have certified more than 164 health professionals in Agricultural Occupational Health. The certification is based on the National Committee on Agricultural Occupational Health Certificate Training, which has set standards for curriculum content. Participants also may receive approximately 40 hours of continuing nursing or continuing medical education, or three semester hours of graduate credit from The University of Iowa. Plans are underway to expand this training to other states, including Kansas, Illinois, North Carolina, and Kentucky. The course is being developed for distance learning, and exams will be accessible on the Internet. Topics for the 40-hour course include current issues in agricultural medicine and review topics selected by survey and knowledge testing of health professionals in the field.

Annual Refresher Nurse Continuing Education in ASH Nurses in our AgriSafe Network will be required to have 10 hours of Agricultural Occupational CEU's biannually. Nurses will have access to continuing education training through an agricultural health newsletter and an annual refresher course. The newsletter will be sent to the 24 AgriSafe Network clinics and all alumni of the certification workshop. It will include a section of current topics, review of current literature, case presentations, and a problem-solving exercise with a quiz.

Physician Continuing Education Training Consulting physicians in the AgriSafe Network are able to take advantage of continuing education programs offered regionally. Additionally, the Heartland Center offers training to the residency programs of a statewide clinical education network.

## Outreach

### Objectives

- a. Assist the University of Nebraska in expanding nurse and physician expertise in agricultural occupational health.
- b. Assist Kansas University and Kansas State University in introducing agricultural occupational health to the state as a follow up to statewide conferences we facilitated on agricultural health in 2001 and 2002.
- c. Work with the University of Missouri to develop distance-learning programs in agricultural occupational health nursing, so that such training would be available by year three of the proposal.
- d. Work with the ERC from Illinois, and the NIOSH Agricultural Health Centers in Kentucky and North Carolina, to train their staff and consult on developing ASH training in their regions.
- e. Work with Northeast Iowa Community College (NICC) and the National Education Center for

Agricultural Safety (NECAS), to provide train-the-trainer programming in ASH for agricultural faculty in Iowa's community college system, and work to develop an articulated safety and health program between the small four-year and Community Colleges in the state, and the University of Iowa.

- f. Work with all states in Region VII to help establish agricultural occupational health clinics within their states.

## Research Training – PhD Research Training

The doctoral program in ASH trains graduate students to design, conduct, and manage agricultural health and safety research in an academic, governmental, or private research setting. The degree is a sub-track within the Department of Occupational and Environmental Health (OEH), College of Public Health. The training program is defined by the curriculum and prescribed research. The students are required to take the core courses in ASH (25-30 semester hours), plus the core PhD curriculum in one of the following Occupational Safety and Health (OSH) departmental programs: 1) Industrial Hygiene, 2) Ergonomics, 3) Injury Epidemiology, or 4) Occupational and Environmental Health. The research training includes a research methods course and a student defined research focus in an ASH topic, as guided and mentored by a faculty supervisor. Candidates for this doctorate program must have a GPA of at least 3.25, and a combined GRE score of at least 1650. Women and minorities are strongly encouraged to apply. Candidates are recruited based on their background, interest and track record in ASH, as well as background and interest in Industrial Hygiene, Ergonomics, Injury Epidemiology or Occupational and Environmental Health. Prior to admission, an interview and suitable faculty match is required.

Doctoral students must complete 72 hours of coursework including the ASH core (25-30 hours), as presented in Figure 1, and the core curriculum in one of the programs mentioned above. The research training is highly interdisciplinary. All students, regardless of their other OSH program area, take the same ASH core (listed below). Three of these programs are ERC cores. The Occupational and Environmental Health (OEH) program area, although not one of the ERC cores, is a long standing and important program of the department. The program is a strong program with many core courses in common with the ERC cores. Those students electing to the OEH emphasize a research topic that is toxicologic, or microbiologic in nature, but highly interdisciplinary and relevant to ASH.

### PhD ASH Core Curriculum (Research Training)

The following courses are required for the PhD in ASH (25 – 30 semester hours):

- Rural Health and Agricultural Medicine (175:209) – 3 hrs
- Agricultural Safety: Theories and Practice (175:196) – 2 hrs
- Current Topics in Agricultural Health (175:210) – 4 – 6 hrs
- Epidemiology of Infectious Disease – (173:255) – 3 hrs
- Advanced Agricultural Safety and Health – (175:xxx) – 2 hrs
- Preceptorship – (175:203) – 3 – 6 hrs
- Research and Dissertation in Agricultural Safety and Health – (175:300) – 6 – 8 hrs

The purpose of research training is to create the next generation of specialists and leaders in ASH research and program management. The proposed evidence of research competency will include successful completion and defense of a dissertation and preparation of at least three publishable manuscripts in peer-reviewed journals. The doctoral program in ASH will build on the academic (MS) training in ASH, which requires all MS students to complete and defend a research thesis, and publish at least one paper in a peer-reviewed journal.

Students who complete the research training program in ASH will be prepared to:

- a. identify and prioritize research needs in ASH.
- b. identify and locate information resources in ASH.
- c. keep current in scientific inquiry in ASH.

- d. use current research tools and techniques in ASH.
- e. complete and publish research in the scientific literature.
- f. anticipate and analyze policies as they relate to and affect agriculture and ASH.

### Program Activities and Accomplishments

#### Didactic Training – Progress Toward Stated Goals

The following is an analysis of progress toward stated goals.

- Develop three new didactic courses in agricultural safety and health.  
In addition to our existing Rural Health and Agricultural Medicine Course, three new courses have been developed for the program.

Agricultural Safety: Theories and Practice of Intervention (175:196), is a two-semester hour course that uses the book *Safety and Health in Production Agriculture* by Murphy. It is taught by lecture, discussion, and problem solving exercise. There are nine students currently enrolled in this course.

Current issues in Agricultural Health and Safety (175:210), is taught in a seminar format including journal article review and critique (focusing on the Journal of Agricultural Safety and Health, and the Journal of Agromedicine).

The third course is a new agricultural safety and health preceptorship. This course will establish relationships with agricultural health or production firms, and provide direct experience in providing health and safety services to the farming community.

- Recruit and retain sufficient students to matriculate six students in three years with either the MS or PhD.  
This program specialization has eight students enrolled. Three of these students are currently working toward their PhD, and five on their MS.
- Develop at least three new preceptorship sites.  
The preceptorships developed at Swine Graphics and the AgriSafe Network, are new. These preceptorships are going extremely well. Preceptorships are also being developed with Pioneer Hi-Bred International, John Deere, and Monsanto. We will also be contacting other agribusinesses for additional preceptorships.
- Develop a recognized specialty tract, with certificates for Agricultural Occupational Health.
- Development of new training materials with emphasis on a textbook in Agricultural Medicine.  
Dr. Donham has been writing a textbook in agricultural medicine.

#### Continuing Education – Progress Toward Stated Goals

- Expand the Agricultural Occupational Health Training Program (AOHTP) to the Upper Midwest Region.
- Conduct training in surrounding states.  
Dr. Donham is working with the University of Illinois and Carle Medical Clinic to develop a program modeled after our AOHTP course in Illinois.
- Grant at least 20 new agricultural health nurse certificates.  
A total of 35 certificates were granted last summer, with another 30 on target for this

year.

- Conduct certificate training for 10 physicians over the next three years. This past summer, we certified two physicians in Agricultural Occupational Medicine.
- Conduct at least 3 hours of occupational health training to 100 physicians over the next 3 years.

#### Outreach – Progress Toward Stated Goals

- Assist the University of Nebraska in expanding training in agricultural occupational health.
  - Assist Kansas University and Kansas State University in introducing agricultural health in the state.
  - Work with University of Missouri to develop distance-learning programs in agricultural health by year three of the proposal.
  - Work with Northeast Iowa Area Community College in agricultural occupational health.
  - Work with Minnesota and Wisconsin to establish agricultural occupational nurse training.
  - Work with all states in the region to help establish agricultural occupational health clinics.
  - We have worked with our AgriSafe Network helping to develop as a new separate not-for-profit company.
- a. We have conducted 15 lectures during the period on agricultural occupational safety and health for a variety of health care professionals across the state and health professions students at the University of Iowa, and Iowa State University, impacting 314 students/health professionals.
  - b. We conducted the annual Agricultural Occupational Health Certificate Course to 42 students this year. This 40 hour course was extremely successful and determined from our evaluation where the course received a mean of 3.8/4 on all phases of student evaluation.

#### **Program Products**

See Appendix B & C

#### **Future Plans**

- Obtain approval for support of training PhD students in Agricultural Health and Safety. We recently received this level of support, and currently have three students enrolled in the PhD program.
- Recruit additional faculty with a focus in agricultural health and safety to augment the teaching faculty.

With this increased formalization in our Agricultural Health and Safety training, we plan to hire additional faculty and staff with expertise in this field. There are provisions in our Department strategic plan to seek a faculty member with health and medical expertise in agricultural health. We have support from an international agribusiness firm to dedicate a chair in agricultural/rural health. We envision this person to add significantly to the program's teaching, outreach and research.



## **Program Title: Ergonomics Training Program – Progress Report**

**Program Director: Dan Anton, PT, PhD, ATC**

### **Program Description**

In the Heartland Center ETP, trainees who wish to specialize in ergonomics/human factors may pursue a Master of Science (MS), Master of Public Health (MPH), or Doctor of Philosophy (PhD) degree including:

- MS in OEH (with emphasis in ergonomics): 38 semester hours.
- MS in IE (with emphasis in ergonomics/human factors): 30 semester hours.
- MS in BME (with emphasis in ergonomics/biomechanics): 30 semester hours.
- MPH in Ergonomics: 40 semester hours.
- PhD in OEH (with emphasis in ergonomics): 72 semester hours.
- PhD in IE (with emphasis in ergonomics/human factors): 72 semester hours.
- PhD in BME (with emphasis in ergonomics/biomechanics): 72 semester hours.

#### **Master's-Level Ergonomics Training Program**

The purpose of the ETP at the master's-level is to provide academic and practical experience that prepares MS and MPH trainees for career opportunities as an ergonomics/human factors practitioner in local, state, or federal health agencies, and in departments of industrial health and safety in commercial enterprises and academic institutions. Additionally, the ETP prepares MS trainees (and PhD) to pursue certification as a Certified Professional Ergonomist (CPE) or Certified Human Factors Professional (CHFP).

At the completion of the ETP at the master's-level, graduates will be able to:

- perform work-site job analysis, classify biomechanical risk factors, and assist with prioritizing resources,
- design tasks, workstations and tools in manufacturing or office environments that follow ergonomic principles,
- modify work tasks and workstations to accommodate the injured and disabled worker, establish an ergonomics program within a company, agency, or union,
- train employees and supervisors on the basics of ergonomics,
- assist with establishment of medical surveillance programs for prevention of work-related MSDs,
- understand basics of ergonomics/human factors research methods, and
- take Part I ("Basic Knowledge" of ergonomics/human factors) of the CPE/CHFP examination

#### **Doctoral and Post-Doctoral Ergonomics Training Program**

The purpose of the ETP at the doctoral and post-doctoral level is to provide academic, research, and practical field experiences that prepare PhD and post-doctoral trainees for career opportunities as independent researchers and consultants in ergonomics/human factors.

At the completion of the ETP at the doctoral-level, graduates will have:

- completed advanced graduate courses in ergonomics/human factors and other advanced courses related to their specific discipline,
- conducted mentored laboratory research in ergonomics/human factors,
- conducted mentored field research in ergonomics/human factors, and
- provided ergonomic/human factors consultation services.

Those who have completed the ETP at the post-doctoral-level will have:

- participated in the preparation of at least one independent grant,
- participated in the preparation and management of research budgets,
- submitted at least one peer-reviewed manuscript as the primary author.

## Program Plan

The duration of the ETP is approximately two years for MS and MPH trainees, three to four years for PhD trainees depending on previous coursework and/or experience, and one to two years for post-doctoral trainees. Program integration occurs in a systematic manner. In the first year of the ETP, trainees take the required core courses (MS, MPH, PhD) and participate in various research projects (MS, PhD, post-doctoral). Since the MPH is considered the primary professional degree in public health, these trainees focus primarily on ergonomics and public health coursework. In the second year, trainees complete coursework, and at the end of the year take Preceptorship in Occupational & Environmental Health (175:203, MS, PhD) or MPH Practicum Experience (170:299, MPH).

For MS trainees, the final examination is an oral defense of the master's thesis, conducted by an Examining Committee. The committee consists of three (OEH) or five (BME, IE) members of the Graduate College faculty. The committee must be comprised of at least two faculty members from the trainee's primary departmental faculty, and at least one member of the ETP Core Faculty. For MPH trainees, the final examination is an oral presentation of the Practicum project. The presentation is given to the Practicum preceptor, the trainee's advisor, an ETP Core Faculty member if the advisor is not Core Faculty, and other interested parties.

At the end of the second year, doctoral trainees must pass a Comprehensive Examination, conducted by an Examining Committee. This committee consists of at least five members of the Graduate College faculty, one of which must be a member of the ETP Core Faculty. Also, the committee must include a chair or co-chair, and at least three members from the trainee's primary department. Having satisfactorily completed this examination, the trainee is accepted as a PhD Candidate.

For PhD trainees, the final Examination is an oral defense of the trainee's dissertation research, conducted by an Examining Committee (composition similar to that for the Comprehensive Examination). The PhD degree is given upon demonstration by the trainee of comprehensive knowledge and scholarly work at the highest level.

## Interdisciplinary Outreach Opportunities

Trainees also interact with industries, employers, managers, and workers by working alongside Core and Supporting Faculty during various outreach activities. Outreach activities include continuing education programs and ergonomic consultation services. Continuing education programs have included presentations on various ergonomics/human factors topics throughout the region, nationally, and internationally. These programs have been presented to other universities, federal and state agencies, health care organizations, industries, and various international groups and organizations.

The ETP offers trainees practical hands-on training in ergonomics/human factors research, education, and consultation while emphasizing interaction with other occupational health and safety professionals in real-world settings.

## Trainee Performance - Academic

Numerous methods are used to evaluate academic performance of ETP trainees. The trainee's Plan of Study is the first step towards assuring the necessary breadth and depth of academic performance. The trainee's Plan of Study is developed in collaboration with the trainee's advisor (typically an ETP Core Faculty member). For all trainees, the ETP Director assures compliance of the Plan of Study with the ETP core curriculum.

Each semester, grades and trainee progress are reviewed by the trainee's advisor. If the trainee's advisor is not a member of the ETP Core Faculty, the ETP Director reviews grades as well. Trainees must receive grades of B- or better in all ETP core courses. Trainees must retake any core courses in which they obtain a grade less than B-. Verbal feedback is also obtained from instructors of extra-departmental courses and below-standard performance will be discussed with trainees as necessary. Discussions regarding academic progress are held with trainees at least once each semester. In

general, interaction between a trainee and a Core Faculty member occurs weekly.

For PhD trainees, deficiencies in academic preparation are specifically identified at the Preliminary Assessment completed before the end of the trainee's 3<sup>rd</sup> semester of study (OEH), or at Qualifying Examinations (BME, IE). Success in examinations (e.g. Comprehensive Examination) is monitored closely by the trainee's Examining Committee.

#### Trainee Performance - Research

Thesis and dissertation data collection, analysis, preparation of manuscripts, and dissemination of findings at scientific meetings is closely monitored by the trainee's advisor. MS and PhD trainees must present their research to the Examining Committee, either as an MS thesis or PhD dissertation defense.

#### Trainee Performance – Outreach and Other

Trainee performance during ergonomic consultations is evaluated verbally by the ETP Core Faculty member participating in the outreach. Verbal feedback is also obtained from supervisors or preceptors during the Preceptorship in Occupational and Environmental Health (175:203) or the MPH Practicum Experience (170:299). Other data collected for purposes of evaluating the trainee and effectiveness of the curriculum includes number of publications, number and monetary amount of grants received, and professional activities and honors of graduates. Exit interviews are held when trainees graduate or leave the program.

#### Qualifications of Prospective Trainees

In OEH, prospective MS and MPH trainees may have a bachelor's degree from various disciplines including, but not limited to, public health, business, engineering, psychology, nursing, physical or occupational therapy, premed, statistics, exercise science (physical education), or communications. Trainees are expected to have a cumulative grade point average (GPA) of 3.0 (based on 4.0) and a minimum Graduate Record Examination (GRE) score of 1050 (combined verbal and quantitative). In BME and IE, prospective MS trainees must have a strong math and science background, and a bachelor's degrees from disciplines such as engineering, mathematics, physical science, computer science, psychology (with a math background), statistics, or computer programming. Trainee's are expected to have a cumulative GPA of 3.00 (based on 4.00) and an acceptable GRE score (typically a combined score of 1250 for verbal and quantitative).

Prospective trainees must have English language competency. Competency is defined as graduating from an English-speaking university or score of greater than 600 (or 250 computer) on the Test of English as a Foreign Language (TOEFL). Anyone with lower scores must take an English proficiency test and then take any recommended English classes based on the test results.

#### Selection of Trainees

Prospective trainees (MS, MPH, and PhD) can enter the ETP if they are enrolled in the Departments of OEH, IE, or BME. Prospective post-doctoral trainees can enter the ETP if they are planning on conducting research while being mentored by a Core Faculty member. Prospective trainees apply directly to the program by contacting the ETP Director.

The Core Faculty selects trainees in the ETP. Trainees are selected based on the following criteria, in order of priority: 1) prospective trainee must meet the minimal academic criteria of their home department (e.g. GPA, GRE scores), 2) prospective trainee identifies ergonomics/human factors as their primary research interest, 3) prospective trainee (PhD, post-doctoral) identifies specific areas of interest within ergonomics/human factors, or prospective trainee (MS, MPH) has experience conducting ergonomic consultations, and 4) prospective trainee's academic performance greatly exceeds the minimal academic criteria.

Prospective post-doctoral trainees will be interviewed by the Core Faculty, who will assess productivity, enthusiasm, and dedication to the field of ergonomics/human factors. The decision to offer a position in the ETP is based on the results of this evaluation process.

### **Program Products**

See Appendix B & C

### **Program Activities and Accomplishments**

#### **Future Plans**

We've strengthened or are in the process of strengthening the curriculum in the following ways:

- To strengthen the curriculum, at least 20 clock hours is now devoted to perception, cognition, and human error in Human Factors and Ergonomics I (056:144). Additionally, human performance subject areas are included in Ergonomics: Design and Evaluation (056:147) at the master's-level and in Ergonomics of Occupational Injuries (051:152) at the doctoral-level.
- We have significantly strengthened the curriculum by adding Introduction to Biostatistics (171:161) or an equivalent graduate-level intermediate statistics course for MS trainees. Since ergonomic/human factors researchers will likely need to be knowledgeable about experimental design, we now require Design & Analysis of Biomedical Studies (171:162) or Design of Experiments (22S:159) for PhD trainees.
- We worked with the course co-directors for Occupational Health (175:230) to expand the industrial hygiene content. That course now serves as an introductory industrial hygiene course and is the equivalent of a 1.5 credit course in this content. Currently, over 45% of the 3 s.h. course Occupational Health (175:230) is devoted to industrial hygiene.
- We improved the quality of education by adding two new required courses to the master's ETP curriculum: Introduction to Biostatistics (171:161) or an equivalent graduate level statistics course, and Responsible Conduct in Research (050:270).
- New core courses have been added to the doctoral ETP including Biomedical Instrumentation (101:212) or an equivalent graduate level instrumentation course, Graduate Biomechanics (051:149) or Biomechanical Analysis in Rehabilitation (101:285), and Design & Analysis of Biomedical Studies (171:162) or Design of Experiments (22S:159).

#### **Program Administration and Faculty**

As noted in the proposal, the primary change to the program leadership is the appointment of Dr. Anton as the Director of the ETP. Dr. Anton will be assisted by the previous director, Dr. Cook, Associate Director of the ETP. There have been no other changes in the ETP administration or faculty.

#### **Core Curriculum**

The substantial improvements in the ETP curriculum have been detailed above. These courses have been added to improve compatibility of the ETP with the Ergonomist Formation Model. A member of the Board of Directors of the Board of Certification in Professional Ergonomics reviewed our curriculum to confirm that it was congruent with the Ergonomist Formation Model. Additional changes to the core curriculum have also been made. Based on feedback from trainees and further review of the Ergonomist Formation Model, Ergonomics: Design and Evaluation (056:147) is now in the master's curriculum instead of the doctoral curriculum, and Ergonomics of Occupational Injuries (051:152) is now in the doctoral curriculum instead of the master's curriculum. Additionally, Clinical Ergonomics

(175:295) is now a 3 s.h. course instead of 2 s.h., which is more appropriate for the workload in the course. Trainees have indicated that these changes have been favorable for the ETP.

#### Recruitment, Graduation, and Placement of Trainees

During the three years prior to NIOSH funding of the ETP, eight trainees completed graduate training in ergonomics/human factors in one of the three contributing departments (OEH, BME, IE). In the first year of the Heartland Center ETP (2001 – 2002), we successfully recruited four trainees. Since 2001, we have consistently recruited excellent trainees at the master's and doctoral level. During the most recent academic year (2004 – 2005), we had five master's graduate trainees enrolled in the ETP (three from OEH, one from BME, and one from IE). Additionally, we had four doctoral trainees enrolled (one from OEH, one from BME, and two from IE).

#### Trainee Academic Performance

Academic performance of trainees has been consistently outstanding. As with other graduate programs at the University of Iowa, admitted trainees have an excellent academic background with an average GPA of 3.5 and GRE scores in the top 20%. No trainees have been placed on academic probation (defined as MS GPA <2.75 and PhD GPA <3.0). All trainees in the ETP have passed their Qualifying Examinations (BME, IE only) and Comprehensive Examinations (PhD) on the first attempt.

#### Trainee Research Performance

Trainees consistently have made good progress towards completing their research requirements (MS, PhD). Master's trainees in the ETP have completed the program in two to two and a half years. Additionally, all trainees in the ETP have passed their Final Examinations (MS thesis defense, MPH Practicum presentation, or PhD dissertation defense) on the first attempt. As previously noted, trainees have had excellent success obtaining funding for their research projects. Since 2001, 100% of ETP trainees obtaining the MS or PhD degree have had all or part of their research funded.

Trainees in the ETP have also been strong in research dissemination. Since 2001, our trainees have been authors on eleven peer-reviewed publications, six as the first author. An additional manuscript is in review and six are close to submission. In addition, trainees have produced twelve manuscripts for proceedings of scientific meetings, and have presented nineteen abstracts or posters at conferences.

## **Program Title: Industrial Hygiene Training Program – Progress Report**

**Program Director: Wayne Sanderson, PhD, CIH**

### **Program Description**

#### Program Needs, Goals, and Objectives

Increasingly our graduates are asked to participate in broader activities which require knowledge of environmental pollution as well as management skills and ethical awareness. Our curriculum provides training not only in areas common to traditional IH, but also in environmental pollution, occupational health, toxicology, safety management, and ethics. Course offerings within the department, the College, and the University are consistent with this philosophy. Our IH students who graduate from our program will be able to:

1. Recognize occupational and environmental chemical, physical, and biological hazards
2. Understand and describe routes of human exposure to these agents and the work processes that influence exposures;
3. Understand the principles, instrumentation, and techniques for exposure assessment of these hazards;
4. Evaluate, develop, and implement strategies to control exposure to these hazards;
5. Describe the organization and functions of governmental agencies and regulatory bodies that impact occupational and environmental health; and
6. Understand fundamental principles of allied fields such as occupational medicine, safety, ergonomics, and occupational health nursing and be able to work as part of a multidisciplinary team to prevent and solve occupational and environmental health problems.
7. Develop and conduct OEH research studies.

The IH degree program is administered by the University of Iowa Graduate College as a distinct track within the Department of Occupational and Environmental Health, of the College of Public Health. It includes curricula for both master's- and doctoral-level training, which are integrated into the Heartland Center's broader interdisciplinary program that includes occupational medicine, occupational health nursing, ergonomics, occupational injury prevention, occupational epidemiology, and agricultural health and safety. Our objective is to graduate four industrial hygienists per year—two to three MS students and one to two PhD students.

#### Level of Training Proposed and Degrees

Our IH program provides training at both the Master's and Doctoral level to 10 to 12 trainees (we currently have 11 IH students). The University of Iowa has been providing IH training at both these levels since 1938. The Master's degree program has been accredited by ABET since 1995.

**Masters (MS) Training:** Our master's level IH training program aims to impart the skills necessary for a successful career as a modern industrial hygienist in a wide variety of positions. A minimum of 43 semester credit hours is required. The curriculum is designed to allow students to complete their courses and a written thesis within two calendar years and we provide stipend and tuition support during the two-year period. At the University of Iowa, full-time graduate students take 12-15 credit hours per semester (the Graduate College does not permit a student to be enrolled in more than 15 hours in a semester). A defense of the master's thesis serves as the Master's Final Examination. The defense is an oral presentation of the purpose, methods, and results of the thesis research. An acceptable thesis is comparable to a manuscript which could be submitted for peer-reviewed publication in a professional journal. The students' Thesis Committees examine both their general IH knowledge and area of knowledge associated with their theses.

**Doctoral (PhD) Training:** The doctoral program in IH trains individuals to conduct and supervise research or to manage advanced applied programs in academic, government, or private IH settings.

The training program in IH is defined by the curriculum and by the research interests of the student and faculty supervisor. Candidates are recruited based on their academic strengths, experience, and creativity as well as their test scores, and admitted after an interview has been completed and a suitable faculty match arranged.

Doctoral students must complete 72 hours of coursework, which must include the master's-level curriculum (presented in Table C) if these courses have not previously been passed for a prior MS degree. As previously noted, the didactic training has strong interdisciplinary components, especially in occupational health, toxicology, ergonomics, epidemiology, biostatistics, and rural health and agricultural medicine. In addition to the required courses, the student and advisor select electives tailored to a particular career trajectory and research interests. The Centers at the IREH offer extremely rich resources of faculty expertise, facilities, and equipment, and IH students have opportunities to contribute to multidisciplinary research projects involving physicians, engineers, chemists, and microbiologists. Research opportunities are also available through the investigator-initiated grants of departmental faculty members.

### Curriculum

Since our last competing ERC application in 2002, we have changed the IH core curriculum. We have replaced the three former core courses – IH-1:Recognition, IH-2:Evaluation, and IH-3:Control (10 credit hours) – with five courses (15 credit hours). The five new core courses are presented in Table C. We believe that the new courses enable our students to better manage the complex issues that face today's practicing industrial hygienists. They also draw on our faculty strengths more effectively, foster collaboration and consistency among courses, and eliminate redundancies. Moreover, this structure more completely covers IH rubrics and facilitates our efforts to renew our ABET accreditation. Table C presents the curriculum that is required of all MS and PhD level IH students.

A significant strength of the Heartland Center program is that all IH students are exposed to occupational medicine, occupational health nursing, epidemiology, biostatistics, ergonomics, environmental health, and injury prevention. Integration of these disciplines is achieved through a variety of classroom and educational experiences. In the Occupational and Environmental Health seminar IH students also interact with students from other program areas, doing joint presentations (research findings and literature reviews) and participating in "IH Jeopardy," a didactic version of the popular game show that has become a yearly tradition. Ergonomics courses required for IH students are also taken by ergonomics, engineering, and nursing students. In the aerosol technology course, our IH students interact with chemistry, engineering, and pharmacy students.

### Trainee Training and Research Experiences

Within the past three years, since our last competing ERC application, students have conducted research on a variety of topics and been supported by many funding sources in addition to the Heartland ERC. A listing of the students who have completed research projects within the past three years is provided in Table D. This table lists supporting or collaborating groups—besides the Heartland ERC--which provided funding, equipment, facilities, or collaboration on data collection and analysis.

We also promote interactions between students and practitioners in industry, government, and private practice. Local and regional industrial hygienists have been active in providing our students with preceptorships. They also participate as guest lecturers in classes and seminars. These relationships have not only strengthened our curriculum but have resulted in employment opportunities. Students participate in local sections of professional societies and the AIHA Iowa-Illinois Local Section has been an avid supporter of the AIHA Student Chapter. Funds from the Heartland Center support travel to national meetings, such as the American Industrial Hygiene Conference and Exposition (AIHCE). In fact, this year eight of our eleven IH students and one ergonomics student attended the AIHCE in Anaheim, California. All of these students either presented platform presentations or posters on their research projects.

### **Trainee Performance - Academic**

- Trainees are required to complete a Plan of Study that outlines their courses for each semester of study. These Plans are developed in collaboration with their advisor and the IH Core Director.
- Student progress and grades are reviewed by the student's advisor and IH Core Director each semester.
- Instructors of extra-departmental courses are contacted whenever students have below-standard performance within their courses and trainees are required to retake the course if necessary.
- Results of PhD qualifying examinations and defense of MS theses and PhD dissertations are monitored by the Executive Committee at their monthly meetings.
- Discussions regarding academic progress are held between academic advisors and the IH Core Director at least once each semester.
- Exit interviews are held by the OEH Department Head with each trainee who graduates or leaves the program.

### **Trainee Performance - Research**

- Thesis and dissertation projects are evaluated by the trainee's dissertation committee, which includes at least one Executive Committee member.
- Thesis and dissertation data collection, analysis, and defense are closely monitored by the trainee's advisor.
- Submission of work to scientific societies, professional meetings, and scientific journals is monitored by the trainee's advisor.
- Positions held, number of publications, number of grants received, and professional activities and honors of graduates will be closely monitored and evaluated.

### **Qualifications and selection of trainees**

Training candidates must meet departmental requirements to be admitted to our program. Admission to degree programs within the Department of Occupational and Environmental Health is governed by the rules of the University of Iowa Graduate College. General admission criteria include a baccalaureate degree in a science or engineering discipline, a minimum cumulative GPA of 3.0 for the MS and 3.25 for the PhD, a minimum combined score on the verbal, quantitative, and analytical portions of the Graduate Record Exam (GRE) of 1600 for the MS and 1650 for the PhD. The OEH faculty evaluates applicants based on their general academic background, science background, previous work experience, clarity of focus, and promise.

In addition to meeting university requirements, prospective students must have the prerequisites specified by ABET. These prerequisites include a baccalaureate degree and candidates' undergraduate preparation must include 63 semester credit hours in the following courses: calculus, physics, mathematics, biological, chemical and either physical sciences or engineering. We require students who are accepted into our program but lack these prerequisites to satisfy these conditions in addition to the standard IH curriculum.

### **Program Activities and Accomplishments**

The IH program has been strengthened considerably over the past three years, by the academic experiences gained by Drs. Heitbrink and Sanderson. During this time, they have taught and mentored thirteen students in the MS program and seven students in the PhD program. Nine of the MS students completed their degrees during the past 3 years, and within the next year, four of the PhD students and one more MS student are expected to have completed their degrees. All of the MS graduates are currently working in full-time IH positions.



At the time Dr. Sanderson joined the OEH faculty in 2002, the College of Public Health made a commitment to further strengthen and stabilize the IH program by hiring a third IH tenure-track faculty member. In 2004, Dr. Thomas Peters joined the OEH faculty as Assistant Professor of IH. Dr. Peters dramatically strengthens our program in the area of aerosol technology and ventilation control. Dr. Peters will teach the new Aerosol Technology course (100%) and 25% of the new Environmental Epidemiology and Exposure Assessment course.

The program has been strengthened further by the addition of two other faculty members since 2002. Dr. William Field, a graduate of the University of Iowa with extensive research and mentoring experience in health physics joined the faculty. Dr. Field provides training and research support for work on physical agents and occupational epidemiology. The safety training and research aspects of the IH program were strengthened when on March 1, 2003, Dr. Risto Rautiainen joined the faculty. Dr. Rautiainen is an engineer who conducts agricultural safety research. These five professors serve as the Executive Committee of the IH Program. With five professors fully devoted to training and mentoring the research of IH students, our program is stronger than it has been in many years

Since 2003, we have also restructured the industrial hygiene curriculum. We eliminated the former structure of three core courses of Industrial Hygiene I, II, and III—Recognition, Evaluation, and Control and replaced them with five core courses—Industrial Hygiene Fundamentals, Aerosol Technology, Assessing Physical Agents, Controlling Occupational Hazards, and Occupational and Environmental Epidemiology and Exposure Assessment. The addition of new faculty allowed us to create these new courses and expand the training to include topics that were formerly inadequately covered. We received advice from our current students, alumni, and external advisors in revising the curriculum and it was a consensus that these new courses better prepare our students to meet the broad challenges they will face in their careers.

Between 2000 and 2005, twenty-seven students were trained by the IH Core with fifteen students earning graduate degrees in IH (thirteen MS and two PhD degrees).

Recruitment of new trainees remains a high concern for the IH program faculty. We are fortunate to have maintained an enrollment of IH trainees since the creation of the Heartland ERC. Formerly, we had several more MS students than PhD students, but this trend has recently reversed with seven PhD students and four MS students currently being trained by the IH Training Program. We continue to expand our efforts to recruit students, particularly at the MS level.

### **Program Products**

See Appendix B & C

### **Future Plans**

The goal of the IH Training Program is to contribute to occupational disease and injury prevention in industrial, environmental, and agricultural sectors of Iowa, the region, and the nation, with a special emphasis on addressing rural needs. We train industrial hygiene professionals at the MS and PhD degree levels for careers in industrial, environmental, and agricultural settings and in research. We do this through classroom and laboratory instruction but also provide opportunities for supervised research and field experiences. We provide this training with an interdisciplinary approach that prepares industrial hygienists to practice as members of an occupational/environmental health and safety team. Since 2002, we have developed a strong research training program which develops our trainees' skills for conducting independent research through experience in primary data collection, database management, and grant preparation. Our trainees have received a diversity of research training experiences, both related and not related to their MS thesis and PhD dissertation projects. The IH faculty will continue to build a strong research program and include MS and PhD students in the matrix for accomplishing that research. A major goal of the IH trainee experience is to also obtain

experience disseminating the results of research findings. Our trainees have been very successful in disseminating research findings through publications and oral presentations.

Our goal is to graduate four students per year with an MS degree in industrial hygiene and one student every two years with a PhD degree. The availability of training funds from the ERC has been invaluable in recruiting students into our program and helping to complete their degrees on time. Our students also benefit in conducting their research projects by participating in pilot projects funded by the Heartland ERC's Pilot Grant Program. ERC funding allowed us to purchase much needed equipment to support student IH work.

The program's graduates are working to control workplace health hazards in various professional positions in the region. We have graduates employed by government agencies including NIOSH, the US Army, the Iowa Department of Public Health, and the Veterans Administration Hospital system. Our graduates also protect the health and safety of employees of the Hygienic Laboratory and the Health Protection Office of the University of Iowa. However, most of our graduates take careers as IHS in the private sector and provide health and safety for workers in a broad range of industries.

The IH Core is utilizing funds made available to the Center from NIOSH to purchase monitoring equipment and supplies which improve our ability to train our students as well as conduct research studies. The equipment is used to study the association between workplace activities and exposures and enable students to conduct more insightful research leading to better control measure implementation. The funds will also support development of lab exercises in which students learn how to carry out hazard evaluations using state-of-the-art sampling and analytical equipment.

The availability of training-related expenses has enhanced the program by providing partial salary support for clerical staff and for the Department's Graduate Student Coordinator. The Coordinator is responsible for academic record keeping, both student requirements and ABET admission requirements, and generally facilitates recruitment, admission, supervision, and placement of the Department's graduate students. The Coordinator also maintains contact with alumni of the Department.

In summary, the IH Core has been an important resource for the field of health and safety at the University of Iowa. We anticipate that our reputation and growth will continue as the College and our ERC matures. We will continue to enhance our efforts to recruit the best students and foster growth in occupational safety and health research across multiple disciplines.

## **Program Title: Occupational Epidemiology Training Program – Progress Report**

**Program Director: R. William Field, PhD**

### **Program Description**

The primary goal of the Occupational Epidemiology Training Program (OETP) is to provide the foundation to enhance the existing knowledge of Occupational Epidemiology skills for a variety of health disciplines including, occupational health, industrial hygiene, health physics, occupational health nursing, safety engineering, occupational medicine, environmental epidemiology, toxicology, environmental science, and occupational injury prevention specialists, etc. In some cases, the trainees may wish to further training by entering a PhD or MD program such as the PhD in the Occupational Injury Prevention Training Program in the College of Public Health with a subsequent career in research, teaching, medicine, trade unions, or administration. Upon completion of the MS or PhD degree in the OETP, a graduate will have demonstrated achievement of the following objectives:

- 1) to understand epidemiologic principles including: design and analysis of case-control and cohort studies, historical and current examples of descriptive and analytic epidemiologic studies, occupational etiologic factors in human disease and the determinants of disease in man;
- 2) to understand the principles and integration of the practice of occupational medicine, industrial hygiene and safety, occupational health nursing, ergonomics and occupational health management as related to Occupational Epidemiology;
- 3) to critically read research articles in occupational epidemiology;
- 4) to understand the most frequently used epidemiologic study designs and how to apply them to occupational epidemiology;
- 5) to assess contemporary human health issues associated with the biological, chemical and physical factors in the occupational environment and to perform a critical review of occupational factors that affect health;
- 6) to develop a research plan in occupational epidemiology;
- 7) to implement a research plan by collecting and appropriately analyzing data;
- 8) to disseminate research results, both orally and in writing;
- 9) to provide training and teach workshops in occupational epidemiology;
- 10) to understand and demonstrate the use of statistical analyses including: graphs and tables, descriptive statistics, probability, binomial and normal distributions, sampling distributions, tests of significance, confidence intervals, frequency data analysis, linear regression and correlation and nonparametric tests; and
- 11) to discuss and identify the sources, routes of entry, and effects of occupational and environmental toxicants and their effects on humans; as well as the pathophysiology of toxicant actions, including those of air and water pollutants, metals, pesticides, solvents, mycotoxins, food toxicants and other chemicals.

### **Program Activities and Accomplishments**

The Occupational Epidemiology Training Program was funded starting in July 2005. Considering the program has been in existence for only a short period, a tremendous amount of progress has been made in a short period.

#### **a. Trainees**

Four trainees have been recruited to date and are actively involved in the OETP. Two of the new trainees have been working toward a PhD degree in the Department of Epidemiology and a third student is a new student in the Department of Epidemiology working toward a MS degree. The fourth trainee is a Presidential Graduate Fellow who is currently working toward both a MS degree in the Department of Biostatistics and a PhD in the Department of Occupational and Environmental Health. Each year, the University of Iowa Presidential Graduate Fellowship Program brings twenty of the most promising doctoral students in the world to the University of Iowa. The University of Iowa will provide

tuition and stipend support for Ms. Sun's graduate studies. The new enrollees had a long-term interest in Occupational Epidemiology, but no training program existed prior to July 2005 to accommodate the students' interest. All three trainees with a goal of receiving a PhD degree have already identified topics for their dissertation and are actively performing their literature review.

Some details related to the new trainees follow. KS is a second year doctoral student in the Department for Occupational and Environmental Health. Her dissertation topic focuses on retrospective reconstruction of radioactive particle exposure. AQ is a fourth year doctoral student in the Department of Epidemiology. She will be performing a retrospective cohort mortality and cancer incidence study of former DOE contract workers at the Iowa Army Ammunitions Plant. JM is a fourth year doctoral student in the Department of Epidemiology. She will be performing a retrospective cohort mortality study of over 1000 chimney sweeps for her dissertation. SG is a first year MS student in the Department of Epidemiology and is exploring an occupational related thesis that will be performed in conjunction with the Iowa Department of Public Health. Two other trainees started in Fall 2006 semester.

#### b. Program changes

One change in the training program is the addition of Dr. Tom Peters as a core faculty member. Dr. Peters is an assistant professor in the Department of Occupational and Environmental Health and Industrial Hygienist who has an area of focus in aerosols. He will teach several of the exposure assessment lectures for the Occupational Epidemiology course. The exposure assessment aspect of the course is intended to provide a "toolbox" of skills that will enhance exposure assessment skills for occupational epidemiologic analyses. Another change in the program for the coming year will be the requirement that all trainees take the course entitled, (050:270) "Responsible Conduct in Research".

All Occupational Epidemiology trainees (masters, doctoral and postdoctoral) are required to receive instruction in the responsible conduct of research by taking the University of Iowa course: 050:270 Responsible Conduct in Research. Responsible research conduct is taught through case studies, group discussions and readings lead by experienced research faculty. This course covers ethical issues; misconduct and fraud; proper handling of data; responsible authorship; conflict of interest; and ethical research on animals and human subjects

All trainees are also required to complete human subjects protection education prior to conducting research.

### **Program Products**

See Appendix B & C

### **Future Plans**

While the College of Public Health has several large scale on-going research projects that allow students to gain valuable experience in Occupational Epidemiology, Dr. Field will be working in collaboration with the Geisinger Health Care System to transfer the National Chimney Sweep Registry to the College Public Health at the University of Iowa. The registry will provide additional research opportunities for trainees. The National Chimney Sweep Guild requested the program's help in assessing whether or not the workers had an increase in adverse health outcomes related to their employment as sweeps.

Trainees, including underrepresented racial and ethnic groups, have been recruited in numerous ways. Notices of the training opportunity in Occupational Epidemiology have been posted on several public health jobs sites, professional organizations newsletters, and numerous Listserves including those serving the state (e.g. Iowa Department of Public Health) and national professional organizations. The College of Public Health also has issued a general press release describing the new training opportunity. Information about the training program is also disseminated by the College of Medicine during their regular medical school recruitment visits.

**Program Title: Occupational Health Nursing Training Program – Progress Report****Program Director: Kenneth Culp, PhD, RN****Program Description**

Occupational Health Nursing (OHN) Curriculum at The University of Iowa College of Nursing has been designed more specifically for the distance learner. The University of Iowa has adopted a web-based software system from a vendor and we are engaging students with new content.

OHN Program Objective 1: Make available a course of study within the master's program that accommodates the distance learner and targets potential candidates outside the state of Iowa to include students from Kansas, Nebraska, Missouri, and Iowa.

- We graduated our first student from Nebraska in Fall '05
- The College of Nursing has now placed the entire MSN core (see Table I) online. These courses are now offered in both formats; one semester they are on-campus and the next these are on the web.
- The College of Public Health has now placed the epidemiology and interdisciplinary occupational health courses online.
- We have arranged occupational health practicum sites with partners in the student's home community
- All off-campus students did complete short 2-3 day on-campus activities as required by the course instructors (attendance at an Occupational Health Symposium and an on-campus training exercise in respiratory protection)

OHN Program Objective 2: Revise the curriculum based on responsiveness to NIOSH site visitors, graduates, Heartland Executive Board, and a community-based occupational health nursing advisory committee.

- We have strengthened safety and industrial hygiene content in the occupational health nursing courses.
- Toxicology is now contained in modules for both of the didactic occupational health nursing courses.
- Interdisciplinary experiences with IH and OM students has been implemented for respiratory protection labs
- Developed Toxicology Modules that are incorporated into both 96:256 and 96:258

All Occupational Health Nursing trainees (masters, doctoral and postdoctoral) are required to receive instruction in the responsible conduct of research by taking the University of Iowa course: 050:270 Responsible Conduct in Research. Responsible research conduct is taught through case studies, group discussions and readings lead by experienced research faculty. This course covers ethical issues; misconduct and fraud; proper handling of data; responsible authorship; conflict of interest; and ethical research on animals and human subjects.

All members of a research team, including the principal investigator and all other individuals (faculty, staff, or student) must complete a course entitled "Human Participants Protection Education for Research Teams." Any student or faculty member who has contact or interactions with research subjects or with their private, identifiable information must be certified in human subjects' protections.

## Program Activities and Accomplishments

- A transition to distanced based technologies in the College of Nursing is now complete. Courses are offered both online and on-campus in order to meet the expectation of both in-residence and remote learners.
- Upgraded software for online courses from WebCT version 3 to version 4.1 for didactic courses 96:256 and 96:258. This has made streaming video more practical and also allowed for more user-friendly features for students. Assigned readings are now stored online in a password protected environment for easy access. We now allow written assignments to be submitted online and use timed quizzes with online grading. These quizzes have also permitted interesting options for exams exploiting the rich color of photographs – for example we can now test student assessment skills for various environmental risks. In the last year the faculty has taken real-world workplace hazards photographs that demonstrate violation of OSHA standards and student must examine the scenes quickly to respond to the exam question.
- Continued support for national and international practicum experiences for students with the assignment to an internship with OSHA headquarters in Washington, DC and to The Gambia.

## Program Products

See Appendix B & C

## Future Plans

We have used a number of specific strategies to recruit students in the last three years, including advertising in the state board of nursing newsletter, conducting a direct mailing to AAOHN nurses in Region VII, developing a website on international occupational health nursing ([www.occhealthnursing.net](http://www.occhealthnursing.net)), developing web classes to accommodate the distance learner, developing new academic programs like the joint MSN-MPH degree, and having faculty attend state and regional occupational health nursing conferences to talk directly to attendees about coming to Iowa. Now, we are in the process of developing plans for trainees who require distance-based opportunities. There are specific areas that require more refinement, specifically the opportunity for distanced-based students to complete their practicum assignments in locations near their home communities. If successful, this and other distance-based strategies will strengthen recruitment efforts outside of Iowa. We plan to develop brochures and orientation materials that target this audience specifically in the next 6 months.

In the next year, we plan to recruit more heavily among the nursing population working outside of occupational health, including 1) recent graduates of BSN programs and 2) nurses in hospitals and other acute settings or outpatient clinics who are dissatisfied with acute care and hospital nursing. For this audience, our recruitment materials describe occupational health nursing as a new direction in nursing—a practice markedly different from inpatient care delivery—and a compelling career choice offering more autonomy than traditional health care settings.

In the next five years, we plan to develop a clinical doctorate program which would prepare an occupational and environmental health nurse practitioner. This degree program will be markedly different from the current MSN clinical specialist. This will not be a PhD research-oriented degree, but a new post-graduate program that will enable graduates to provide primary care at the work-site. This plan is congruent with the College of Nursing at the University of Iowa.

Over the next five years we plan to focus on four vital areas to further improve our OHN Training Program:

- 1) curricular effectiveness – We will continue to evaluate our OHN curriculum in relation to the College of Nursing Evaluation Plan and AAOHN Core Curriculum.
- 2) program accessibility – We plan to offer courses in a variety of delivery formats including distance-based education and traditional course work at a variety of times and days of the week. We will also continue to improve student advising and opportunities for off-site practica for students engaged in distance learning.
- 3) cultural diversity – We will focus on helping OHN students become aware of under-served worker populations through course content, practica experiences (possibly international), and networking. as previously described.
- 4) new certification/degree options – To meet the educational needs of OHN students with a variety of career goals, the College of Nursing and College of Public Health have recently obtained approval for a joint MSN-MPH degree. We are also considering development of certificate programs for occupational health nurses and/or occupational health nurse practitioners.

## **Program Title – Occupational Injury Prevention Research Training Program – Progress Report**

**Program Director – Corinne Peek-Asa, PhD, MPH**

### **Program Description**

The Occupational Injury Prevention Training Program (OIPP) was established in 2001, in response to the identified need for additional specialists trained in occupational injury prevention [Institute of Medicine, 2000]. Our program is housed in the University of Iowa, College of Public Health, and trains annually three doctoral students and one post-doctoral researcher in the Departments of Occupational and Environmental Health, Epidemiology, and Community and Behavioral Health. The objective of the training program is to train doctoral-level researchers who can begin independent research and prevention careers in settings such as Universities, Federal agencies, State agencies, and private industry.

One strength of this application is the multidisciplinary leadership. In addition to the PI, whose primary research focus is injury control, the Executive Committee that oversees the training program includes three department heads whose research areas include injury control.

The doctoral curriculum includes 12 core courses that are taken by all trainees, plus additional departmental requirements. Our OIPP builds on a strong multidisciplinary curriculum that includes three full courses that focus exclusively on injury prevention and control, as well as courses in occupational health and safety, epidemiology, and program development and evaluation. In addition to course work, the program offers trainees a wide range of research opportunities, both on and off campus.

Our doctoral and post-doctoral trainees will be integrated into a rich research environment. Our research program draws on a strong infrastructure that includes a CDC-funded Injury Prevention Research Center, a CDC-funded Agricultural Health Center, and a CDC-funded Prevention Research Center. We also integrate student research experiences with collaborators at the Iowa Labor Services Division, the Office of the Iowa Chief Medical Examiner, and the Iowa Department of Public Health. Training funds enable the Occupational Injury Prevention Core to attract talented students who are interested in the field of occupational injury prevention. Training funds also enable us to recruit promising students from other related fields. As part of the Heartland Center ERC, the Occupational Injury Prevention Core is able to provide a multidisciplinary collaborative environment in which trainees foster their research interests and develop collaborations with fellow faculty and students.

Upon completion of the Occupational Injury Prevention Training Program, the doctoral-level graduates will have demonstrated achievement of the following objectives:

- Understand and apply the public health approach to occupational injury control
- Critically read research articles in occupational injury epidemiology
- Understand the most frequently used epidemiologic study designs and how to apply them to occupational injuries
- Develop a research plan in occupational injury epidemiology
- Understand the federal grant system and develop proposal writing skills
- Understand the IRB process and how to ethically conduct research and protect human subjects
- Implement a research plan by collecting and appropriately analyzing data
- Disseminate research results, both orally and in writing
- Teach courses in occupational injury epidemiology

Post-doctoral trainees, in addition to meeting the goals of the doctoral program listed above, will also:

- Participate in the preparation of at least one independent grant
- Understand the budgeting and budget oversight process
- Develop skills to supervise and manage project staff
- Serve as a primary author on at least one peer-reviewed manuscript



## Program Activities and Accomplishments

The OIPP seeks to train students to be leaders in occupational injury research, and is thus based on a strong program in research experience. Students who successfully complete the program will be able to 1) formulate a clear research question related to occupational injury epidemiology 2) develop a research plan; 3) demonstrate skills in data collection and appropriate data analysis; and 4) present research results both orally and in writing. Doctoral students normally complete course work (in just over two years) and submit a doctoral dissertation on a research project in a total of four to five years. We anticipate that the final two to three years of each trainee's study will be supported by externally funded research grants.

In addition to doctoral research, each trainee is encouraged to work on a number of projects to obtain broad research skills. For each trainee, we try to provide experience in primary data collection, database management, project supervision, fiscal oversight, human subject protection oversight, and grant preparation.

OIPP trainees will receive experience through a number of potential research channels. The primary focus is on tailoring each trainee's dissertation research to their individual interests and goals. Four steps help structure the OIPP students' research experience. First, a qualifying examination substantiates their didactic knowledge, relevant analytic skills, ability to design a research project, and written and oral skills in English. This exam requires each student to discuss their main research interests. Second, a comprehensive examination enables the student to demonstrate their capability for creative individual research by completing a thorough analysis of a research topic. For OIPP trainees, this topic is assigned to be in the field of occupational injuries, but is not the same as the planned dissertation topic. This strategy provides an opportunity to examine a different occupational injury topic in great detail. Next, students develop their dissertation research proposal and defend it before an examining committee. This committee consists of at least five members of the graduate college faculty, with at least three faculty members who are predominantly from the student's primary departmental faculty and the Chair or Co-Chair of the examining committee from that department. For OIPP trainees, at least one member is from the OIPP Executive Committee. The Examining Committee will determine if a student is ready to commence dissertation research. In the final examination, the student will defend their dissertation, which shall include original thought, formulation, and conduct of research, whether or not original data were collected (in some cases existing, well-documented databases may be used as the basis for research). The dissertation's quality will be judged relative to the probability that it will withstand the peer-reviewed publication process.

In addition to experiences conducting research in a variety of settings, OIPP trainees are required to participate in activities that enhance presentation skills. Trainees are required to develop and present a poster through one of several mechanisms, including the ERC Student Poster Competition, the Department of Epidemiology Student Poster Competition, and the UI College of Medicine/Public Health Research Week. We also require OIPP trainees to present their work orally at least once at a national research meeting.

The OIPP training money has been instrumental in influencing the direction of growth within the new College of Public Health. OIPP funds provided incentive to Department Heads to establish courses on injury prevention, and three new courses have been developed. Recruitment of new faculty who specialize in the area of injury control has also led an increase in the number of lectures devoted to injury prevention. For example, Dr. John Lowe and Dr. Ginger Yang have been successful in integrating occupational injury prevention case studies into the CBH curriculum. The growing curriculum on injury control, influenced by the OIPP, has attracted many new students to our courses and provided a growing interest in injury control. Injury Prevention course enrollment has increased an average of 20% each year, and interest in research experiences in the field has grown equally.

The OIPP has influenced the research directions of both faculty and students. Several faculty members

have broad research interests, and the presence of a strong occupational injury prevention program has influenced the level of injury prevention work they do. For example, Dr. John Lowe recently applied for an NIH grant to study health behaviors and safety in the occupational setting, with which he partnered with several faculty members with OEH experience. Dr. Ginger Yang, whose focus is primarily on sports injury prevention, has included an occupational focus to her work to study injuries among professional athletes.

The OIPP has played a critical role in bringing students to the University of Iowa. For example, Hope Tiesman was recruited from the South Florida Veteran's Administration, where she was conducting NIOSH-funded work on nursing injuries within the VA system. Hope was offered graduate assistantships from a number of institutions. She chose the University of Iowa in part because of the strong program in occupational injury control, but also largely because we could offer her an attractive funding program.

The OIPP has played an important role in attracting students from related fields into the study of occupational injuries. For example, Rebecca Heick was admitted to the Epidemiology doctoral program with a MS in Health Behavior. She was originally interested in health promotion. However, she also serves as a volunteer Emergency Medical Technician in her community, and although she was very interested in occupational issues, she was not aware of opportunities to study occupational safety. She applied to the OIPP training program immediately after learning of the program, and she now has external funding to conduct dissertation research on injuries to EMS workers. Erin Heiden, our first OIPP trainee in the Department of Community and Behavioral Health is another example. Erin's primary interest is in the population of people with disabilities, and her original interest was injury prevention among children with disabilities. However, she is now primarily interested in work accessibility and safety for workers with disabilities, as well as work stress for parents whose children have disabilities.

The OIPP has also played an important role in training ERC and College of Public Health students whose primary interests are not injury control. Elements of injury control are important in areas such as industrial hygiene, ergonomics, occupational medicine, occupational nursing, and agricultural safety and health. Many students studying these topics enroll in the OIPP injury courses. ERC students also learn about occupational injury control through lectures in other courses. Many of these lectures are provided by OIPP Core Faculty. In addition, ERC and CPH students have opportunities for research experiences on injury projects. OIPP Core Faculty provide consultation and collaboration on many ERC student projects that have injury prevention concerns.

In summary, the OIPP has been an important resource for the field of occupational injury prevention at the University of Iowa. We anticipate that this trajectory of growth will continue as the College matures, as the College develops a reputation on campus and throughout the region, and as the number and quality of the CPH student body grows. We will continue to enhance recruiting efforts to recruit the best local students and bring in competitive students nationwide, and we will continue to foster growth in occupational injury research across multiple disciplines.

### **Program Products**

See Appendix B & C

### **Future Plans**

Faculty in the Occupational Injury Prevention Research Training Program are enthusiastic about the growth of this program and are delighted with the strong students that we have recruited. We will continue recruitment activities, research support, and mentoring of our current trainees.

**Program Title: Occupational Medicine Training Program – Progress Report****Program Director: Nancy Sprince, MD, MPH****Program Description**

The overall goal of the 24-month residency program is to train well-rounded, excellent OM physicians who are qualified for the comprehensive practice of OM and can enter any of the available sectors to carry out their professional work. Objectives are achieving the ACGME and Residency Program skills, competencies and knowledge required for OM physicians.

During the reporting period, the goals and objectives of the program have continued to be implemented successfully. The Program has achieved recruitment of a full complement of OM residents, high quality training in a fully accredited OM residency program, placement of graduates in OM positions in the region, 100% success rate for OM residency graduates taking OM Boards from ABPM, and curriculum expansion as described below. Crucial program support from the NIOSH training grant has allowed us to expand numbers of residents to reach a critical mass of six residents, enhancing case discussions, information exchange, and teaching between academic and practicum year residents. Crucial program support from the NIOSH training grant has provided staff support for key activities including aggressive recruitment of residents, development of new practicum sites, coordination of practicum rotations, and assistance with placement of graduates.

**Program Activities and Accomplishments**

In the course of preparing the Program Information Form for the re-accreditation site visit, the program has sought feedback on the educational program from current residents, faculty and practicum supervisors. Based on these recommendations, we plan to implement a wider variety of assessment tools to evaluate residents' competencies and to increase resident feedback to strengthen the program.

We continue to work on strengthening the program based on feedback from the last Summary Statement. In response, we have previously addressed several areas including strengthening IH and Ergonomics training, strengthening research opportunities and experience, and providing peer education experiences by establishing joint academic-practicum year weekly seminars. We are working to strengthen several areas based on feedback. We developed an elective rotation with Iowa OSHA during which residents rotate through plants that are in various stages of achieving OSHA Voluntary Participation Star status. Based on recent resident feedback, we will try to coordinate with I-OSHA to provide more direct input from OSHA personnel during this rotation. Dan Holus, Director of the University of Iowa's Labor Center, has agreed to work with Richard Pashed, UAW member, to strengthen the labor occupational health and safety rotation for OM residents.

All residents are required to take Responsible Conduct in Research (050:270), a one semester course held weekly. Responsible research conduct is taught through case studies, group discussions and readings lead by experienced research faculty. This course covers ethical issues; misconduct and fraud; proper handling of data; responsible authorship; conflict of interest; and ethical research on animals and human subjects. Other topics relevant to the practice of OM include confidentiality of patient information and informed consent.

All trainees are also required to complete human subjects protection education prior to conducting research.

The OM residency training program continues to work with the College of Public Health's Associate Dean for Diversity, Dr. Joe Coulter, in recruitment of underrepresented minorities. Dave Asa, the Heartland Center coordinator, is a member of the College-wide Committee on Diversity. The strategy

includes recommendations from faculty and students, including current OM and Heartland Center students who are from minority groups, focused recruitment contacts at Historically Black Colleges and Hispanic Serving Institutions, and focused GRE searches.

**Program Products**

See Appendix B & C

**Future Plans**

In addition to continuing plans for recruiting, training and placement of OM residents from a fully accredited OM residency program, we will provide documentation for the Accreditation Council for Graduate Medical Education five-year re-accreditation site visit/review. We do not anticipate upcoming changes in curriculum, program faculty, staff, or resources.

**Program Title: Continuing Education Program – Progress Report****Program Director: Kimberly J. Gordon, RN, MA, BSN, COHN-S****Program Description**

The Heartland Center for Occupational Health and Safety Continuing Education (CE) Program provides interdisciplinary continuing education for occupational safety and health (OSH) professionals practicing in Federal Region VII. CE trainees have included physicians, nurses, industrial hygienists, workers and their representatives, safety engineers, paraprofessionals such as Emergency Medical Technicians and Certified Medical Assistants, and members of labor-management health and safety committees. Trainees have come from all four states of Region VII (Iowa, Kansas, Missouri and Nebraska).

From July 1, 2005, to June 30, 2006, the Heartland Center CE program offered 35 continuing education courses (311.85 hours), which were attended by 1380 trainees (a time commitment equivalent to 1613.28 person-days). Table 12b-CE provides a summary of these data.

**Goals and Objectives**

In the process of creating the Heartland Center for Occupational Health and Safety, we carefully selected four basic goals. These goals have stood the test of time as the four areas in which we continue to develop objectives and by which we measure our progress: 1) geographic impact, 2) course content, 3) target audience, and 4) integration of multiple disciplines. The objectives for each goal are listed below.

**Goal 1. To ensure that practitioners in all four states of Federal Region VII receive continuing education from the Heartland Center.**

Objective 1. By 2007 document a 25% increase in the number of trainees from the three states other than Iowa (Kansas, Missouri and Nebraska).

Objective 2. By 2007 document a 10% increase in the number of trainees from Iowa.

Objective 3. Develop our capacity for providing distance education and deliver two (2) distance education courses in 2006 and two in 2007.

**Goal 2. To conduct targeted needs assessment and respond to results with appropriate CE offerings.**

Objective 1. Conduct targeted needs assessment with Industrial Hygienists in 2005 to be utilized in program development for 2006 and 2007.

Objective 2. Conduct targeted needs assessment with Safety professionals in 2006 to be utilized in program development for 2007 and beyond.

**Goal 3. To further diversify the target audience for our CE program.**

Objective 1. Increase the number of IH trainees over the next 2 years (2007).

Objective 2. Increase the number of safety trainees over the next 2 years (2007).

**Goal 4. Explore innovative ways to integrate the disciplines of the Center in CE programs**

Objective 1. Continue to incorporate at least three of the disciplines of our Center (IH, OM, OHN, Ergonomics, Agricultural Safety and Health as well as Safety) in an annual interdisciplinary conference.

Objective 2. Integrate topics and speakers from the Center's Occupational Injury Prevention Research Training and Occupational Epidemiology Program Areas into CE courses.

**Program Activities and Accomplishments**

The Heartland Center Continuing Education Program Area is making progress toward our goals and objectives. A 12% increase in total trainees, 21% increase in total person days, and 25% increase in the number of courses is noted from the 2004-2005 reporting period. The number of safety trainees increased by 112% compared to the number of safety trainees in the 2004-2005 reporting period.

Program Director, Kimberly Gordon, is actively working with a distance education consultant to create a library of distance based training opportunities. Elluminate Live and Iowa Course Online (ICON) are being used for these offerings. Final topic determination is underway and is based on formal needs assessment data.

A variety of new courses were held this year along with many repeat offerings. An annual interdisciplinary conference is held each March incorporating the disciplines of our Center. Examples of new offerings include:

- Occupational & Environmental Epidemiology for the Industrial Hygienist, Occupational & Environmental Health Professional;
- Applied Epidemiology for Industrial Hygienists;
- Using Occupational Research in Practice;
- Occupational Medicine: Where Medicine Meets the Workplace;
- The Best Practices in Iowa: A Workplace Safety Conference.

We continue with electronic communication for Continuing Education trainee recruitment. We have experienced an increase in new and returning trainees from Federal Region VII.

### **Program Products**

The Heartland Center Continuing Education Program is the primary sponsor for the majority of our offerings. In addition, we jointly sponsor programs with the Central State Occupational Medicine Association (CSOMA), the Northeast Iowa Occupational Health Nurses Association (NIAOHN), WORKSAFE IOWA and the Iowa Center for Agricultural Safety and Health (ICASH). The Heartland Center maintains an active role in directing the content of all jointly sponsored programs. A complete list of CE course offerings can be found on Table 12a.

An example of a successful Research to Practice (R2P) project is a presentation by James A. Merchant, MD based on research at NASA. The NASA model for workplace wellness was presented at the WORKSAFE IOWA Occupational Medicine Associates Network Meeting and Seminar (Spring 2006). A physician attendee incorporated the concepts and paradigm with a local employer to increase the role of occupational medicine and case management in this manufacturing facility. This has resulted in a streamlined approach for the workers to access local and referral healthcare services.

A variety of unique training courses and topics have been presented using the disciplines and expertise from our center:

- Case Management: Care of Work-Related Injuries - this offering is created for workers' compensation case managers;
- Occupational & Environmental Epidemiology for the Industrial Hygienist, Occupational & Environmental Health Professional – a unique interdisciplinary offering;
- Using Occupational Research in Practice – a course for occupational health nurses offered via distance education using the Iowa Communications Network (ICN) ;
- Agricultural Occupational Health Training (Session I) was offered to distance trainees using Elluminate Live.

An impact evaluation of the 2005 Case Management conference was completed with trainees completing a post-course written evaluation the day of the training and an online follow-up survey 6 months post training. This information received helped plan the 2006 Case Management conference.

### **Future Plans**

The Heartland Center will continue the targeted discipline-specific needs assessment approach focusing on Ergonomics trainees in 2007. The online needs assessment survey technique will

continue. The data from previous needs assessment is being incorporated into traditional and distance education offerings. Strengthening the efforts to provide professional courses targeting the learning needs of Industrial Hygiene and Safety professionals is priority. Repeating unique and successful courses is being considered to build the breadth of the CE program.

The creation of 2 distance education offerings using Elluminate Live and ICON is planned during 2007. An ongoing maintenance plan for these offerings is of utmost important as we strengthen our programs for trainees throughout Federal Region VI.

The Opinion Leader Panel guides the CE Director in the strategic planning for this program area. The impact of our CE offerings will be assessed using online surveys with trainees. Training program evaluation is a continued priority including the measurement of the overall quality of the CE program, assessing the impact of CE training on professional practice and worker safety and health.

## Report on Specific Improvements in OS&H resulting from ERC Programs:

The following are specific improvements that were the result of ERC programs, including academic training programs, continuing education, outreach, research training pilot grants, and research training in NORA-related activities:

- Pilot grant results on particulates generated by blower motors in cabin filtration equipment have informed deliberations of the American Society of Agricultural and Biologic Engineers on the consensus standard S525. The results prompted taking into consideration the particulates generated by blower motors in standard setting for cabin filtration control devices to protect agricultural, construction and other workers.
- Pilot grant results on controlling silica during mortar removal with shrouded hoods providing local exhaust ventilation were published by the Center to Protect Workers' Rights, posted on the NIOSH website, and distributed to construction contractors in the US.
- IH research results on TORBO™ blasting to control silica exposure were published in the Journal of Occupational and Environmental Hygiene (Golla V, Heitbrink W. Control technology for crystalline silica exposure in construction: wet abrasive blasting. *J Occup Environ Hyg.* 1(3): D26-32, 2004.
- New occupational medicine rotations at NIOSH and with the Iowa Fatality Assessment, Control, and Evaluation Program (FACE) have resulted in contributions of OM residents to publications to prevent musculoskeletal disorders in office workers and fatal chemical exposures among agricultural workers.
  - R. Epp, B. Bernard, D. Habes, A. Nimgade, D. Haydon. Workplace Solutions: Prevention of Work-Related Musculoskeletal Disorders in Sonographers; in press, DHHS (NIOSH). Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. 2005.
  - W. Sanderson, M. Madsen, R. Rautiainen, R. Epp. Report to the Director. National Institute of Occupational Health and Safety. Hog Farmer Dies from Asphyxiation After Manure Pit Agitation. Iowa, 2005.
  - M. Jones, W. Sanderson, R. Epp, R. Rautiainen, M. Madsen. Report to the Director. National Institute of Occupational Health and Safety. Agricultural Cooperative Worker Dies Following an Anhydrous Ammonia Nurse Tank Rupture. Iowa, 2005.
- Continuing Education presentation on control of workplace hazards resulted in an Occupational Medicine physician participant in the CE program implementing practices at a local ethanol manufacturing facility to improve safe work practices and care for affected workers..
- Continuing Education presentation on lean manufacturing processing in an occupational medicine clinic prompted a clinic member to streamline internal processes using the lean concepts learned at the presentation.
- Impact evaluation data showed that 95% of respondents from a Continuing Education conference on Case Management reported that they used the information on management of chronic pain in their daily practice as a result of the training.
- Monthly updates in occupational health and safety, published as e-bulletins, for WORKSAFE Associates reach 1000's of Iowa and regional employers
- Information dissemination/outreach to occupational medicine physicians on commercial drivers license assessments and firefighter and police assessments improve the assessment and care of these workers, according to several physicians who received this information.
- Improved research to practice in agricultural health and safety through regular newspaper columns in two statewide newspapers and a quarterly newsletter "Alive and well in agriculture". Readers have commented on the usefulness and timeliness of the prevention messages in their own farmwork and practice.
- Eight of the 30 graduates of the agricultural occupational health certificate course given in June, 2006, are opening new clinics in IA, MO, KS, WI, and SD. The clinics impact farmer's health and safety through prevention education, respirator training, screening for lung diseases and hearing loss, and consultation concerning safe farm practices.



## Appendix A

## Agricultural Safety & Health Training Program Curriculum

Students must take all required courses for the PhD, MS or MPH in one of the following academic programs:

Industrial Hygiene  
 Ergonomics  
 Occupational Health Nursing  
 Occupational Injury Prevention Research  
 Occupational Medicine Residency

In addition, students must take the following agricultural health and safety courses:

<b>Course Title</b>	<b>Course #</b>	<b>Credits</b>	<b>Semester</b>
Rural Health and Agricultural Medicine	175:209	3	Spring
Agricultural Safety: Theories and Practice	175:196	2	Fall
Current Topics in Agricultural Health (Enroll each fall semester unless waived by the Program Director)	175:210	1	Fall
Preceptorship in Occupational and Environmental Health	175:203	Arr.	Every
Thesis/Dissertation	175:300	Arr.	Every

## Ergonomics Training Program Curriculum

### Core Curriculum – Master’s Level

Master's trainees must complete nine core courses (22 semester hours, Table A). Other courses are taken to fulfill the minimum degree requirements, and these courses are dependent on the trainee's academic department (i.e. OEH, IE, or BME).

The core courses are based on the Ergonomist Formation Model, originally developed by the Committee for Harmonizing European Training Programs for the Ergonomic Profession, and adopted by the Board of Certification in Professional Ergonomics in the US (Board of Certification in Professional Ergonomics, 2004). The Model outlines the topic categories and clock hours for contact and/or studies that a trainee must have for competency as an ergonomics professional. It should be noted that other graduate (and undergraduate) courses related to these topic categories would contribute to the overall clock hours. For example, undergraduate courses in anatomy, physiology, engineering, psychology, and statistics would contribute to the clock hours required in the topic categories. Thus, it is not necessary that the core courses in the ETP comprise the total clock hours required (most three-semester hour courses have approximately 37 lecture/contact hours per semester). Although the field of engineering strongly influences the discipline of ergonomics, an engineering degree is not a prerequisite to be a CPE or CHFP.

**Table A. Required Core Courses for the Heartland Center MS/MPH Ergonomics Training Program.**

<i>Course #</i>	<i>Course Title</i>	<i>Instructor(s)</i>	<i>Semester</i>	<i>EFM</i>	<i>s.h.</i>
175:190	Occupational Ergonomics I	Anton	Fall	A,B	3
056:144	Human Factors and Ergonomics I	Lee	Fall	A,B,D	3
056:147	Ergonomics: Design and Evaluation	Schnell	Spring	A,D	3
175:295	Clinical Ergonomics	Anton	Spring	C,E	3
175:230	Occupational Health	Sprince	Fall	D,F	3
		Sanderson			
175:180	Occupational & Environmental Health Seminar*	Cook	Fall Spring	Any	1
171:161	Introduction to Biostatistics	Staff	All	C	3
	OR				
	Equivalent graduate level statistics			C	3
175:203	Preceptorship in Occupational and Environmental Health (MS)	Core Faculty	All	Any	3
	OR				
170:299	MPH Practicum Experience (MPH)	Core Faculty	All	Any	3
050:270	Responsible Conduct of Research	Anderson	All	F	0
				TOTAL	22

(EFM – Ergonomist Formation Model topic categories: A) ergonomics principles, B) human characteristics, C) work analysis and measurement, D) people and technology, E) applications, and F) professional issues; s.h. – semester hours; \*MS and MPH trainees in OEH take this seminar three times: twice for 0 s.h. and once for 1 s.h.)

**175:190 Occupational Ergonomics I: Principles and Methods.** This graduate level ergonomics course covers the principles of ergonomics with a focus on the physiological and anatomical capabilities of the worker and interaction with their work environment. The course covers anthropometry, work physiology and anatomy, basic occupational biomechanics, work-related MSDs and associated risk factors, assessment of exposure to risk factors, basic instrumentation, workplace and tool/equipment design, manual materials handling, and miscellaneous ergonomic topics.

**056:144 Human Factors and Ergonomics I.** This course is concerned with the design of human-machine systems and development of work environments by applying principles of behavioral science and systems engineering. The emphasis is on safety, human error, sensory and perceptual processes, motor skills, human – computer interaction, and experimental methodology. The course presents basic information on human characteristics, capacities, and limitations and points out the application of this information to the design of human tasks, machines, and environment. This course conveys human factors principles through a series of design exercises and case studies of actual mishaps cause by inadequate attention to human factors issues.

**056:147 Ergonomics: Design and Evaluation.** This course introduces students to the principles of ergonomics design of jobs and products in an industrial and consumer market setting. Principles of good design are thoroughly investigated. Consequences of poor job and product design are studied. Also investigated are principles of work sampling, usability studies, performance rating, sizing and planning of workstations, hand-tool design, and ergonomics design in transportation.

**175:295 Clinical Ergonomics.** This course incorporates the material learned in Occupational Ergonomics I and applies it to actual worksite and ergonomic research situations. The course covers ergonomic job analysis; assessment of exposure to risk factors including self-report surveys, observational methods, and direct measurement methods; medical management of MSDs; and lean manufacturing concepts. The course begins with practical ergonomics training using videotaped ergonomic case studies and advances to on-site ergonomic evaluations including the development and evaluation of ergonomic interventions. The student also rotates through occupational medicine and physical therapy clinics. The capstone project is an ergonomic job analysis or research study.

**175:230 Occupational Health.** The course is designed as an introduction to a wide cross section of occupational health topics and issues. The course covers the principles of occupational medicine, occupational health nursing, industrial hygiene, occupational safety, and occupational ergonomics. A portion of the course includes on-site factory visits for interdisciplinary student teams from nursing, industrial hygiene, occupational medicine, safety, and occupational ergonomics. Group projects that are related to these site visits encourage the students to work as a team in identifying and solving an array of occupational health problems.

**175:280 Occupational and Environmental Health Seminar.** This seminar course consists of presentations by faculty and staff on issues of concern in occupational and environmental health. Seminars are presented by faculty from the Colleges of Public Health, Engineering, and Medicine at the University of Iowa, as well as by experts nationally and internationally (via Polycom and Elluminate Live, interactive video or graphics-based distance learning software). The seminar provides a lively forum for interdisciplinary topics and discussion.

**171:161 Introduction to Biostatistics.** Introduction to the application of statistical techniques to biological data. Topics include descriptive statistics, normal and binomial distributions, sampling distributions, hypothesis tests, confidence intervals, contingency tables, nonparametric methods, one-way ANOVA, correlation analysis, and simple linear regression OR **Equivalent graduate level statistics course.**

**175:203 Preceptorship in Occupational and Environmental Health.** The preceptorship is a six-week practicum that provides the trainee with field experience in ergonomics. The trainee performs ergonomics work locally, nationally, or internationally. Local ergonomic work involves the WORKSAFE Iowa outreach program based in the Department of OEH. Currently, five facilities participate locally. National and international ergonomic preceptorships may consist of ergonomic consulting or ergonomic research. Regardless of preceptorship experience, the trainee works with one of the core faculty and company/institute personnel during the preceptorship.

OR

**170:299 MPH Practicum Experience.** A comprehensive and integrated application of the knowledge required by the MPH program in a practice setting in such a way as to demonstrate a professional competency in public health practice. This field course requires students to practice public health concepts and demonstrate public health competencies. This capstone course fulfills the requirement of producing a written thesis or sitting for a final comprehensive style examination.

**050:270 Responsible Conduct of Research.** The focus of this course is to outline major issues in different areas of Ethics and Science and to expand participants' ability to recognize and resolve problems they may encounter during a career in science. Topics include the social context of science, scientific misconduct, human research guidelines, authorship and publication, mentoring and training, conflict of interest, ethical treatment of animals, and ethical issues in genetic research.

Although the ETP core courses are identical for each master's trainee, the remaining curriculum varies depending on the trainee's primary academic department. Other courses are taken to fulfill the minimum MS or MPH degree requirements for each department (i.e. OEH, IE, or BME). The trainee takes additional courses (30 – 40 s.h.) and/or electives from the supporting curricula. Appropriate substitutions to core courses can be made on a case-by-case basis, subject to approval by the ETP Core Faculty.

### Core Curriculum – Doctoral Level

Doctoral trainees must complete eight core courses (15 – 16 s.h., Table B), in addition to the master's core curriculum previously described. Doctoral trainees will therefore be required to complete 17 core courses in the ETP.

**Table B. Required Core Courses for the Heartland Center PhD Ergonomics Training Program (in addition to master's requirements).**

<i>Course #</i>	<i>Course Title</i>	<i>Instructor(s)</i>	<i>Semester</i>	<i>EFM</i>	<i>SH</i>
175:294	Occupational Ergonomics II: Applications and Current Topics	Cook	Spring	A,B,F	3
051:152	Ergonomics of Occupational Injuries	Wilder	Spring	B,C	3
101:212	Biomedical Instrumentation	Gerleman	Fall	C	3
	OR				
	Equivalent graduate level instrumentation			C	
051:149	Graduate Biomechanics	Grosland	Fall	B,C	3
	OR				
101:285	Biomechanical Analysis in Rehabilitation	Yack	Spring	B,C	3
175:180	Occupational & Environmental Health Seminar*	Cook	Fall & Spring	Any	0
051:191	Graduate Seminar in Biomedical Engineering	Staff	Fall & Spring	Any	0
056:191	Graduate Seminar in Industrial Engineering	Staff	Fall & Spring	Any	0
171:162	Design & Analysis of Biomedical Studies	Staff	Spring	C	3
	OR				
22S:159	Design of Experiments (same as 07P:246)	Ansley	Fall	C	4
				TOTAL	15 or 16

(EFM – Ergonomist Formation Model topic areas; s.h. – semester hours; \*PhD trainees in OEH take this seminar three times: twice for 0 s.h. and once for 1 s.h.).

**175:295 Occupational Ergonomics II: Application and Current Topics.** This second level ergonomics course focuses on the application of ergonomic principles in the work setting. Topics covered in the course include participatory ergonomics, economics of ergonomics, workforce issues, psychosocial factors, shift work, integration of ergonomics in a business model, current legislative issues relating to ergonomics, legal aspects of ergonomics, and international perspectives in ergonomics.

**051:152 Ergonomics of Occupational Injuries.** This ergonomics and occupational biomechanics course focuses on the inter-relationship of the mechanics of workplace injuries and the mechanical demands of the associated workplace. Topics include typical acute and chronic injury scenarios and the associated occupational biomechanics. Additional topics discussed include epidemiology, surveillance, psychology, legal aspects, and cost control measures.

**101:212 Biomedical Instrumentation.** Basic electronic concepts and modes of equipment operation, instrument utilization in patient evaluation and investigative study, interpretation of measurements obtained through various instrumentation techniques, critical analysis of selected instrumentation and analysis techniques OR **Equivalent graduate level instrumentation course.**

**051:149 Graduate Biomechanics.** Understanding the human body from an engineering mechanics perspective; challenges of applying engineering principles to living systems, illustrated through real-world examples.

OR

**101:285 Biomechanical Analysis in Rehabilitation.** Link segment modeling and analysis, mechanical energy and power analysis, electromyography and muscle modeling.

**175:280 Occupational & Environmental Health Seminar, 056:191 Graduate Seminar in Industrial Engineering, and 051:191 Graduate Seminar in Biomedical Engineering.** Variety of advanced topics discussed (1 hour/week).

**171:162 Design and Analysis of Biomedical Studies.** Simple and multiple linear regression and correlation; one- and two-way layout considerations in planning experiments, factorial experiments; Tukey's, Scheffe's, Dunnett's multiple comparison techniques and orthogonal contrasts.

OR

**22S:159 Design of Experiments.** Theory and methods in the planning and statistical analysis of experimental studies; testing of hypotheses about linear contrasts among means in single-factor and multifactor, completely randomized, and repeated measurement designs.

Although the ETP core courses are identical for each PhD trainee, the remaining curriculum varies depending on the trainee's academic department (i.e. OEH, IE, or BME). Other courses are taken to fulfill the minimum PhD degree requirements for each department. The trainee takes additional courses (30 – 40 s.h.) from the supporting curricula to provide individualized expertise as the basis for his or her future research efforts. Appropriate substitutions to core courses can be made on a case-by-case basis, subject to approval by the ETP Core Faculty.

To assure the necessary breadth and depth in doctoral training, the trainee's advisor performs an incoming assessment and evaluates the trainee's background, competencies, educational objectives, and career objectives. Based on this assessment, the trainee's individual Plan of Study is developed including elective coursework. For example, trainees with a health background may take courses in IE or BME, while trainees with an engineering background may take physiology and anatomy courses. Since trainees in the various departments will likely have different backgrounds, the ETP allows the flexibility for a trainee to pursue specialization in his or her area of interest. This flexibility has been noted as an asset by all previous doctoral trainees in the ETP.

All post-doctoral trainees must take Responsible Conduct in Research (050:270), the core courses for the PhD ETP (Table B) with the exception of all of the seminars, or have had equivalent courses. Only the seminar in the post-doctoral trainee's home department is required (e.g. BME post-doctoral trainees take Graduate Seminar in Biomedical Engineering). Since most post-doctoral trainees will have had equivalent coursework in their PhD program, it is anticipated that post-doctoral trainees in the ETP will take an average of one course per semester, with their remaining time devoted to research.

**Industrial Hygiene Training Program Curriculum****Table C. Curriculum – Industrial Hygiene Training Program**

Course Number	Course Title	Sem Hrs	Instructors	Course Description
<b>Core Courses Required for All Industrial Hygiene Students</b>				
175:231	Industrial Hygiene Fundamentals	3	Sanderson/Heitbrink	Instruction in the basic principles of industrial hygiene, stressing the recognition and evaluation of chemical health hazards.
175:232	Assessing Physical Agent Hazards	3	Sanderson/Field	Instruction in the basic principles of recognizing and evaluating hazards presented by physical agents in the occupational environment.
175:233	Control of Occupational Hazards	3	Heitbrink	Concepts from engineering applicable to control of industrial hygiene hazards, including ventilation, systems design, and use of protective equipment.
175:221	Aerosol Technology	3	Peters	Study of particle statistics and physics of aerosols including inertia, diffusion, nucleation, evaporation, condensation, optics, and electrical properties.
175:220	Occupational Epidemiology and Exposure Assessment	3	Field/Peters	Epidemiologic study designs and exposure assessment techniques to evaluate occupational and environmental health problems.
<b>Additional Courses Required for All Industrial Hygiene Students</b>				
175:230	Occupational Health	3	Sprince/Sanderson/Heitbrink	Introduction to the principles of occupational medicine, industrial hygiene and safety, occupational health, and ergonomics.
175:192	Occupational Safety	3	Rautiainen	An introduction to the principles and practices of occupational safety with a focus on interactions of safety engineering with other disciplines.
175:197	Environmental Health	3	Thorne/O'Shaughnessy	Study of human health and interactions with physical, chemical, biological, and social factors in the environment.
175:260	Environmental Toxicology	3	Thorne/Fuortes	Study of the sources, routes of absorption, and pathophysiological effects of environmental toxicants.
175:190	Occupational Ergonomics I	3	Anton	Ergonomic principles with a focus on the physiological and anatomical capabilities of workers and interaction with their environment.
171:161	Biostatistics	3	Biostatistics faculty	Introduction to descriptive statistics, probability, distributions, sampling, tests of significance, confidence intervals, and simple linear regression.
173:140	Epidemiology I: Principles	3	Lynch	Introduction to epidemiologic concepts and methods including study designs, communication, and dissemination of epidemiologic findings.



175:180	Occupational & Environmental Health Seminar	1	Cook	Guest lecturers provide presentations on a broad range of occupational and environmental health topics-opportunity for all ERC students to interact.
175:203	Preceptorship/ internship or other elective*	3	IH Faculty	Work experience using knowledge and skills acquired in the classroom; arranged with collegiate activities, government, or industry.
175:172	Independent Study Occup & Environ Health	1-3	IH Faculty	In depth pursuit of an area in occupational and environmental health requiring substantial creativity and independence.
175:201	Research in Occupational & Environmental Health	1-3	IH Faculty	Independent research which may lead to thesis or dissertation.
175:300	Thesis/Dissertation Research	1-3	IH Faculty	Research in preparation of thesis or dissertation.
050:270	Responsible Conduct in Research	0	Anderson	Introduces issues of human subject protection and ethical conduct of research
<b>Additional Courses Required for PhD Industrial Hygiene Students</b>				
171:162	Design & Analysis of Biomedical Studies	3	Zhang	Second level biostatistics course covering multiple regression, correlation, regression diagnostics, model building, and analysis of covariance.
050:270	Responsible Conduct in Research	0	Anderson	Introduces issues of human subject protection and ethical conduct of research

\*Preceptorships and internships are available at local industries. These positions enable students to work with practicing occupational safety and health professionals on their efforts to protect worker safety and health.

## Occupational Epidemiology Training Program Curriculum

The OETP offers either a MS or PhD degree in Occupational and Environmental Health or Epidemiology. Doctoral students are expected to enter the program with a MS degree or complete a MS degree as part of their graduate training.

### Degree Requirements

MS and PhD Degree - Occupational and Environmental Health

MS and PhD Degree - Epidemiology

Additional required courses follow:

Course Number	Course Title	Semester Hours	Semester Offered
173:140	Epidemiology I: Principles	3	Fall, Spring, Summer
173:160	Intro to Epidemiology Data Analysis with the Computer	2	Fall
175:180	Occupational & Environmental Health Seminar	1	Fall, Spring
175:185	Occupational Health Research Seminar	2	Fall, Spring
175:230	Occupational Health	3	Fall
173:240	Epidemiology II: Advanced Methods	3	Spring
173:241	Epidemiology II: Advanced Methods Lab	2	Spring
175:220	Occupational and Environmental Epidemiology	3	Spring
050:270	Responsible Conduct in Research	0	Fall, Spring, Summer

## Occupational Health Nursing Training Program Curriculum

The MSN degree program in occupational health nursing (OHN) is 33 semester hours. A sample full-time plan of study follows:

<p><b>Semester 1 (Fall)</b>            175:230 Occupational Health 3 s.h. - <i>Advanced Practice Core</i>            173:140 Epidemiology I 3 s.h. - <i>Core</i>            96:209 Health Systems/Economics/Policy 3 s.h. - <i>Core</i>  <b>Semester 1 Total - 9 s.h.</b></p>	<p><b>Semester 2 (Spring)</b>            96:206 Nursing Science and Inquiry 3 s.h. - <i>Core</i>            96:263 Informatics in Nursing and Health Care 3 s.h. - <i>Core</i>            96:208 Leadership for Advanced Nursing Practice 3 s.h. - <i>Core</i>  <b>Semester 2 Total - 9 s.h.</b></p>
<p><b>Semester 3 (Fall)</b>            96:256 Occupational Health Nursing 3 s.h. - <i>Didactic Specialization</i>            +96:257 Occupational Health Nursing Practicum I 3 s.h. - <i>Clinical Specialization</i>            ____:____ Elective in emphasis area 3 s.h. (see below)  <b>Semester 3 Total - 9 s.h.</b></p>	<p><b>Semester 4 (Spring)</b>            96:258 Occupational Health Nursing II 3 s.h. - <i>Didactic Specialization</i>            +96:259 Occupational Health Nursing Practicum 3 s.h. - <i>Clinical Specialization</i>            175:180 Occupational &amp; Environmental Hlth Sem. 0 s.h. - <i>Didactic Specialization</i>  <b>Semester 4 Total - 6 s.h.</b></p>

+ These courses include practicum experiences

\*\* **Suggested Elective Courses** (3 semester hours required):

### Case Management

96:170 Introduction to Case Management 3 s.h.  
 96:266 Advanced Case Management: Interdisciplinary Approach 3 s.h.

### Injury Prevention

175:251 Injury Epidemiology 3 s.h. (spring, odd years)  
 175:253 Epidemiology of Occupational Injury 3 s.h. (spring, even years)  
 175:192 Occupational Safety 3 s.h. (fall only)

### Agricultural Health

175:209 Rural Health and Agricultural Medicine 3 s.h. (spring only)  
 175:203 Preceptorship in Occupational and Environmental Health 3 s.h. (spring, summer, fall)  
 175:196 Agricultural Safety: Theories & Practice 3 s.h. (fall)

### Other Electives

96:213 Physiology for Advanced Nursing Practice 3 s.h.  
 96:222 Health Promotion and Related Interventions for Primary Care 3 s.h.  
 96:224 Pharmacotherapeutics for Advanced Clinical Practice 4 s.h.  
 175:190 Occupational Ergonomics I 3 s.h.

## Occupational Injury Prevention Research Training Program Curriculum

Doctoral trainees. Students supported by OIPP training program pursue doctoral degrees in the Departments of Epidemiology, Occupational and Environmental Health, or Community and Behavioral Health. These programs are based on sound academic practice and tailored to meet the needs of individual students' backgrounds and career objectives. A series of written and oral examinations is required, as well as a written dissertation based on the results of original investigation. Graduate work towards a PhD must include at least two semesters of residence and include a minimum of 72 semester hours of total graduate study including research for the dissertation. Departments currently expect doctoral students to complete an MS degree as part of their graduate training, and graduate studies towards an MS degree are included in the minimum requirements, with a maximum of 36 hours transferred in from an MS program. Students admitted without a master's degree normally spend their first two years getting the master's degree in their home department.

The OIPP curriculum includes a core of seven (19 hours) courses that address injury prevention and occupational health, and eight (22 hours) courses that address methodological issues. These courses are described in Table B.

**Table B: Core Courses for all OIPP Trainees**

<u>Injury and Occupational Health Courses</u>				
Course #	Course Name	Sem .Hrs.	Instructor	Description
175:170	Injury and Violence Prevention	3	Dr. Peek-Asa	A basic introduction to the theory, practice, and research on injury control
175:251	Injury Epidemiology	3	Drs. Zwerling and Torner	An advanced epidemiology course that focuses on specific methodologic problems related to injury studies.
175:253	Epidemiology of Occupational Injuries	3	Dr. Zwerling	An advanced didactic methodology course focusing on critical thinking in the field of occupational injuries. Topics include surveillance, high-risk industries, and program design and evaluation.
175:192	Occupational Safety	3	Dr. Rautiainen	An introduction to the principles and practices of occupational safety, with a focus on interactions of safety engineering with other disciplines.
175:230	Occupational Health	3	Dr. Sprince	Introduces principles of occupational medicine, industrial hygiene and safety, occupational health management, ergonomics, and occupational health nursing
175:197	Environmental Health	3	Dr. Thorne	A broad survey of the field of environmental health, including the assessment of contemporary human health issues associated with biological, chemical, and physical factors in the environment
175:180	Seminar in OEH	1	Various	Guest lectures present broad OEH topics with discussion. This seminar is an opportunity for all ERC students to interact.
<u>Methodologic Courses</u>				
Course #	Course Name	Sem .Hrs.	Instructor	Description
173:140	Epidemiology I	3	Dr. Lynch	Introduction to epidemiologic concepts and

173:240	Epidemiology II	3	Dr. Christchilles	methods including study designs, communication and dissemination of epidemiologic findings Topics include bias, confounding, effect modification, matching, data sources, questionnaire design, surveys
171:161	Introduction to Biostatistics	3	Various	Introduction to descriptive statistics, probability, distributions, sampling, tests of significance, confidence intervals, and simple linear regression
171:162	Design and Analysis of Biomedical Studies	3	Dr. Zhang	Multiple regression; correlation; regression diagnostics; model building; analysis of covariance; multiple comparisons; and the use of computer for data analysis
171:241	Applied Categorical Data Analysis	3	Dr. Smith	Advanced model building and diagnostics, control of confounding and effect modification
172:150	Health Behavior and Education	3	Dr. Yang	Theories of health behavior and health education and their application to a variety of settings, including injury control
172:181	Evaluation Theory and Applications	3	Dr. Wallis	Design and methodology used in program evaluation including planning, design, collection and analysis of data
050:270	Responsible Research Conduct	1	Dr. Anderson	Introduces issues of human subject protection and ethical conduct of research

We have approved OIPP curricula in each participating department. Each department has allowed the OIPP to develop a combination of courses that include the required core OIPP courses in injury prevention and occupational health in addition to the existing required courses for the departmental specialization. Substitutions to the required curricula are considered by the Executive Committee on a case-by-case basis. A summary of departmental requirements for OIPP trainees is included in Table C. In Table C, an “R” denotes a course that is required for the trainee. An “RE” denotes a course that is required within a set of electives. For example, OEH students may choose to take two additional injury-related courses from a list of three courses that address disaster management, ergonomics, and agricultural health.

**Table C: Requirements for Doctoral Students in the Occupational Injury Prevention Fellowship, by department**

**R = required RE = required within a set of electives**

	<b>Occupational and Environmental Health</b>	<b>Epidemiology</b>	<b>Community and Behavioral Health</b>
<b><u>Injury Prevention and Control courses</u></b>			
Injury Prevention and Control	R (required)	R	R
Injury Epidemiology	R	R	R
Epidemiology of Occupational Injuries	R	R	R
Research Methods in Disaster Studies	RE (required within a set of electives)	RE	RE
Domestic Violence	RE	RE	RE
<b><u>Occupational and Env. Health courses</u></b>			
Environmental Health	R	R	R
Occupational Safety	R	R	R

Occupational Health	R	R	R
Occupational Ergonomics	RE	RE	RE
Agricultural Health	RE	RE	RE
Seminar in Occupational and Env Health	R	R	R
<b><u>Epidemiology courses</u></b>			
Epidemiology I: Principles	R	R	R
Epidemiology II and lab	R	R	R
Epidemiology III		R	
Introduction to Epi Data Analysis	RE	R	
Writing a Research Proposal	RE	R	RE
<b><u>Biostatistics courses</u></b>			
Introduction to Biostatistics	R	R	R
Design and Analysis of Biomedical Studies	R	R	R
Research Data Management	RE	R	
Statistical Methods in Epi I	R	R	R
Statistical Methods in Epi II	RE	RE	
Longitudinal Data Analysis	RE	RE	
<b><u>Community and Behavioral Health courses</u></b>			
Health Behavior and Education	R	R	R
Evaluation I: Theory and Applications	R	R	R
Evaluation II: Design and Methods	RE	RE	R
Introduction to Health Promotion			RE
Community Development in Public Health			R
Social Sciences and Health			RE
Designing and Implementing Interventions			RE
Health Communications			RE
Persuasion and Health			RE
Qualitative Research for Public Health			R
<b><u>Other courses</u></b>			
Responsible Conduct in Research	R	R	R
Human Pathophysiology	R	R	
Dissertation Hours	12	10	12
Total Hours	72	81	77

## Occupational Medicine Curriculum

Each Occupational Medicine (OM) resident must complete all MPH in OEH requirements plus additional requirements listed below (including three courses/seminars and an Occupational Medicine Clinic weekly session) which must be taken by OM residents in both Fall and Spring semesters. Total semester hours must total at least 39 to meet MPH degree requirements.

### MPH Practicum 170:299 (3 s.h.)

The MPH Practicum course (170:299) will consist of a five-week rotation in one of the approved rotations for occupational medicine residents in their practicum year or another 200 hour experience, if approved by the course director (Prof. Atchison) and the resident's advisor. All Occ Med residents must meet with Drs. Gerr and Sprince and their advisor to choose a topic and draft a plan for this course, including background/rationale, aims, and methods.

Residents will complete the 39 s.h. required for the MPH with a focus in OEH by choosing relevant electives (suggested electives are listed below). A waiver from the graduate program's Pathology requirement should be requested in the resident's plan of study, since Pathology is a course taken in medical school.

<b>MPH / OM Resident Requirements &amp; Course Information</b>		
<b>Number</b>	<b>Course Title</b>	<b>Hours</b>
<b>MPH Required Courses</b>		
170:101	Introduction to Public Health Practice	3
171:161	Introduction to Biostatistics	3
172:101	Introduction to Health Promotion and Disease Prevention	3
173:140	Epidemiology I: Principles	3
174:102	Introduction to the US Healthcare System	3
175:197	Environmental Health	3
175:180	Occupational & Environmental Health Seminar – required both Fall & Spring semesters	0/1
050:270	Responsible Conduct in Research	0
170:299	MPH Practicum	3
<b>Additional Requirements for OM Residents</b>		
175:230	Occupational Health	3
175:260	Environmental Toxicology	3
175:185	Occupational Health Research Seminar - required both Fall & Spring semesters (4 s.h. total)	2/2
175:285	Advanced Topics in Occupational Medicine	2
	Clinical Case Studies in Occupational Medicine -- Register for 175:171 - Problems in OEH - special permission code 098	2
	Occupational Medicine Seminar - required both Fall & Spring semesters - no registration required	0
	Occupational Medicine Clinic -- Wednesday morning or afternoon session, depending on remaining class schedule	0

<b>Summary of Requirements</b>	
<b>MPH Required Courses</b>	<b>22 s.h.</b>
<b>Additional Requirements for OM Residents</b>	<b>14 s.h.</b>
<b>Elective</b>	<b>3 s.h.</b>
<b>Total</b>	<b>39 s.h.</b>

**Suggested electives include the following (in order of course number):**

**175:111 International Health**

Topics include urgent health problems and among disadvantaged populations in developed countries. Biological, social, cultural, and political aspects of international health problems and applications of research methods from epidemiology, environmental health, and the social sciences.

**175:170 Injury Prevention and Control**

Will introduce students to the theory, research, and practice of injury control. Topics include concepts that form the foundation of the study of injury control and prevention, the data available, risk factors, and prevention approaches.

**175:175 Research Methods in Disaster Studies**

This course introduces students to the epidemiologic study of disasters and their health outcomes. It will focus on research to reduce health effects from disasters and discusses disaster response and preparedness research.

**175:190 Occupational Ergonomics I**

This course covers the principles of ergonomics with a focus on the physiological and anatomical capabilities of the worker and interaction with their work environment.

**175:192 Occupational Safety**

This course covers the principles and practices of Occupational Safety. Specific applications in industrial and other occupational settings are presented, and interactions with other disciplines are emphasized.

**175:195 Global Environmental Health**

Global Environmental Health utilizes the latest interactive video technology to bring together international experts to address current problems, including trans-boundary movement of pollutants, vectors of infectious agents, global warming and climate change, and many others.

**175:196 Agricultural Safety: Theories and Practice**

General theories and practice of injury prevention are presented from various fields, including industrial safety, engineering, regulation, education, epidemiology, and social psychology. Applications from these fields are considered for strategic application in agriculture.

**175: 209 Rural Health and Agricultural Medicine**

Introduces students to health care delivery issues, environmental health problems and occupational medical problems commonly encountered by practicing rural physicians. The course is conceptual so that principles can be applied to rural-agricultural areas.

**175:210 Current Topics in Agricultural Health**

Agro-terrorism, antibiotic resistance, and genetically modified organisms are examples of current issues studied, affecting the health of agricultural populations. Current scientific literature is the primary information resource used.



**175:231 Industrial Hygiene I: Recognition**

This course is designed to provide students with specialized instruction in the basic principles of industrial hygiene, stressing the recognition of chemical health hazards and in-depth coverage of physical health hazards.

**175:232 Industrial Hygiene II: Evaluation**

The course provides theoretical and practical experience with air sampling concepts and methods, and discusses their application to industrial hygiene hazard evaluation of chemical, physical, and biological agents.

**175:233 Industrial Hygiene III: Control**

The course presents concepts from physical sciences applicable to control of industrial hygiene hazards. Two-thirds of the course is devoted to engineering ventilation controls; one-third is devoted to non-ventilation controls, program management issues and skills.

**175:251 Injury Epidemiology**

How epidemiology can be applied to injury prevention and control: surveying the literature, specific methodologic problems in injury epidemiology, critical evaluation of research articles.

**175:252 Environmental Policy**

This course surveys the major issues in environmental health and related public policy, focusing on similarities/differences between US and international regulatory efforts. The role of government, industry, academia and advocacy groups is discussed.

**175:253 Epidemiology of Occupational Injuries**

Detailed study of the epidemiologic literature on occupational injuries and their prevention. Will focus on research methods in this field.

**175:270 Special Topics in Toxicology**

The genesis of toxicology as the science of poisoning and its application to murder, magic and medicine is explored. The use of natural products for gaining power, hunting, warfare, religion, and witchcraft is also investigated.

**175:294 Occupational Ergonomics II**

This course focuses on the application of ergonomic principles in the work setting. Ergonomic topics include: participatory issues, economics, workforce issues, psychosocial factors, shift work, integration in a business model, legislative issues, legal aspects, and international perspectives in ergonomics.

**175:295 Clinical Ergonomics**

This experiential course prepares the student for conducting independent on-site ergonomic evaluations. The course includes the development and evaluation of ergonomic interventions within an industrial setting and a rotation through the occupational medicine clinic.

## MS Degree Occupational and Environmental Health

This program prepares graduate level students for professional careers in environmental and occupational health. The degree requires a minimum of 38 semester hours and prepares students for career opportunities in local, state, or federal health agencies, in departments of industrial health and safety in commercial enterprises, and in academic institutions.

### Prerequisites

A baccalaureate degree is required. Undergraduate preparation should include previous course work in mathematics, biological, chemical and either physical sciences or engineering (prerequisites depend on requirements of the chosen specialty area).

### Required Courses

175:197	Environmental Health	3 s.h.
175:230	Occupational Health	3 s.h.
175:260	Environmental Toxicology	3 s.h.
175:180	Occupational & Environmental Health Seminar	1 s.h. *
171:161	Introduction to Biostatistics	3 s.h.
173:140	Epidemiology I: Principles	3 s.h.
050:270	Responsible Conduct in Research	0 s.h.

\*Enroll in OEH seminar three times: twice for 0 s.h. and once for 1 s.h.

One of the following:

069:133	Introduction to Human Pathology Offered Fall semester only	4 s.h.
096:114	Human Pathophysiology: Organ Systems Offered Fall semester only for OEH students	3 s.h.
096:115	Human Pathophysiology: Cellular/Neurology/Immunology Offered Spring semester only for OEH students	3 s.h.
		<b>19-20 s.h.</b>

### Thesis

Completion and acceptance of a master's thesis is required. A maximum of **6** semester hours will be allowed for thesis credit hours (175:300). Additional thesis credit hours may be allowed for students who take more than 38 semester hours.

### Electives

Elective courses must be chosen to fulfill the minimum MS degree requirement of 38 semester hours. Students and advisors should select courses most appropriate to the individual student's professional goals.

**Total Semester Hours Required for MS Degree (Minimum) 38 s.h.**

## PhD Degree Occupational and Environmental Health

This program prepares graduate level students in professional and academic careers in environmental and occupational health. Graduates will be able to assume responsibility for the development and basic administration of environmental and occupational health programs, and will qualify for beginning faculty positions in academic environmental health departments.

### Prerequisites

A baccalaureate degree is required. Although enrollment directly into the PhD program is possible, completion of the MS program is recommended as a first step toward the PhD degree. Undergraduate preparation should include previous course work in mathematics, biological, chemical and either physical sciences or engineering (prerequisites depend on requirements of the chosen specialty area).

### Required Courses

175:197	Environmental Health	3 s.h.
175:230	Occupational Health	3 s.h.
175:180	Occupational & Environmental Health Seminar	1 s.h.*
171:162	Design and Analysis of Biomedical Studies	3 s.h.
171:161	Introduction to Biostatistics	3 s.h.
173:140	Epidemiology I: Principles	3 s.h.
050:270	Responsible Conduct in Research	0 s.h.
		<b>16 s.h.</b>

\*Enroll in OEH seminar three times: twice for 0 s.h. and once for 1 s.h.

One of the following:

069:133	Introduction to Human Pathology	4 s.h.
096:114	Human Pathophysiology: Organ Systems	3 s.h.
096:115	Human Pathophysiology: Cellular/Neurology/Immunology	3 s.h.
		<b>3-4 s.h.</b>

### Elective Credits

A minimum of **24** additional credit hours must be acquired from attendance in non-research-related courses. These would include any courses offered in a classroom setting or the equivalent web-based course. Students and advisors should select courses most appropriate to the individual student's professional goals.

### Research Credits

The remaining credits needed to achieve the 72 required for this degree may be acquired by any combination of the research-related courses given below or other class-based courses.

175:300	Thesis/Dissertation
175:201	Research in Occupational and Environmental Health
175:172	Independent Study in Occupational and Environmental Health

**Total Semester Hours Required for PhD Degree (Minimum) 72 s.h.**

**MS Degree  
Occupational and Environmental Health  
Industrial Hygiene Subtrack**

The overall goal of the industrial hygiene MS program is to train individuals to prevent occupational disease and injury in industry, environmental, and occupational sectors. The MS curriculum is designed to prepare students philosophically and technically to practice the art and science of industrial hygiene. The Accreditation Board for Engineering and Technology (ABET) accredits this program.

### Prerequisites

A baccalaureate degree is required. Undergraduate preparation must include at least 63 semester hours in science, mathematics, engineering, and technology and 21 semester hours in communications, humanities, and social sciences.

Two options are available for obtaining this MS degree:

- **Research Option – this option involves writing a master’s thesis**
- **Professional Option – this option involves a semester-long practical experience**

### Research Option (thesis option)

#### Required Courses

175:231	Industrial Hygiene Fundamentals	3 s.h.
175:232	Assessing Physical Agent Hazards	3 s.h.
175:233	Control of Occupational Hazards	3 s.h.
175:221	Aerosol Technology	3 s.h.
175:220	Environmental and Occupational Epidemiology	3 s.h.
175:230	Occupational Health	3 s.h.
175:192	Occupational Safety	3 s.h.
175:190	Occupational Ergonomics I	3 s.h.
175:260	Environmental Toxicology	3 s.h.
175:197	Environmental Health	3 s.h.
171:161	Introduction to Biostatistics	3 s.h.
173:140	Epidemiology I: Principles	3 s.h.
175:180	Occupational & Environmental Health Seminar	1 s.h. *
050:270	Responsible Conduct in Research	0 s.h.
		<b>37 s.h.</b>

\*Enroll in OEH seminar three times for 0 semester hour credit.

### Thesis

Completion and acceptance of a master’s thesis is required. A maximum of **6** semester hours will be allowed for thesis credit hours. Additional thesis credit hours may be allowed for students who take more than 43 semester hours.

### Electives

Additional elective courses may be taken as desired to increase understanding in an area of interest. Students and advisors should select courses most appropriate to the individual student’s professional goals.

### Final Examination

The final examination for this option will consist of a defense of the MS thesis.

**Total Semester Hours Required for MS Degree (Minimum) 43 s.h.****Professional Option (non-thesis option)****Required Courses**

175:231	Industrial Hygiene Fundamentals	3 s.h.
175:232	Assessing Physical Agent Hazards	3 s.h.
175:233	Control of Occupational Hazards	3 s.h.
175:221	Aerosol Technology	3 s.h.
175:220	Environmental and Occupational Epidemiology	3 s.h.
175:230	Occupational Health	3 s.h.
175:192	Occupational Safety	3 s.h.
175:190	Occupational Ergonomics I	3 s.h.
175:260	Environmental Toxicology	3 s.h.
175:197	Environmental Health	3 s.h.
171:161	Introduction to Biostatistics	3 s.h.
173:140	Epidemiology I: Principles	3 s.h.
175:180	Occupational & Environmental Health Seminar	1 s.h.*
050:270	Responsible Conduct in Research	0 s.h.
		<b>37 s.h.</b>

\*Enroll in OEH seminar three times for 0 semester hour credit.

**Preceptorship**

Completion of a Preceptorship in industrial hygiene is required. A maximum of **3** semester hours will be allowed for preceptorship credit hours. The preceptorship will be a practical experience that utilizes industrial hygiene principles.

**Electives**

At least one **3** semester hour elective course must be taken to fulfill the minimum number of semester hours required for this degree option. Students and advisors should select courses most appropriate to the individual student's professional goals.

**Final Examination**

The final examination for this option will consist of a defense of the preceptorship experience. A report will be prepared and defended orally that summarizes the experience.

**Total Semester Hours Required for MS Degree (Minimum) 43 s.h.**

**PhD Degree  
Occupational and Environmental Health  
Industrial Hygiene Subtrack**

The PhD program trains individuals to conduct and supervise research or to manage advanced applied programs in academic, governmental, or private industrial hygiene settings. The overall goal of the program is to contribute to occupational disease prevention and injury prevention in industrial, environmental or agricultural sectors.

### Prerequisites

A baccalaureate degree is required. Although enrollment directly into the PhD program is possible, completion of the MS program is recommended as a first step toward the PhD degree. Undergraduate preparation must include at least 63 semester hours in science, mathematics, engineering, and technology and 21 semester hours in communications, humanities, and social sciences.

### Required Courses

175:231	Industrial Hygiene Fundamentals	3 s.h.
175:232	Assessing Physical Agent Hazards	3 s.h.
175:233	Control of Occupational Hazards	3 s.h.
175:221	Aerosol Technology	3 s.h.
175:220	Environmental and Occupational Epidemiology	3 s.h.
175:230	Occupational Health	3 s.h.
175:192	Occupational Safety	3 s.h.
175:190	Occupational Ergonomics I	3 s.h.
175:260	Environmental Toxicology	3 s.h.
175:197	Environmental Health	3 s.h.
175:180	Occupational & Environmental Health Seminar	1 s.h. *
171:161	Introduction to Biostatistics	3 s.h.
173:140	Epidemiology I: Principles	3 s.h.
171:162	Design and Analysis of Biomedical Studies	3 s.h.
050:270	Responsible Conduct in Research	0 s.h.
		<b>40 s.h.</b>

\*Enroll in OEH seminar three times: twice for 0 s.h. and once for 1 s.h.

### Elective Credits

A minimum of **12** additional credit hours must be acquired from attendance in non-research-related courses. These would include any courses offered in a classroom setting or the equivalent web-based course. Students and advisors should select courses most appropriate to the individual student's professional goals.

### Research Credits

The remaining credits needed to achieve the 72 required for this degree may be acquired by any combination of the research-related courses given below or other class-based courses.

175:300	Thesis/Dissertation
175:201	Research in Occupational and Environmental Health
175:172	Independent Study in Occupational and Environmental Health

**Total Semester Hours Required for PhD Degree (Minimum) 72 s.h.**

## MPH Degree Occupational and Environmental Health Subtrack

### Objective

The MPH in occupational and environmental health program aims to prepare graduate level students for professional careers in environmental and occupational health. It targets students who already have a graduate or professional degree or have public health experience. The graduates of the program will have a broad overview of the public health perspective on occupational and environmental health and will be ready to hold a wide variety of jobs in that area.

### Prerequisites

An undergraduate degree is required. The cumulative grade point average should be a minimum of a 3.0 on a 4.0 scale. Although no specific major is required, prerequisite coursework includes one semester each of college algebra and biology.

### MPH Core Courses

The following course work is required for all MPH students. Students are expected to earn  $\geq B$ - (2.67) on each core course and must earn a  $\geq B$  (3.0) cumulative grade point average on all core courses. When necessary, a student may repeat a course to achieve this standard.

170:101	Introduction to Public Health Practice	3 s.h.
171:161	Introduction to Biostatistics	3 s.h.
172:101	Introduction to Health Promotion and Disease Prevention	3 s.h.
173:140	Epidemiology I: Principles	3 s.h.
174:102	Introduction to the U.S. Healthcare System <b>or</b>	3 s.h.
174:200	Introduction to Health Care Organization and Policy	3 s.h.
175:197	Environmental Health	3 s.h.
		<b>18 s.h.</b>

### Practicum Requirement

170:299	MPH Practicum Experience	<b>3 s.h.</b>
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The experience from this course, including a final written report and oral presentation constitutes the final examination for the MPH.

### Bioscience Requirement\* or elective if previous course taken in bioscience

Any one of the following courses may be used to meet this requirement:

069:133	Introduction to Human Pathology	4 s.h.
069:270	Pathogenesis of Major Human Diseases	3 s.h.
096:114	Human Pathophysiology: Organ Systems	3 s.h.
096:115	Human Pathophysiology: Cellular/Neurology/Immunology	3 s.h.
		<b>3-4 s.h.</b>

\*If a student has had such coursework in the past, a bioscience course does not need to be taken, but the hours are replaced with three more hours of electives.

**Required Courses**

175:180	Occupational and Environmental Health Seminar	1 s.h.*
050:270	Responsible Conduct in Research	0 s.h.
	Additional required courses	13-14 s.h.
		<b>14-15 s.h.</b>

\*MPH students take OEH seminar three times: twice for 0 s.h. and once for 1 s.h. If completing the MPH in a one-year course of study, the seminar will be taken two times: once for 0 s.h. and once for 1 s.h.

**Summary of requirements**

MPH Core Courses	18 s.h.
Practicum Requirement	3 s.h.
Bioscience Requirement or Elective	3-4 s.h.
Required Courses	14-15 s.h.
<b>Total</b>	<b>39 s.h.</b>

**Total Semester Hours Required for MPH Degree (Minimum) 39 s.h.**



## MPH Degree Ergonomics Subtrack

### Objective

The MPH with an ergonomics focus draws from the multi-disciplinary expertise and interests of faculty members from the Colleges of Public Health, Engineering, and Medicine. The interdisciplinary ergonomics program will require approximately two years of study. Students enrolled in this public health specialty will receive academic, practical, and research experience in the field of ergonomics. The objectives of the ergonomics focus are for students to have 1) a thorough understanding of the physical environment and risk factors at the workplace that contribute to human error and musculoskeletal injuries and illness, 2) knowledge of the engineering and administrative methods of controlling these risk factor, and 3) the ability to conduct ergonomics/human factors research and/or provide ergonomics/human factors consultation services at a basic level. Graduates of the MPH in ergonomics may work for industry, unions, government agencies, or pursue further academic training.

### Prerequisites

An undergraduate degree is required. The cumulative grade point average should be a minimum of a 3.0 on a 4.0 scale. Although no specific major is required, prerequisite coursework includes one semester each of college algebra and biology.

### MPH Core Courses

The following course work is required for all MPH students. Students are expected to earn  $\geq$ B- (2.67) on each core course and must earn a  $\geq$  B (3.0) cumulative grade point average on all core courses. When necessary, a student may repeat a course to achieve this standard.

170:101	Introduction to Public Health Practice	3 s.h.
171:161	Introduction to Biostatistics	3 s.h.
172:101	Introduction to Health Promotion and Disease Prevention	3 s.h.
173:140	Epidemiology I: Principles	3 s.h.
174:102	Introduction to the U.S. Healthcare System <b>or</b>	3 s.h.
174:200	Introduction to Health Care Organization and Policy	3 s.h.
175:197	Environmental Health	3 s.h.
		<b>18 s.h.</b>

### Practicum Requirement

170:299	MPH Practicum Experience	<b>3 s.h.</b>
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The experience from this course, including a final written report and oral presentation constitutes the final examination for the MPH.

### Required Courses

175:180	Occupational and Environmental Health Seminar	1 s.h.*
175:190	Occupational Ergonomics I	3 s.h.
175:230	Occupational Health	3 s.h.
056:147	Ergonomics: Design and Evaluation	3 s.h.
175:295	Clinical Ergonomics	3 s.h.
056:144	Human Factors and Ergonomics I	3 s.h.
050:270	Responsible Conduct in Research	0 s.h.
		<b>16 s.h.</b>

\*MPH students take OEH seminar three times: twice for 0 s.h. and once for 1 s.h. If completing the MPH in a one year course of study, the seminar will be taken two times: once for 0 s.h. and once for 1 s.h.

**Elective Courses**

Three semester hours are required. Electives may be chosen from the following list or may include any related course approved by the student's advisor.

175:192	Occupational Safety	3 s.h.
175:231	Industrial Hygiene I: Recognition	3 s.h.
175:251	Injury Epidemiology	3 s.h.
175:253	Epidemiology of Occupational Injuries	3 s.h.
		<b>3 s.h.</b>

**Summary of requirements**

MPH Core Courses	18 s.h.
Practicum Requirement	3 s.h.
Required Courses	16 s.h.
Elective Courses	3 s.h.
<b>Total</b>	<b>40 s.h.</b>

**Total Semester Hours Required for MPH Degree (Minimum) 40 s.h.**

## **Appendix B**

ERC Applicant Institution: University of Iowa  
 Program Director: Kelley Donham  
 Discipline: Agricultural Safety & Health

**Table 4a  
 Academic Training Report  
 Previous Budget Period: July 1, 2005 to June 30, 2006**

Degree Awarded	How Does Degree Read?	# Full-Time Trainees Enrolled <sup>1</sup>	# Full-Time NIOSH-Supported Trainees	# Part-Time Trainees Enrolled	# Part-Time NIOSH-Supported Trainees	# Other Trainees Taking OS&H Courses <sup>2</sup>	# Trainees Graduated
<b>Baccalaureate/associate degree</b>							
<b>Master's degree</b>							
MSN	Master of Science in Nursing	2	2	0	0	20	1
<b>Doctorate degree</b>							
PhD	Doctor of Philosophy/Occupational & Environmental Health	2	2	0	0	20	1
<b>Post-doctoral (Include formally registered Occupational Medicine residents in all years of the residency.<sup>3</sup>)</b>							
<b>Other (specify, e.g., undergraduate Certificate program trainees)</b>							

Page

Refer to: Supplemental Instructions, page 10.

<sup>1</sup> Trainee counts include all students in the approved programs.

<sup>2</sup> Does not include trainees counted in any of the full-time or part-time categories

<sup>3</sup> In this case, there may be double counting between Doctorate degree and Post-doctoral categories.

ERC Applicant Institution: University of Iowa  
 Program Director: Kelley Donham  
 Discipline: Agricultural Safety & Health

**Table 13**  
**Minority Recruitment Data<sup>1</sup>**  
**Previous Budget Period: July 1, 2005 to June 30, 2006**

GROUP DATA			INDIVIDUAL DATA			
# of Minorities Applied	# of Minorities Offered Admission	# of Minorities Entered Program	For those who entered program: Identify by sequential #	Current Status (in training, graduated, left the program, etc.)	Sources of Support	Subsequent Career Development/ Employment
0	0	0				

Page

Refer to: Supplemental Instructions, page 13.

<sup>1</sup> First three columns are a group total; last four columns refer to individual trainees.

ERC Applicant Institution: The University of Iowa  
 Program Director: Dan Anton  
 Discipline: Ergonomics

**Table 4a  
 Academic Training Report  
 Previous Budget Period: July 1, 2005 to June 30, 2006**

Degree Awarded	How Does Degree Read?	# Full-Time Trainees Enrolled <sup>1</sup>	# Full-Time NIOSH-Supported Trainees	# Part-Time Trainees Enrolled	# Part-Time NIOSH-Supported Trainees	# Other Trainees Taking OS&H Courses <sup>2</sup>	# Trainees Graduated
<b>Baccalaureate/associate degree</b>							
<b>Master's degree</b>							
MS	Master of Science/Occupational & Environmental Health	2	2			20	1
MPH	Master of Public Health	0	0	1	1	0	0
MS	Master of Science/Biomedical Engineering	1	1	0	0	0	1
<b>Doctorate degree</b>							
PhD	Doctor of Philosophy/Occupational & Environmental Health	1	1	0	0	10	0
PhD	Doctor of Philosophy/Biomedical Engineering	2	2	0	0	0	0
PhD	Doctor of Philosophy/Industrial Engineering	3	3	0	0	0	0
<b>Post-doctoral (Include formally registered Occupational Medicine residents in all years of the residency.)<sup>3</sup></b>							
<b>Other (specify, e.g., undergraduate Certificate program trainees)</b>							

Page

Refer to: Supplemental Instructions, page 10.

<sup>1</sup> Trainee counts include all students in the approved programs.

<sup>2</sup> Does not include trainees counted in any of the full-time or part-time categories

<sup>3</sup> In this case, there may be double counting between Doctorate degree and Post-doctoral categories.

ERC Applicant Institution: The University of Iowa  
 Program Director: Dan Anton  
 Discipline: Ergonomics

**Table 13**  
**Minority Recruitment Data<sup>1</sup>**  
**Previous Budget Period: July 1, 2005 to June 30, 2006**

GROUP DATA			INDIVIDUAL DATA			
# of Minorities Applied	# of Minorities Offered Admission	# of Minorities Entered Program	For those who entered program: Identify by sequential #	Current Status (in training, graduated, left the program, etc.)	Sources of Support	Subsequent Career Development/ Employment
0	0	0	01	In training	NIOSH	
			02	In training	NIOSH	
			03	In training	NIOSH	

Page

Refer to: Supplemental Instructions, page 13.  
<sup>1</sup> First three columns are a group total; last four columns refer to individual trainees.

ERC Applicant Institution: The University of Iowa  
 Program Director: Wayne Sanderson  
 Discipline: Industrial Hygiene

**Table 4a**  
**Academic Training Report**  
**Previous Budget Period: July 1, 2005 to June 30, 2006**

Degree Awarded	How Does Degree Read?	# Full-Time Trainees Enrolled <sup>1</sup>	# Full-Time NIOSH-Supported Trainees	# Part-Time Trainees Enrolled	# Part-Time NIOSH-Supported Trainees	# Other Trainees Taking OS&H Courses <sup>2</sup>	# Trainees Graduated
<b>Baccalaureate/associate degree</b>							
<b>Master's degree</b>							
MS	Master of Science/Occupational & Environmental Health (Industrial Hygiene)	7	7	1	1	20	1
<b>Doctorate degree</b>							
PhD	Doctor of Philosophy/Occupational & Environmental Health (Industrial Hygiene)	6	3	1	0	10	2
<b>Post-doctoral (Include formally registered Occupational Medicine residents in all years of the residency.)<sup>3</sup></b>							
<b>Other (specify, e.g., undergraduate Certificate program trainees)</b>							

Page

Refer to: Supplemental Instructions, page 10.

<sup>1</sup> Trainee counts include all students in the approved programs.

<sup>2</sup> Does not include trainees counted in any of the full-time or part-time categories

<sup>3</sup> In this case, there may be double counting between Doctorate degree and Post-doctoral categories.



ERC Applicant Institution: The University of Iowa  
 Program Director: Wayne Sanderson  
 Discipline: Industrial Hygiene

**Table 13  
 Minority Recruitment Data<sup>1</sup>  
 Previous Budget Period: July 1, 2005 to June 30, 2006**

GROUP DATA			INDIVIDUAL DATA			
# of Minorities Applied	# of Minorities Offered Admission	# of Minorities Entered Program	For those who entered program: Identify by sequential #	Current Status (in training, graduated, left the program, etc.)	Sources of Support	Subsequent Career Development/ Employment
2	2	2	01	In Training	NIOSH	
			02	In Training	NIOSH	
			03	In Training	NIOSH	

Page

Refer to: Supplemental Instructions, page 13.  
<sup>1</sup> First three columns are a group total; last four columns refer to individual trainees.

ERC Applicant Institution: The University of Iowa  
 Program Director: Bill Field  
 Discipline: Occupational Epidemiology

**Table 4a**  
**Academic Training Report**  
**Previous Budget Period: July 1, 2005 to June 30, 2006**

Degree Awarded	How Does Degree Read?	# Full-Time Trainees Enrolled <sup>1</sup>	# Full-Time NIOSH-Supported Trainees	# Part-Time Trainees Enrolled	# Part-Time NIOSH-Supported Trainees	# Other Trainees Taking OS&H Courses <sup>2</sup>	# Trainees Graduated
<b>Baccalaureate/associate degree</b>							
<b>Master's degree</b>							
MS	Master of Science/Occupational & Environmental Health						
MS	Master of Science/Epidemiology	1	1	0	0	20	0
<b>Doctorate degree</b>							
PhD	Doctor of Philosophy/Occupational & Environmental Health	1	1	0	0	10	0
PhD	Doctor of Philosophy/Epidemiology	2	2	0	0	0	0
<b>Post-doctoral (Include formally registered Occupational Medicine residents in all years of the residency.)<sup>3</sup></b>							
<b>Other (specify, e.g., undergraduate Certificate program trainees)</b>							

Page

Refer to: Supplemental Instructions, page 10.

<sup>1</sup> Trainee counts include all students in the approved programs.<sup>2</sup> Does not include trainees counted in any of the full-time or part-time categories<sup>3</sup> In this case, there may be double counting between Doctorate degree and Post-doctoral categories.



ERC Applicant Institution: The University of Iowa  
 Program Director: Kenneth Culp  
 Discipline: Occupational Health Nursing

**Table 4a  
 Academic Training Report  
 Previous Budget Period: July 1, 2005 to June 30, 2006**

<b>Degree Awarded</b>	<b>How Does Degree Read?</b>	<b># Full-Time Trainees Enrolled<sup>1</sup></b>	<b># Full-Time NIOSH-Supported Trainees</b>	<b># Part-Time Trainees Enrolled</b>	<b># Part-Time NIOSH-Supported Trainees</b>	<b># Other Trainees Taking OS&amp;H Courses<sup>2</sup></b>	<b># Trainees Graduated</b>
<b>Baccalaureate/associate degree</b>							
<b>Master's degree</b>							
MSN	Master of Science in Nursing	3	3	8	8	5	3
<b>Doctorate degree</b>							
<b>Post-doctoral (Include formally registered Occupational Medicine residents in all years of the residency.)<sup>3</sup></b>							
<b>Other (specify, e.g., undergraduate Certificate program trainees)</b>							

Page

Refer to: Supplemental Instructions, page 10.

<sup>1</sup> Trainee counts include all students in the approved programs.

<sup>2</sup> Does not include trainees counted in any of the full-time or part-time categories

<sup>3</sup> In this case, there may be double counting between Doctorate degree and Post-doctoral categories.

ERC Applicant Institution: The University of Iowa  
 Program Director: Kenneth Culp  
 Discipline: Occupational Health Nursing

**Table 13  
 Minority Recruitment Data<sup>1</sup>  
 Previous Budget Period: July 1, 2005 to June 30, 2006**

GROUP DATA			INDIVIDUAL DATA			
# of Minorities Applied	# of Minorities Offered Admission	# of Minorities Entered Program	For those who entered program: Identify by sequential #	Current Status (in training, graduated, left the program, etc.)	Sources of Support	Subsequent Career Development/ Employment
0	0	0				

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Refer to: Supplemental Instructions, page 13.  
<sup>1</sup> First three columns are a group total; last four columns refer to individual trainees.

ERC Applicant Institution: The University of Iowa  
 Program Director: Corinne Peek-Asa  
 Discipline: Occupational Injury Prevention

**Table 4a**  
**Academic Training Report**  
**Previous Budget Period: July 1, 2005 to June 30, 2006**

Degree Awarded	How Does Degree Read?	# Full-Time Trainees Enrolled <sup>1</sup>	# Full-Time NIOSH-Supported Trainees	# Part-Time Trainees Enrolled	# Part-Time NIOSH-Supported Trainees	# Other Trainees Taking OS&H Courses <sup>2</sup>	# Trainees Graduated
<b>Baccalaureate/associate degree</b>							
<b>Master's degree</b>							
MS	Master of Science/Occupational & Environmental Health	0	0	1	1	20	0
<b>Doctorate degree</b>							
PhD	Doctor of Philosophy/Occupational & Environmental Health	3	3	0	0	10	2
PhD	Doctor of Philosophy/Epidemiology	4	4	0	0	0	0
PhD	Doctor of Philosophy/Community and Behavioral Health	1	1	0	0	0	0
<b>Post-doctoral (Include formally registered Occupational Medicine residents in all years of the residency.)<sup>3</sup></b>							
<b>Other (specify, e.g., undergraduate Certificate program trainees)</b>							

Page

Refer to: Supplemental Instructions, page 10.

<sup>1</sup> Trainee counts include all students in the approved programs.<sup>2</sup> Does not include trainees counted in any of the full-time or part-time categories<sup>3</sup> In this case, there may be double counting between Doctorate degree and Post-doctoral categories.

ERC Applicant Institution: The University of Iowa  
 Program Director: Corinne Peek-Asa  
 Discipline: Occupational Injury Prevention

**Table 13**  
**Minority Recruitment Data<sup>1</sup>**  
**Previous Budget Period: July 1, 2005 to June 30, 2006**

GROUP DATA			INDIVIDUAL DATA			
# of Minorities Applied	# of Minorities Offered Admission	# of Minorities Entered Program	For those who entered program: Identify by sequential #	Current Status (in training, graduated, left the program, etc.)	Sources of Support	Subsequent Career Development/ Employment
1	1	1	01	In Training	NIOSH	

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Refer to: Supplemental Instructions, page 13.  
<sup>1</sup> First three columns are a group total; last four columns refer to individual trainees.

ERC Applicant Institution: The University of Iowa  
 Program Director: Nancy Sprince  
 Discipline: Occupational Medicine

**Table 4a  
 Academic Training Report  
 Previous Budget Period: July 1, 2005 to June 30, 2006**

Degree Awarded	How Does Degree Read?	# Full-Time Trainees Enrolled <sup>1</sup>	# Full-Time NIOSH-Supported Trainees	# Part-Time Trainees Enrolled	# Part-Time NIOSH-Supported Trainees	# Other Trainees Taking OS&H Courses <sup>2</sup>	# Trainees Graduated
<b>Baccalaureate/associate degree</b>							
<b>Master's degree</b>							
MS	Master of Science/Occupational & Environmental Health	0	0	1	1	12	1
MPH	Master of Public Health	7	7	0	0	18	3
<b>Doctorate degree</b>							
<b>Post-doctoral (Include formally registered Occupational Medicine residents in all years of the residency.)<sup>3</sup></b>							
<b>Other (specify, e.g., undergraduate Certificate program trainees)</b>							

Page

Refer to: Supplemental Instructions, page 10.

<sup>1</sup> Trainee counts include all students in the approved programs.

<sup>2</sup> Does not include trainees counted in any of the full-time or part-time categories

<sup>3</sup> In this case, there may be double counting between Doctorate degree and Post-doctoral categories.



ERC Applicant Institution: The University of Iowa  
 Program Director: Nancy Sprince  
 Discipline: Occupational Medicine

**Table 13**  
**Minority Recruitment Data<sup>1</sup>**  
**Previous Budget Period: July 1, 2005 to June 30, 2006**

GROUP DATA			INDIVIDUAL DATA			
# of Minorities Applied	# of Minorities Offered Admission	# of Minorities Entered Program	For those who entered program: Identify by sequential #	Current Status (in training, graduated, left the program, etc.)	Sources of Support	Subsequent Career Development/ Employment
1	1	1	01	Graduated	NIOSH	Occ Med Physician
			02	Graduated	NIOSH	TBD
			03	In Training	NIOSH	

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Refer to: Supplemental Instructions, page 13.  
<sup>1</sup> First three columns are a group total; last four columns refer to individual trainees.

**Table 12a**  
**CE Course Offerings by Program Area**  
**Past Year Only (July 01, 2005 to June 30, 2006)**

Course/Seminar Title	Program Area	Total Trainees	Length of Course (Hrs.)	Total Pers Days	# Trainees by Profession					# Trainees by Employer						
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other
Occupational & Environmental Epidemiology for the Industrial Hygienist, Occupational & Environmental Health Professional 03/29/2006, Iowa City, IA	IH	15	9.00	16.88	3	6	5	0	1	6	1	0	0	0	8	0
8th Annual Occupational Health Symposium: Caring for Workers in the Heartland 03/30-31/2006, Iowa City, IA	IH	91	15.00	170.63	12	54	9	2	14	50	0	0	3	0	38	0
Applied Epidemiology for Industrial Hygienists 05/13/2006, Chicago, IL	IH	38	8.00	38.00	0	0	38	0	0	30	8	0	0	0	0	0
<b>Subtotal IH</b>	<b>IH</b>	<b>144</b>	<b>32.00</b>	<b>225.50</b>	<b>15</b>	<b>60</b>	<b>52</b>	<b>2</b>	<b>15</b>	<b>86</b>	<b>9</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>46</b>	<b>0</b>
NIOSH-Approved Spirometry Training for Worker Screening 07/28-29/2005, Iowa City, IA	OHN	10	20.70	25.88	1	5	0	1	3	8	0	0	0	0	2	0
Case Management: Care of Work-Related Injuries 10/28/2005, Coralville, IA	OHN	101	7.50	94.69	7	74	0	3	17	85	0	0	4	0	11	1
NIOSH-Approved Spirometry Training for Worker Screening 11/03-04/2005, Iowa City, IA	OHN	12	21.00	31.50	0	8	0	0	4	7	1	0	0	0	4	0
7th Annual Occupational Health Nursing Conference 11/18/2005, Waterloo, IA	OHN	45	6.90	38.81	0	43	0	2	0	42	0	0	0	0	3	0
Occupational Hearing Conservationist Certification 03/08-10/2006, Iowa City, IA	OHN	13	23.70	38.51	0	5	0	0	8	11	0	0	0	0	0	2
Occupational Hearing Conservationist Recertification 03/09/2006, Iowa City, IA	OHN	12	9.60	14.40	0	11	0	0	1	12	0	0	0	0	0	1
Using Occupational Research in Practice 03/23/2006, Iowa City	OHN	12	1.50	2.25	0	12	0	0	0	9	0	0	0	0	3	0
NIOSH-Approved Spirometry Training for Worker Screening 04/13-14/2006, Iowa City, IA	OHN	11	21.00	28.88	0	3	0	0	8	11	0	0	0	0	0	0

**Table 12a**  
**CE Course Offerings by Program Area**  
**Past Year Only (July 01, 2005 to June 30, 2006)**

Course/Seminar Title	Program Area	Total Trainees	Length of Course (Hrs.)	Total Pers Days	# Trainees by Profession					# Trainees by Employer						
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other
<b>Subtotal OHN</b>	<b>OHN</b>	<b>216</b>	<b>111.90</b>	<b>274.91</b>	<b>8</b>	<b>161</b>	<b>0</b>	<b>6</b>	<b>41</b>	<b>185</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>23</b>	<b>4</b>
CSOMA Annual Fall Seminar 09/16-17/2005, Dubuque, IA	OM	92	13.60	156.40	76	9	0	0	7	78	2	0	0	0	9	3
WORKSAFE IOWA: Medical Associates Network Meeting & Seminar 10/06-07/2005, Urbandale, IA	OM	26	6.50	21.13	6	9	0	0	11	23	0	0	0	0	3	0
CSOMA Occupational Medicine: Where Medicine Meets the Workplace 03/16/2006, Lisle, IL	OM	97	8.40	101.85	57	36	2	0	2	87	4	0	0	0	4	2
CSOMA 82nd Annual Spring Seminar: It's A Team Effort 3/17-18/2006, Lisle, IL	OM	142	11.40	202.35	114	26	1	0	1	127	3	0	0	0	12	0
WORKSAFE IOWA: Medical Associates Network Meeting & Seminar 04/20-21/2006, Urbandale, IA	OM	26	8.00	26.00	7	9	0	0	10	24	0	0	0	0	2	0
<b>Subtotal OM</b>	<b>OM</b>	<b>383</b>	<b>47.90</b>	<b>507.73</b>	<b>260</b>	<b>89</b>	<b>3</b>	<b>0</b>	<b>31</b>	<b>339</b>	<b>9</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>30</b>	<b>5</b>
Breath Alcohol Technician Training 01/12/2006, Marengo, IA	OS	6	8.00	6.00	0	0	0	0	6	6	0	0	0	0	0	0
Calibration Technician Training 01/13/2006, Marengo, IA	OS	6	6.00	4.50	0	0	0	0	6	6	0	0	0	0	0	0
Supervisor Training for Drug & Alcohol Abuse Testing - Initial 2-Hour Training 04/11/2006, Bettendorf, IA	OS	20	2.00	5.00	0	0	0	0	20	18	0	0	2	0	0	0
Supervisor Training for Drug & Alcohol Abuse Testing - Annual 1-Hour Training 04/13/06, Bettendorf, IA	OS	27	1.00	3.38	0	0	0	0	27	24	0	0	3	0	0	0
The Best Practices in Iowa: A Workplace Safety Conference 05/17/2006, Iowa City, IA	OS	282	7.00	246.75	0	1	0	275	6	41	1	7	11	0	220	2

**Table 12a**  
**CE Course Offerings by Program Area**  
**Past Year Only (July 01, 2005 to June 30, 2006)**

Course/Seminar Title	Program Area	Total Trainees	Length of Course (Hrs.)	Total Pers Days	# Trainees by Profession					# Trainees by Employer						
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other
<b>Subtotal OS</b>	<b>OS</b>	<b>341</b>	<b>24.00</b>	<b>265.63</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>275</b>	<b>65</b>	<b>95</b>	<b>1</b>	<b>7</b>	<b>16</b>	<b>0</b>	<b>220</b>	<b>2</b>
No HST Courses Offered	HST															
<b>Subtotal HST</b>	<b>HST</b>	<b>0</b>	<b>0.00</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Certified Safe Farm Training 08/02/2005, Spencer, IA	Ag S&H	6	8.00	6.00	0	0	0	6	0	6	0	0	0	0	0	0
Certified Safe Farm Auditor Evaluator Training 10/17/2005, Aplington, IA	Ag S&H	2	3.00	0.75	0	0	0	2	0	2	0	0	0	0	0	0
Agricultural Trauma Training for EMTs 10/22/2005, Morley, IA	Ag S&H	15	2.00	3.75	0	0	0	0	15	0	0	0	0	0	0	15
Midwest Rural & Agricultural Safety & Health Forum 10/27-28/2005, Johnston, IA	Ag S&H	104	11.00	143.00	5	30	5	27	37	18	5	10	6	0	37	28
Certified Safe Farm Audit Review 11/10/2006, Grundy Center, IA	Ag S&H	2	3.00	0.75	0	0	0	1	1	2	0	0	0	0	0	0
Certified Safe Farm Training 12/1-2/2005, Iowa City, IA	Ag S&H	8	8.00	8.00	0	4	0	4	0	8	0	0	0	0	0	0
Certified Safe Farm Training 1/12-13/2006, Spencer, IA	Ag S&H	2	8.00	2.00	0	0	0	2	0	2	0	0	0	0	0	0
Certified Safe Farm Training 1/17/2006, Keosauqua, IA	Ag S&H	22	2.00	5.50	0	2	0	20	0	22	0	0	0	0	0	0
Certified Safe Farm Training 1/18/2006, Oskaloosa, IA	Ag S&H	26	2.00	6.50	0	2	0	24	0	26	0	0	0	0	0	0
Agricultural Trauma Training for EMTs 05/04/2006, Elberon, IA	Ag S&H	8	2.00	2.00	0	0	0	0	8	0	0	0	0	0	0	8
Agricultural Occupational Health Training Session I 05/30-06/01/2006, Iowa City, IA	Ag S&H	28	21.00	73.50	10	8	0	0	10	9	0	1	0	1	17	0
Agricultural Occupational Health Training Session II 06/01-03/2006, Iowa City, IA	Ag S&H	28	21.30	74.55	9	9	0	0	10	8	8	1	1	1	17	0

**Table 12a**  
**CE Course Offerings by Program Area**  
**Past Year Only (July 01, 2005 to June 30, 2006)**

Course/Seminar Title	Program Area	Total Trainees	Length of Course (Hrs.)	Total Pers Days	# Trainees by Profession					# Trainees by Employer						
					MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other
Agricultural Rescue Training for Firefighters 06/15/2006, Tama, IA	Ag S&H	24	2.00	6.00	0	0	0	24	0	0	0	0	24	0	0	0
<b>Subtotal Ag S&amp;H</b>	<b>Ag S&amp;H</b>	<b>275</b>	<b>93.30</b>	<b>332.30</b>	<b>24</b>	<b>55</b>	<b>5</b>	<b>110</b>	<b>81</b>	<b>103</b>	<b>13</b>	<b>12</b>	<b>31</b>	<b>2</b>	<b>71</b>	<b>51</b>
Bringing Research to Practice: A Colloquium of NIOSH Pilot Projects 05/24/2006, Iowa City, IA	Ergo	21	2.75	7.22	1	3	8	2	7	3	0	0	0	0	18	0
<b>Subtotal Ergo</b>	<b>Ergo</b>	<b>21</b>	<b>2.75</b>	<b>7.22</b>	<b>1</b>	<b>3</b>	<b>8</b>	<b>2</b>	<b>7</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>18</b>	<b>0</b>
<b>GRAND TOTALS (All Program Areas)</b>	<b>All</b>	<b>1380</b>	<b>311.85</b>	<b>1613.28</b>	<b>308</b>	<b>369</b>	<b>68</b>	<b>395</b>	<b>240</b>	<b>811</b>	<b>33</b>	<b>19</b>	<b>54</b>	<b>2</b>	<b>408</b>	<b>62</b>

**Table 12b**  
**CE Course Offerings - Summary by Program Area**  
**July 1, 2005 to June 30, 2006**

Program Area	Total Trainees	Number of Courses	Total Pers Days	# Trainees by Profession					# Trainees by Employer						
				MD	NURS	HYG	SAFETY	OTHER	Private Industry	Fed Gov	State Gov	Local Gov	Foreign Country	Academic	Other
Industrial Hygiene (IH)	144	3	226	15	60	52	2	15	86	9	0	3	0	46	0
Occupational Health Nursing (OHN)	216	8	274.91	8	161	0	6	41	185	1	0	4	0	23	4
Occupational Medicine (OM)	383	5	507.73	260	89	3	0	31	339	9	0	0	0	30	5
Occupational Safety	341	5	265.63	0	1	0	275	65	95	1	7	16	0	220	2
Hazardous Substance Training (HST)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Agricultural Safety and Health (Ag S&H)	275	13	332.3	24	55	5	110	81	103	13	12	31	2	71	51
Other OS&H (Ergonomics)	21	1	7.22	1	3	8	2	7	3	0	0	0	0	18	0
<b>TOTAL</b>	<b>1380</b>	<b>35</b>	<b>1613.29</b>	<b>308</b>	<b>369</b>	<b>68</b>	<b>395</b>	<b>240</b>	<b>811</b>	<b>33</b>	<b>19</b>	<b>54</b>	<b>2</b>	<b>408</b>	<b>62</b>

## Appendix C

## Publications

### Industrial Hygiene Program Area:

Boekelheide K, Perreault-Darney S, Daston GP, David RM, Luderer U, Olshan AF, Sanderson WT, Willhite CC, Woskie S. NTP-CERHR Expert Panel Report on the reproductive and developmental toxicity of 2-bromopropane. *Reproductive Toxicology* 18:189-217, Mar/Apr. 2004.

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