

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

ANNUAL REPORT
July 1, 2005 – June 30, 2006

**SUBMITTED BY:
NOAH S. SEIXAS, PHD
CENTER DIRECTOR
UNIVERSITY OF WASHINGTON
SEATTLE, WA 98195**

OCTOBER 2006

NORTHWEST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

TABLE OF CONTENTS

	<i>Page</i>
I. Table of Contents.....	<i>i</i>
II. Introduction and Executive Summary	1
A. Major Accomplishments.....	1
B. Significant Changes since July 1, 2004 – June 30, 2005	1
C. ERC Website	2
III. Program Progress Reports	3
Center Administration.....	3
Industrial Hygiene	8
Occupational Health Nursing	11
Occupational and Environmental Medicine.....	15
Health Services Research Training.....	18
NORA Research Training	20
Hazardous Substance Training.....	23
Hazardous Substance Academic Training.....	26
Continuing Education/Outreach	29
IV. Report on Specific Improvements in OS&H Resulting from ERC Programs.....	33
V. Appendices	
A. Program Curricula.....	36
B. Data Tables 4a, 5, 12a, 12b and 13	65
C. Publications	95

INTRODUCTION AND EXECUTIVE SUMMARY

Center Director: Noah Seixas

A. Major Accomplishments, July 1, 2005 to June 30, 2006

The Northwest Center for Occupational Health and Safety continues its mission of training a professional workforce in the disciplines dedicated to preventing disease and injury among the working public in Washington, Idaho, Oregon and Alaska, through strong research-based graduate education, continuing education for practicing professionals and outreach and services to the region. Over this reporting year, we have grown and consolidated our presence and an interdisciplinary Center through continued funding of graduate students in these disciplines, improving our interdisciplinary interactions, and continuing presentation of well-regarded continuing education classes. Stronger central administration of the Center's budgets and activities has allowed us to ensure that our funds are effectively spent and are addressing the core objectives of the Center.

- Each of our academic programs remains strong, with supported trainees numbering six in IH, nine in OHN, four in OEM, two in HSAT, and four in HSRT. During the reporting period we graduated nine students with an MS in IH, two with a PhD in IH, seven with an MPH in OEM, two with an MN in OHN, one with a PhD in OHN, three with an MS in HSAT, and one with a PhD in HSRT.
- CE and HST programs reached a total of 3,401 trainees, with 35% receiving in-person training and the remainder taking part in online training offerings.
- We have developed several new initiatives to better address training effectiveness and regional impact. These include our interdisciplinary research seminar, a research ethics training requirement, support for regional and national conferences and a NORA research projects funding mechanism.
- Six projects involving student research were supported by the NORA research projects in its first year, including students in core programs as well as students from Epidemiology and Engineering.
- Center faculty and staff helped organize and present a successful NORA Town Hall meeting in conjunction with the Pacific Northwest Agricultural Safety and Health Center and NIOSH. About 125 attendees participated, providing 42 presentations through which important regional issues were identified.

B. Significant Changes

No significant changes have been made to the ERC's structure or program. The curricula remain essentially unchanged since the competing renewal, with only small changes in individual courses designed to improve our training in line with comments of the reviewers and other oversight bodies.

Several significant changes have been made to the leadership of the ERC over the past year. In Occupational Health Nursing, Pat Butterfield, the OHN program director, was made Department Chairperson. As a result, Dr. Mary Salazar provided support to the program while a search was mounted for a new Director. The search ended successfully in the recruitment of Dr. Butch de Castro to the faculty, as well as to the Directorship of the OHN Program.

In Continuing Education-Outreach and Hazardous Substance Training, Scott MacKay stepped down and a search was mounted for a new Director. Steve Hecker, an industrial hygienist and long-time supporter of the Northwest Center, was recruited as the new Director of these programs. Mr. Hecker was also appointed as the Center's Deputy Director.

In the Occupational and Environmental Medicine program, Dr. Dennis Shusterman was appointed as Director of the ERC OEM Program, as well as the OM Residency. Several new core faculty have also been added to the program. Dr. Stephen Hunt of the Seattle Veterans Administration Hospital and Dr. David Bonauto, from the Washington State Department of Labor and Industries, SHARP program (Safety & Health Assessment & Research for Prevention), became part of our core faculty group. Dr. Catherine Karr, previously part of the supporting faculty, was also added to the core faculty for the program.

Three new members were appointed to our External Advisory Board, strengthening our outreach abilities: Chris Barton of the Service Employees International Union, District 1199 (representing the health care industry), Don Lofgren, an industrial hygienist with the WA State Department of Labor and Industries, and Dede Montgomery, an industrial hygienist and outreach specialist for Oregon Health and Science University, Center for Occupational and Environmental Toxicology. A new charter for the Advisory Board was also adopted.

C. ERC Website

The website for the Northwest Center for Occupational Health and Safety is under development. Links to each of the programs can be obtained at the following website:

<http://depts.washington.edu/envhlth/centers/nwcenter/nwcenter.html>.

CENTER ADMINISTRATION

Program Director: Noah Seixas

Program Highlights: July 1, 2005 to June 30, 2006

- Each of our academic programs remained strong, with supported trainees numbering nine in OHN, six in IH, two in HSAT, four in OEM, and four in HSRT.
- Recruitment has been highly successful for the coming year, with ten students expected in IH (eight MS, two PhD), two in OEM, three in OHN, and two in HSAT.
- CE and HST programs reached a total of 3,401 trainees with 35% receiving in-person training, and the remainder taking part in online training offerings.
- Pat Butterfield, the OHN program director, was appointed Chair of the Department of Psychosocial and Community Health, and Mary Salazar is providing support in running the program until Autumn, 2006, when Dr. Butch de Castro takes over as Director of the OHN Program.
- Scott MacKay has stepped down and Steve Hecker has been appointed Director of the CE/O Program, and also serves as the Center's Deputy Director.
- Dennis Shusterman has taken over as Director of the Occupational and Environmental Medicine program.
- We have developed several new initiatives to better address training effectiveness and regional impact. These include our interdisciplinary research seminar, a research ethics training requirement, support for regional and national conferences and a NORA research projects funding mechanism. Six projects involving student research were supported by this program in its first year.
- Three new members were appointed to our External Advisory Board, representing outreach activities in Oregon, a Washington State regulatory agency, and labor in the health care industry.

Program Description

Goals and Objectives

The Northwest Center for Occupational Health and Safety (NWCOS) supports interdisciplinary training in occupational health and safety (OH&S), including both professional practice and research-oriented education. In addition, the Center provides continuing education programs for OH&S professionals practicing in Region X (WA, OR, ID, AK), and serves as a regional resource for information and consultation on occupational health and safety problems. The Center is housed within the Department of Environmental and Occupational Health Sciences at the University of Washington and is guided by a ten-member External Advisory Board.

Faculty Participation

During the reporting period, the NWCOS was lead by Dr. Noah Seixas, Director, and Dr. Joel Kaufman, Deputy Director. The individual program directors were Michael Yost (Industrial Hygiene), Dennis Shusterman (Occupational and Environmental Medicine), Patricia Butterfield (Occupational Health Nursing), John Kissel (Hazardous Substance Academic Training), Tom Wickizer (Health Services Research Training) and Scott MacKay (Continuing Education-Outreach and Hazardous Substance Training). Several important changes in leadership occurred during or at the end of this reporting period. Steve Hecker replaced Scott MacKay as Director of the CE-O and HST programs, and also replaced Joel Kaufman as the Deputy Director of the Center. Dr. Butch de Castro assumed responsibility for the Directorship of the OHN program, taking over from Patricia Butterfield, who was promoted to Chair of the Department of Psychosocial and Community Health Nursing. Dr. Dennis Shusterman replaced Matt Keifer as Director of the OEM program and the OM Residency.

Curriculum

There has been no change in the number of core programs. Considerable strength continued in our Industrial Hygiene, Occupational Health Nursing and Occupational Medicine programs, furthered through programs in Hazardous Substance Academic Training, Health Services Research Training, Continuing Education and Outreach, and Hazardous Substance Training Programs. The NORA Research Training program supplemented and added strength to each of the discipline-specific programs. Some changes were made in the curricula of individual programs to enhance specific areas of instruction, as suggested by our advisory

boards, review committees and accreditation boards. These changes are outlined in the individual program narratives.

Responsible Conduct of Science

All trainees are required to complete the Biomedical Research Integrity lecture series sponsored by the University of Washington's School of Medicine, Department of Medical History & Ethics. The lecture series this year included four lectures and 53 discussion groups on three mandated PHS topics: conflict of interest, collaborative science, and research misconduct. The lecture series is offered in the summer quarter, although trainees are allowed to attend the lectures via videotape at UW libraries throughout the year. Trainees can also attend lectures from prior years that are offered via videotape sessions.

We also developed a program to support student research training under our NORA component. Several of the projects funded include research involving human subjects and have been reviewed and approved by the UW IRB.

Interdisciplinary Research and Training

Several activities of note address our interdisciplinary research training. We have continued our quarterly interdisciplinary research seminar in which advanced graduate students present research methods and findings for an audience that includes trainees from all disciplines and the major faculty from each program. Our first seminar this year addressed health and safety issues in small businesses (OHN faculty presentation), cholinesterase depression among pesticide handlers (occupational epidemiology doctoral student methods presentation), and racial and ethnic disparities in occupational injuries (health services doctoral student research). Our winter seminar included presentations on biomarkers for diesel exposure, immunological effects of silica exposure and effects of telecommuting on worker health behaviors. The truly interdisciplinary nature of these topics demonstrates the breadth of subject matter encompassed by our Center.

Several required and elective classes in the various curricula attracted students from each of the programs, allowing for a rich interdisciplinary interaction. Trainees have also participated in a wide range of regional and national interdisciplinary research meetings – notably the Northwest Occupational Health Conference and the joint University of Washington-University of British Columbia (Canada) Semiahmoo research symposium, and professional meetings such as the American Industrial Hygiene Conference and Exposition and the American College of Occupational and Environmental Medicine Annual Meeting.

Program Activities and Accomplishments

Discussion of Progress

Significant progress has been made in enhancing the interdisciplinary interaction of our trainees. In particular, our Quarterly Interdisciplinary Research Seminar brought together faculty and advanced trainees from all of the occupational health and safety disciplines to discuss current research methodology and findings. Trainees were also encouraged to attend regional conferences on interdisciplinary occupational health and safety research, including our CE offerings and especially the Occupational Medicine Grand Rounds series. Seminars and courses that stimulate interdisciplinary interactions remain a cornerstone of each of our training programs.

Increasingly close ties to regional training institutions and partners outside Washington State have enhanced our ability to conduct needs assessment, and serve the needs of the region. The Director presented a talk about challenges and opportunities for OH&S training at the Northwest Occupational Health Conference and solicited input from the assembled IH, OHN and OM communities on our work. The Center partnered with the Pacific Northwest Agricultural Safety and Health Center (PNASH) in hosting a NIOSH NORA Town Hall meeting 1/17/06 in which individuals testified on the needs for OH&S research in the Northwest. Many well-documented issues were brought forth and considered by the NWCOHS, as well as NIOSH representatives.

We have helped support regional institutions by offering assistance with expenses for attending the annual symposium held at Semiahmoo (on the U.S.-Canada border) by researchers at the UW and the University of British Columbia, the NORA Town Hall meeting, and the NIOSH NORA Symposium.

In a new effort funded under the NORA Program, the Center began its first round of funding for small research projects to help expand the impact of the Center's resources. Six projects were funded, allowing us to expand the scope of the work we do, reach students in non-traditional OH&S disciplines, and directly fund research activities. This program is discussed in more detail in the NORA Program section.

The Northwest Center has an Advisory Board which meets yearly and confers with the directors occasionally throughout the year to provide oversight and advice on programs and progress. Several new members were invited to participate in the Board including:

- Chris Barton of the Service Employees International Union, District 1199, representing the health care industry,
- Don Lofgren, Industrial Hygienist with the WA State Department of Labor and Industries,
- Dede Montgomery, Industrial Hygienist and Outreach Coordinator for Oregon Health and Science University, Center for Occupational and Environmental Toxicology.

Several other actions were also taken at the annual meeting of the Board in April. Because our past board Chairman was Steve Hecker, who was hired to be the new director of CE/O and HST, and Center Deputy Director, he needed to be replaced on the Advisory Board. Doug Briggs, a long time member of the Board, agreed to be the interim Chair until our next meeting in 2007. In addition, the Director and Board members developed a Charter for the Board, to assist us with clarification of duties, and to allow members to be appointed for a period of three years, which may be renewed. This change will assist us in assuring the Board Membership stays current and active. The Board now includes ten members.

Trainee Recruitment

Our programs continued to attract excellent students into occupational health and safety disciplines. The recruitment activities specified in each program report, website development, targeted mailings, presentations at conferences and at other schools and colleges and participation in national meetings and other activities, continue to produce an adequate number of applicants. Although we would like to see a higher number of applicants, our current efforts are adequately filling our classes with competent, and in some cases, outstanding students.

Minority recruitment has been emphasized during the past year. We believe we're seeing some improvement in minority recruitment and enrollment. In the class entering in 2006, one of our two OEM residents is from an under-represented minority, and two of our ten IH students are from minority backgrounds.

Program Products

Measures of Effectiveness

We have begun the process of monitoring several objective measures of effectiveness as outlined in our competing renewal, and consistent with the ERC Directors' Task Force 3 report on Evaluation Metrics. Our accomplishments are summarized in the table below showing the number of various indices achieved during the reporting year.

Achieved/Goals: July 1, 2005-June 30, 2006

	IH	OHN	OEM	HSRT	HSAT
<u>Number of Core Faculty*</u>	6	6	13	5*	5*
<u>Information Dissemination by Core Faculty</u>					
# Peer Reviewed Publications	25/15	15/10	39/33	23/15	12/8
# Reports/Chapters/Lay Pubs	8/4	5/3	0/5	1/3	1/1
# Research New Grants/Contracts	18/6	4/4	6/6	5/5	4/2
<u>Knowledge Transfer</u>					
# Consultations with outside Groups	4/4	12/5	2/11	2/3	6/4
# Presentations to Regional Conferences	13/9	12/6	21/8	0/2	0/2

Training					
# Trainees enrolled (total)	21/18	10/12	12/6	4**/4	11/8
# Graduates	11/7	3/5	7/3	1/1	3**/4
# Minority Trainees enrolled	4/3	1/2	1/1	0/1	2/2
# Research papers by trainees published	8**/5	5**/2	2**/2	1**/2	2**/3
# Conference presentations by trainees	5/9	5**/4	5/4	3**/4	6**/4

* Core faculty excluding those counted in other programs

**ERC-supported trainees only

As the table suggests, our programs performed very well, and achieved most of our goals. Our publication record is excellent and the programs are competing successfully for research grants and contracts. We provided extensive consulting and presentations with outside groups – primarily within the region. Our enrollment and graduation rates were solid, and most of our programs achieved excellent diversity in our student body. Students have been highly successful in publishing their work, and presenting their work at conferences. Overall, the programs performed very highly.

In addition to these quantitative measures of effectiveness, several examples of achievement are worth noting. The Northwest Center collaborated with the Pacific Northwest Agricultural Safety and Health Center (PNASH) and NIOSH to host a NORA Town Hall Meeting on January 17, 2006. The meeting was highly successful, with about 125 attendees, and about 42 presentations. Interesting regional issues were identified, including the need for research on training effectiveness, addressing the needs of immigrant laborers, and the need for continued emphasis on basic health and safety research, in addition to applied intervention-style research. Other issues included the changing nature of work and the workforce, high technology issues, and the importance of international occupational health and safety.

The Center held a competition for NORA-related small research projects, each of which had a NORA focus, included research training for a graduate student, and furthered the overall goals of the Northwest Center. The funded projects included:

- Identification of Risk Factors for Pesticide Over-Exposure Among Applicators in Washington State
- Evaluation of Vehicle Vacuuming Intervention for Cherry Pickers, Workplace Exposure Determinants of Take Home Exposure
- Computer Exposure Assessment and Intervention Project: UW Computer Odometer Program
- Organization of Work in Assisted Living: Occupational Health and Safety Implications for Direct Care
- Survey of Occupational Safety and Health Needs of Day Laborers
- Does Changing Work Organization through Telecommuting Affect Individual Health Behaviors?

Two doctoral student trainees in Industrial Hygiene have received major fellowships. Doug Johns graduated in September 2005 and received a fellowship to conduct research at the EPA laboratories. Parveen Bhatti is conducting his post-doctoral research under a fellowship at the National Cancer Institute.

OHN students made more than 20 presentations and publications during the reporting year. Students have also received various awards and scholarships. Julie Postma was a recipient of the Citizens of the World Award and the Hester McLaws Scholarship, and received a Multidisciplinary Clinical Research Fellowship.

Dr. Chris Carlsten completed a fellowship in Occupational Medicine in June 2006 and will complete a fellowship in Pulmonary Medicine and Critical Care Medicine in June 2007. In addition to ERC support, Dr. Carlsten had been supported by a T32 training grant in Pulmonary/Critical Care Medicine. His MPH thesis addressed immunological effects of silica exposure among construction workers, and was supervised by Dr. Joel Kaufman (OM) and Dr. Noah Seixas (IH); this work is in press in *Arthritis Care and Research*. Dr. Carlsten is now working with Dr. Kaufman on research pertaining to effects of diesel exhaust on blood coagulation and inflammation. He has submitted both NRSA and K23 grants to NIH for continuing research at the UW.

Four posters authored or co-authored by five current or former HSAT trainees were presented at the annual meeting of the International Society of Exposure Analysis in Tucson, AZ.

Publications

A listing of all publications by core faculty and trainees during the reporting period is given in Appendix C, pages 95-102. In addition to the knowledge dissemination represented by these publications, these accomplishments also represent the very rich research environment that our trainees are immersed in during their tenure at the University of Washington.

Future Plans: July 2006 - June 2007

In the coming year, we plan to continue to provide funding for small research projects to help expand the impact of the Center's resources and make them available to training institutions around Region X.

The addition of Steve Hecker as Director of CE/O and HST, as well as Deputy Director for the Center, will greatly enhance our activity and effectiveness. Mr. Hecker will contribute to training programs on effective training techniques and methods of program evaluation, and will extend and improve our outreach effectiveness through his contacts and involvement with regional partners.

INDUSTRIAL HYGIENE

Program Director: Michael Yost

Program Highlights: July 1, 2005 to June 30, 2006

- The Industrial Hygiene (IH) program currently includes 21 students including 12 in the MS program.
- Three new MS and one PhD student were admitted to the 2005-06 year class.
- Two doctoral students have received major fellowships. Doug Johns graduated in September 2005 and received a fellowship to conduct research at the EPA laboratories and Parveen Bhatti is conducting his post-doctoral research under a fellowship at the National Cancer Institute. Nine MS students (seven IH and two Safety and Ergonomics) graduated as of June 2006.
- Of 22 active grants and contracts, 18 new awards, including two new RO1 grants, were made to program faculty.

Program Description

Goals and Objectives:

The Industrial Hygiene training component of the ERC trains MS-level safety and health professionals for outstanding careers as industrial hygienists; the program also trains doctoral-level industrial hygienists to conduct exceptional occupational health and safety research with the most advanced tools and contemporary research methods available. Overall the training program continues to produce strong graduates and to fill a steady regional demand for occupational health and safety professionals and researchers. Future emphasis in the IH program will need to focus on recruiting strong applicants and refining the curriculum to address these diverse needs, while still maintaining a strong core of IH training.

Faculty Participation

No major changes to the core faculty have been made during the reporting period. The IH faculty consists of four full professors, two assistant professors and two lecturers. Starting in the summer, 2005, we added Steve Hecker to our program faculty as a Senior Lecturer. Although he has major responsibility for CE and HST programs, he will contribute to the IH program by teaching on training effectiveness and program evaluation topics.

Curriculum

No significant changes were made in the IH MS or PhD curricula during the reporting period. The faculty continues to work toward a revision that will improve the integration of traditional occupational health and safety with risks for workers, workers' families, and communities in general associated with environmental and occupational exposures. [See Appendix A, pages 37-41 for complete MS and PhD curricula and sample plans of study.]

Responsible Conduct of Science

All trainees are required to complete the Biomedical Research Integrity lecture series sponsored by the University of Washington's School of Medicine, Department of Medical History & Ethics. The lecture series this year included four lectures and 53 discussion groups on three mandated PHS topics: conflict of interest, collaborative science, and research misconduct. Over 300 student trainees from across the UW campus participated in the series. The lecture series is offered in the summer quarter, although trainees are allowed to attend the lectures via videotape at libraries at UW Health Sciences, Harborview Medical Center, Children's Hospital and Regional Medical Center (CHRM), and Fred Hutchinson Cancer Research Center throughout the year. Optionally, trainees can attend lectures from prior years that also are offered via videotape sessions. These lectures cover additional PHS topics relevant to scientific research ethics such as: data collection; data management and ownership; mentor-trainee responsibilities; human subjects' research and conflict of interest.

Program Activities and Accomplishments

Discussion of Progress

The IH training program has continued to maintain and develop a national presence: Dr. Michael Yost and

Dr. Noah Seixas have taken on major roles in both the teaching and research activities in Industrial Hygiene and in the Department. Dr. Yost serves as the Program Director of the Industrial Hygiene & Safety faculty in the Department; Dr. Seixas is the ERC Director and is the Rohm & Haas Professor of Environmental Health. The industrial hygiene ERC training program has six full-time professorial positions and two lecturers; it carries on a strong research and research training program to complement its commitment to the education of industrial hygienists with career ambitions in industry and government. IH program faculty authored more than 25 peer-reviewed publications, and provided 13 presentations at scientific meetings. We have started to implement revisions to modernize the curriculum as recommended by our outside advisors, the core faculty and the recent NIOSH site review. ENVH 557 "Exposure Controls" was offered this year in revised form to include content in the use of protective equipment along with rigorous training in ventilation. Content in ENVH 564 "Recognition of Health & Safety Problems" has been strengthened to include more on physical agents.

The IH program has 21 students currently enrolled. During this reporting period, seven ERC-supported trainees graduated with MS degrees. A list of graduates from the program is provided below and in Appendix B, page 67.

We accepted ten new students into the program for the 06-07 year, eight MS students and two doctoral students. We continue to conduct exit interviews with graduates and to assess the regional changes in professional needs through contacts with industry and the local American Industrial Hygiene Association (AIHA) section. Graduates report a high level of satisfaction with the training experience; employers in particular seem interested in graduates having a variety of training experiences, internships, and general knowledge of IH, safety, and environmental issues.

Trainee Recruitment

The program has adopted a strategy based on web site presence, targeted mailings, and a department brochure as the principal recruitment tools. This has led to a reasonably stable number of applicants with appropriate qualifications. We continue to use the ERC display at the AIHA Conference and the American Public Health Association meeting to recruit new applicants. A series of targeted outreach mailings are conducted each year to increase program visibility. Targeted areas include relevant undergraduate majors (i.e., chemistry, biology, engineering, biochemistry), at the UW and other universities and majors of previous applicants; faculty who have written letters of recommendation for previous applicants; and students registered in the GRE Search Service. We also attend numerous recruitment fairs, conferences, university events and community events each year.

The department's Graduate Program Office has developed several brochures identifying department, school, and university achievements to serve as an initial contact piece. Web links are maintained on commonly used sites including Petersons.com, Gradschools.com, and Enviroeducation.com. We have developed an IH program brochure identifying health and safety careers and opportunities in the private and public sectors. In addition, we created a series of alumni profiles on our website so that applicants can learn how our graduates are applying their education in their professional realm. In the current year, the Graduate Program Office is organizing a new initiative to bring undergrad students from minority and underserved schools in the region to the department for summer internships. Dr. Yost and Dr. Simpson have offered to participate and host student interns in their laboratories.

Program Products

Publications

Research contributions (listed in Appendix C, pages 95-96) by current or former trainees appeared in seven publications in the reporting period. These papers appeared in recognized international scientific journals and have all been subjected to peer review. The faculty in the IH training program produced a total of 25 peer-reviewed publications during the reporting period, reflecting the breadth and strength of the research experience offered to the trainees.

Continuing Education

The IH program faculty were involved in numerous continuing education courses including "Risk Communication," "Wood Smoke: Burning Health Issues," "Accident and Incident Investigation," and three new

courses designed for the “New Generation of First Responders.” In addition, Mr. Gleason was heavily involved with numerous courses offered through our OSHA Training Center.

Research involving students

The following students in the industrial hygiene and safety program produced theses and graduated during the reporting period.

Student	Thesis or Dissertation Title
Chris Ballew, MS	An Intervention Aiding in the Reduction of Organophosphate Pesticides From Take-Home Pathways
Parveen Bhatti, PhD	DNA Double Strand Break Repair Polymorphisms, Ionizing Radiation Exposure and Breast Cancer Risk
Janet Blackstone, MS	Physical Exposure Differences Between Children and Adults on Different-Sized Computer Input Devices
Amber Govert, MS	Development of an Analytical Method for the Determination of 3-Nitrotyrosine in Human Samples by HPLC-MS/MS
Elizabeth Gray, MS	Exposure Assessment and Exhaled Breath Analysis of Solvent Exposed Workers
Cheng (Robin) Han, MS	The development of testing software to measure and characterize differences in computer mouse use proficiency: comparison of children and adults.
Douglas Johns, PhD	The Effect of Ethanol Consumption on the Biotransformation of 1,1,1-Trichloroethane in Human Volunteers
Yi-Nien Lin, MS	The Effects of High Frequency Stimulation on Fatigue and Twitch Potential
Maggie Trabeau, MS	An Evaluation of "Train-The-Trainer" vs. Expert Training Modalities for Hearing Protection Use in Construction
Jason Woodruff, MS	Validation of Task-Based Noise Exposure Predictions in the Construction Trades
Jennifer Young, MS	Hearing Protection Device Use and Attenuation Among Construction Workers

R2P

Each of our MS students prepared research theses with significant R2P content, whether they were laboratory or field based projects. In particular, Maggie Trabeau’s thesis was a collaboration with the Associated General Contractors (AGC) of Washington addressing their interest in using a train-the-trainer approach to hearing conservation training. Chris Ballew’s thesis also had direct implications for interruption of the exposure pathways for take-home pesticides in the agricultural communities in which he did his work. Those projects that involved worksites directly provided feedback and recommendations to the workplace partners.

Future Plans: July 2006 – June 2007

We have admitted ten new students into the program for the 2006-2007 academic year - eight MS students and two doctoral students.

Curriculum revisions are being prepared for consideration by our department curriculum committee during the coming year. These revisions are designed to meet the employer needs and regional trends in occupational health and safety training, while maintaining a research-based training program on the cutting edge of industrial hygiene.

OCCUPATIONAL HEALTH NURSING

Program Director: Patricia Butterfield

Program Highlights: July 1, 2005 to June 30, 2006

- Ten OHN students, including two doctoral students, are currently enrolled in the OHN program. Three new students were admitted to the 2006-2007 class.
- Patricia Butterfield, PhD, RN, FAAN began her tenure as Chair of the Department of Psychosocial and Community Health September, 2005; Butch de Castro, PhD, MSN/MPH, RN, was hired as the new OHN program director, effective September 16, 2006.
- OHN students have more than 20 presentations (~12) and publications (~ten) to their credit this past year. Students have also received various awards and scholarships. For example, Julie Postma was a recipient of the Citizens of the World Award and the Hester McLaws Scholarship. Julie also received a Multidisciplinary Clinical Research Fellowship.

Program Description

Goals and Objectives

The occupational health nursing program focuses on the maintenance of a strong interdisciplinary graduate program that prepares graduates to synthesize and apply occupational and public health sciences to the health promotion, injury prevention and health maintenance of workers and worker populations. Additionally, graduates are prepared to:

- 1) Analyze and respond to dynamic and ever-changing forces that affect worker health and safety;
- 2) Collaborate with an interdisciplinary team to plan, implement, and evaluate comprehensive programs aimed at prevention, management and control of occupational injuries and illnesses;
- 3) Critically analyze and respond to legal and regulatory mandates that affect worker health and safety;
- 4) Advocate for organizational attention to occupational concerns of workers, families and the community.

Faculty Participation

The core faculty for the occupational health nursing program this past year were: Patricia Butterfield, PhD, RN, FAAN, Program Director; Michelle Kom Gochnour, MN, RN, COHN-S (resigned September, 2005); Anna Bruck, MN, RN, COHN-S (began her position December, 2006); Mary K. Salazar, EdD, RN, FAAN, former Program Director; Jenny Tsai, PhD, RN, Assistant Professor; and Randal Beaton, PhD, EMT, Research Professor. Other faculty that contribute to the OHN program through their mentorship of students and by teaching required courses include Bobbie Berkowitz, PhD, RN, Professor; Noel Chrisman, PhD, Professor; Rebecca Kang, PhD, RN, Associate Professor, Marjorie Muecke, PhD, RN, Professor; June Strickland, PhD, RN, Associate Professor, Phyllis Zimmer, MN, RN, Lecturer, and Mary Anne Draye, MN, RN, Assistant Professor.

Curriculum

There have been no changes to the program curriculum since the last application. [See Appendix A, pages 42-52 for complete MN and PhD curricula and sample plans of study.]

Responsible Conduct of Science

All trainees are required to complete the Biomedical Research Integrity lecture series sponsored by the University of Washington's School of Medicine, Department of Medical History & Ethics. The lecture series this year included four lectures and 53 discussion groups on three mandated PHS topics: conflict of interest, collaborative science, and research misconduct. Both master's and doctoral students are required to complete a scholarly project (includes thesis and dissertation) as a requirement for graduation. All research activities that include contact with human subjects must be approved by the University of Washington's human subjects' committee. All students are lectured on the ethical considerations of research and are mentored by their faculty advisors on this issue as they conduct their research.

Program Activities and Accomplishments

Discussion of Progress

There have been two major changes in occupational health nursing leadership this past year. Dr. Patricia Butterfield, Program Director, assumed her new position as Chair of the Department of Psychosocial and Community Health in the School of Nursing in September 2005. She continued to manage and direct the OHN program with Dr. Salazar's assistance this past year; however, a search for a new program director was conducted winter quarter, 2006. The search culminated with the hiring of Butch de Castro, PhD, MSN/MPH, RN. Dr. de Castro completed his master's and doctoral education in occupational health nursing at the Johns Hopkins University in 2002. His dissertation focused on impact of emotional labor on depression and job satisfaction of young adult workers. Upon completing his doctoral program, he accepted a position with the American Nurses Association (ANA) serving as the occupational health and safety specialist. He worked for the ANA for three years. He then accepted a post doctoral opportunity at the University of Illinois in Chicago where he pursued his interest in minority and immigrant workers. Dr. de Castro is scheduled to assume responsibility for the OHN program September 16, 2006.

The second change occurred September, 2005 with the resignation of Ms. Michelle Kom Gochmour, a Lecturer who served as assistant program director for eight years. Ms. Gochmour accepted an occupational health nursing management position at Children's Hospital in Seattle. In December, 2005, Ms. Anna Bruck, Lecturer in the School of Nursing, agreed to serve in this position. Ms. Bruck has extensive experience as an occupational health nurse. She graduated from our master's program in 1998 with a dual degree as an occupational health nurse and a psychiatric nurse practitioner. She worked at the Lighthouse for the Blind, a small manufacturing company that employs disabled workers, for six years. She also works part time as an employee health nurse for the University of Washington employee health services. She has been a Lecturer in the School of Nursing since 2003. Ms. Bruck's primary responsibilities include oversight of OHN student practica, advising students, assisting with the teaching of OHN and continuing education courses and helping with the day to day operation of the OHN program.

Dr. Jenny Tsai, Assistant Professor, has taken a more active role in the OHN program this past year. In addition to teaching the core occupational health nursing course (with input from Drs. Butterfield and Salazar), she is also actively involved in mentoring and advising the OHN students. Dr. Randal Beaton, who has become the regional expert in the area of bioterrorism and disaster planning, is also expanding his contributions to the occupational health nursing program through his integration of this content into required occupational health nursing courses. He works directly with students interested in disaster planning (as well as other psychosocial issues), serving as their committee Chair and meeting with students to discuss this aspect of program development in the occupational setting. This is consistent with our goal to assure that students are able to analyze trends and forces that affect current occupational health nursing practice.

Core OHN faculty have six research projects completed or in progress this past year. These include Dr. Butterfield's recently initiated study of environmental exposures among rural families, Dr. Salazar's recently completed study of orchard workers and Dr. Tsai's study of Chinese immigrant workers. At least twenty publications and more than 40 national and regional presentations have been generated by these faculty. Additionally, faculty provide frequent consultation on issues related to occupational safety and health, serve on occupational health and safety committees and advisory boards and are otherwise recognized for their contributions to occupational health nursing.

Trainee Recruitment

The School of Nursing makes an active effort to recruit trainees from underrepresented and minority groups. In fact, the school's strategic plan specifically states that our goal is to "recruit, support, and retain underrepresented students" and to have "a recruitment plan that aims to reduce barriers to underrepresented student success." Overall, we have high enrollment and retention of these students; and over the years, the OHN program has had some success in recruiting minority and underrepresented students to our program. While this past year, we only had one student from an underrepresented group (Eastern Europe), we continue to actively seek out potential students by providing recruiting material for outreach to minority group functions

(i.e., association meetings) and by identifying current minority nurse practitioner and community health nursing students who are eligible for our program.

Program Products

Publications

The occupational health nursing faculty strongly emphasizes the importance of dissemination of scholarly work through students' presentations and publications. The success of this message is reflected in the students' exceptional participation in national and regional conferences among both PhD and master's students this past year. For example, Luiza Marinescu presented a paper at the American Public Health Association annual meeting; Julie Postma has a total of six posters (3) and presentations (3) this past year describing her work focusing on agricultural workers; and Glenise McKenzie was an invited speaker at this year's Washington State Governor's conference. Trainee and core faculty publications from the current reporting period are listed in Appendix C, pages 96-97.

ERC master's trainee Luiza Marinescu also has the following publication currently in press:

Marinescu LG. Business Approach for Integrating Health Benefits in Manufacturing Worksites: The Role of Occupational Health Nursing. AAOHN Journal (In Press).

In addition to one publication in print during the reporting period (listed in Appendix C), ERC doctoral trainee Julie Postma has the following publications to her credit:

Postma JM. Farmworkers and Pesticides: An Enduring Legacy. IN: Oxford Encyclopedia of Latinos and Latinas in the United States: DJ González, S Oboler, eds. Oxford University Press, New York, 2005; (e-reference edition). <http://www.oxford-latinos.com.offcampus.lib.washington.edu/entry?entry=t199.e726>

Postma J. Environmental justice: Implications for occupational health nurses. AAOHN Journal (In Press).

Research involving students

Students are actively involved in faculty research. Two students are working with Dr. Butterfield on her study of environmental and occupational (take home) exposures among children in rural families; and two students have been working with Dr. Salazar and Dr. Keifer (occupational medicine) on their community-based participatory research (CBPR) project with agricultural workers. One PhD student's doctoral dissertation is focusing on CBPR study.

The following students in the OHN program produced theses or dissertations and graduated during the reporting period.

Student	Thesis or Dissertation Title
Michelle Filipo, MN	Parental Perceptions of Risk in Low Income Rural Populations: A Secondary Analysis of Data from the ERRNIE Project
Luiza Marinescu, MN	Business Approach for Integrating Health Benefits in Manufacturing Worksites: The Role of Occupational Health Nursing
Glenise McKenzie, PhD	Organization of Work in Assisted Living: Implications for the Occupational Health and Safety of Unlicensed Direct Care Workers

Future Plans: July 2006 – June 2007

Although Drs. Salazar and Butterfield will continue to be involved in the OHN program this year, Dr. de Castro will have the major responsibility for setting the future direction of the program. His orientation to the OHN program and to the WA ERC has already begun; he has met with students and faculty and attended an ERC meeting and part of a continuing education session. While the program and the curriculum will likely remain essentially the same, it is fully anticipated that Dr. de Castro will bring fresh ideas and new energy to the program. He is particularly interested in continuing our efforts to improve our minority recruitment; and secondarily to increase research among minorities and immigrant workers.

A major change in the School of Nursing this past year was the approval of a Doctor of Nursing Practice (DNP) program. The first students will be admitted to this program Winter Quarter, 2007. It is projected that all of the nurse practitioner students will be admitted to the DNP by the year 2010, and that the MN option for NPs will be phased out. The effect of this change on the community health (including occupational health nursing) students has not yet been determined, but the possibility of including them in the DNP option has been considered. A decision regarding this possibility will continue to be discussed in the coming year; however, for the present time, students who are admitted to the OHN program in the administrative pathway will pursue the existing curriculum. This is a transition year for the DNP program, so students admitted into the OHN/NP pathway may pursue either the MN or the DNP degree. OHN faculty will monitor these changes and will assure that the integrity and the excellence of the OHN curriculum is preserved, regardless of the decisions regarding the terminal degree.

OCCUPATIONAL AND ENVIRONMENTAL MEDICINE

Program Director: Dennis Shusterman

Program Highlights: July 1, 2005 to June 30, 2006

- Twelve students were enrolled in the OEM program and excellent candidates were recruited for academic year 2006-2007.
- An internal curriculum review resulted in strengthening of academic and clinical offerings.
- Dr. Keifer stepped down as program director and was replaced by Dr. Dennis Shusterman, who also serves as director of the Residency.
- Dr. Stephen Hunt of the Seattle Veterans Administration Hospital, and Dr. David Bonauto, from the Washington State Department of Labor and Industries, SHARP program, became part of our core faculty group. Dr. Catherine Karr, previously part of the supporting faculty was also added to the core faculty for the program.

Program Description

Goals and Objectives

The Occupational and Environmental Medicine program's goal is training of physicians specializing in the diagnosis, treatment, management and prevention of illness and injuries related to workplace and general environmental exposures. An emphasis is placed on training of physicians to serve in leadership roles in the specialty, and to prepare physicians to incorporate research activities into their career and practice.

The major emphasis over the above-captioned period was curriculum review. During this period, the faculty conducted a retreat and re-examined the academic elements of the curriculum in light of feedback from trainees, an evolving faculty complement, and a pending 2007 accreditation review by ACGME. Basic themes included diversification of training through expanded clinical faculty appointments, enhanced documentation of competencies, and restructuring of coursework and conference schedules.

Faculty Participation

A strong core faculty in occupational medicine continued to provide leadership to the program. Dr. Dennis Shusterman served as ERC program director as well as director of the Residency. Dr. Shusterman replaced Dr. Keifer, who continued to be actively involved in the program with research and teaching activities. The overall OEM program was lead by Dr. Joel Kaufman, and supported by core faculty Drs. Bill Daniell, Sverre Vedal, Michael Silverstein, Jordan Firestone, Gary Franklin, and non-medical core faculty members Harvey Checkoway (epidemiology), and Lianne Sheppard (biostatistics). Newly added core faculty includes Drs. Catherine Karr, David Bonauto and Steven Hunt. Dr. Tim Takaro left the UW for a professorship at Simon Fraser University, and Sharon Morris retired.

Curriculum

Through the curriculum review process, we identified several areas for improvement. Specific changes included the launching of a new (Clinical Preventive Medicine) course, modularization of the content for ENVH 596 (Current Issues in Occupational and Environmental Medicine), and incorporation of journal club and a supplemental speaker series into our regular Thursday afternoon Clinical Case Conference schedule. [See Appendix A, pages 53-55 for the MPH curriculum and sample plan of study.]

Responsible Conduct of Science

All trainees are required to complete the Biomedical Research Integrity lecture series sponsored by the University of Washington's School of Medicine, Department of Medical History & Ethics. In addition, as part of their thesis preparation, all residents are required to complete University of Washington-specific training in Human Subjects Protection. This includes basic principles of research ethics, elements of informed consent, record-keeping responsibilities, and reporting responsibilities.

Program Activities and Accomplishments

Discussion of Progress

Our Clinical Occupational Medicine course (Environmental Health 572) was restructured to include more hands-on, interactive content. The course was attended by a record number of enrollees this year, including UW Occupational Medicine residents, NIH/Fogarty-funded International Scholars in Occupational and Environmental Health (ISOEH), and Madigan Army Hospital Preventive Medicine Program (MPMP) trainees, as well as trainees from the Industrial Hygiene and Occupational Health Nursing MPH programs. The course was a forum for interdisciplinary interaction and received high ratings by students.

Our Thursday afternoon conference schedule has been increased from twice to four times per month, organized by the Occupational Medicine Chief Resident and attended by the clinical faculty from the OEM program. In addition to our traditional two Clinical Case Conferences per month, we are now scheduling a Journal Club and a resource speaker session.

Use of on-line rating systems for global performance evaluation of residents and faculty was instituted, facilitating the feedback process within the program. On-line portfolios were established, whereby residents can track their progress through the program's requirements, as well as spotlight their special projects and accomplishments.

Our six-quarter Current Issues in Occupational and Environmental Medicine course (Environmental Health 596) is in the process of being re-organized on a modular basis. The planned modules are: Respiratory Diseases, Physical and Biological Hazards, Musculoskeletal Medicine and Ergonomics, Case Management, Systems Management, and Surveillance and Cluster Investigation.

A new Clinical Preventive Medicine course was designed and inaugurated in the summer of 2006.

Former UW OEM residents Drs. Stephen Hunt and David Bonauto became part of our core faculty group. Dr. Hunt, who works at the Seattle Veterans Administration Medical Center, will evaluate psychosocial services for the Harborview Occupational and Environmental Medicine Clinic. Dr. Bonauto, who works at the SHARP program of the Washington State Department of Labor and Industries, forms a very important link to our partners in state government.

Valley Medical Center medical director Karen Nilson was appointed to our clinical faculty and our Residency Advisory Committee. Dr. Nilson, who is certified in Sports Medicine, will help develop enhanced curriculum experiences in musculoskeletal medicine for our trainees.

Drs. Keifer and Shusterman exchanged roles, Dr. Shusterman becoming Residency Director and Dr. Keifer Associate Residency Director.

Trainee Recruitment

During the above period, our program supported the maximum number of residents for which we are accredited by the ACGME (i.e., six). This included two incoming academic-year residents and four practicum-year residents. Our high program enrollment has produced a highly cohesive and energetic group of trainees with varied interests and backgrounds.

Drs. Ingeborg Cox and Victor Van Hee were admitted as academic-year residents at the beginning of the 2005-2006 academic year. Dr. Van Hee has since been awarded an Occupational Physicians Scholarship Fund award for academic year 2006-2007. Dr. Cox immigrated to this country from Bolivia.

Drs. Rachel Roisman and Enass A/Rahman were accepted as incoming academic-year residents for July, 2006. Dr. Roisman completed her training in Internal Medicine at the University of California, San Francisco, and Dr. A/Rahman completed her training in Family Medicine at St. Joseph's Hospital in New York. Dr. A/Rahman immigrated to this country from the Sudan.

Two residents receiving ERC support graduated from the program at the end of June, 2006: Chris Carlsten, MD, MPH and Satish Subramaniam, MD, MPH. Dr. Subramaniam immigrated to this country from India. An additional trainee (Spencer Olsen, MD, MPH) is slated for graduation in September 2006.

Outreach activities have been stepped up. Didactic sessions to promote awareness of occupational medicine practice issues and career opportunities have been provided to residents in several local internal medicine and family medicine training programs.

Program Products

Publications

Research contributions by current or former trainees appeared in one publication (two trainee authors) in the reporting period. Core OEM faculty produced a total of 39 peer-reviewed publications during the reporting period, reflecting the breadth and strength of the research experience offered to the trainees. [See Appendix C, pages 97-99.]

CE Courses

Dr. Jordan Firestone served as Course Director for the Grand Rounds series presented through the NWCOHS CE program. Other program faculty were involved in the planning and presentation of several CE courses, including the Grand Rounds series. In particular, the following classes involved OEM faculty:

- The Changing Nature of Musculoskeletal Disorder Risk: Obesity & Aging at Work, Sept. 7-8, 2005, Michael Silverstein, MD
- As Workers Grow Older: Achieving Safety & Productivity, Sept. 27, 2005, Michael Silverstein, MD
- Wood Smoke: Burning Health Issues, Oct. 26, 2005, Sverre Vedal, MD
- Pesticide Safety and the Organophosphate Monitoring Rule: Prevention through Risk Assessment and Communication, Grand Rounds, Feb. 9, 2006, Matthew Keifer, MD
- Preventing Injuries and Disability in an Aging Workforce, Grand Rounds, Grand Rounds, Mar. 9, 2006, Michael Silverstein, MD
- The Challenges of World Trade for Occupational and Environmental Health, Grand Rounds, May 25, 2006, Tim Takaro, MD

Trainee Research

Trainees were involved in several substantial research activities with the faculty, and produced the following theses as part of their training.

Student	Thesis Title
Chris Carlsten, MD, MPH	Cytokines and Cell Markers in Cement Mason Apprentices
Hieu Hoang, MD, MPH	Will Power: Is Personal Motivation Associated with Retention in the Army?
Gabrielle Morris, MD, MPH	Juvenile Decompression Illness -- a case series
Son Phan, MD, MPH	A Study of Silicosis Risk on Vietnamese Refractory Brick Workers
Dung Tri Phung, MPH	The Patterns of At Work Injuries in Community in Viet Nam
Troy Ross, MPH	Hazards to Hearing and Threshold Shifts: The Results of Deployment to a Combat Environment.
Satish Subramaniam, MPH	Baseline characteristics and Predictors of Mesothelioma in the CARET Asbestos cohort.

Future Plans: July 2006 – June 2007

The Occupational and Environmental Medicine program will continue to recruit and train two to three residents each year, with a combination of clinical and research skills. We plan to aggressively recruit from among the top applicants for the field. Trainees will be prepared to assume leadership roles in occupational medicine professional practice, and to advance the field through research and leadership.

HEALTH SERVICES RESEARCH TRAINING

Program Director: Thomas Wickizer

Program Highlights: July 1, 2005 to June 30, 2006

- Four trainees were enrolled in the program, one of whom completed her dissertation. One trainee has almost completed her dissertation work and is expected to finish in the fall of 2006.
- Jeanne Sears, a second-year Health Services Research Training (HSRT) student, attended an institute for disability prevention at Sherbrooke University in Quebec.
- No new trainees were accepted for the coming academic year (2006/2007), however, two trainees will continue to be supported by the ERC during the 2006/2007 academic year.

Program Description

Goals and Objectives

The goals of the HSRT program have remained essentially unchanged. The program is administratively located within the Department of Health Services and only supports the training of doctoral students. Trainees complete all of the requirements of the Health Services doctoral program, but specialize in the area of occupational health and safety. The HSRT program seeks to provide trainees with strong methodological training in health services research, coupled with an understanding of the special characteristics of the field of occupational health and safety. HSRT trainees are afforded the opportunity to actively participate in applied research activities.

Faculty Participation

Faculty involved in training or research associated with the HSRT program include the Program Director, Thomas Wickizer, and Drs. Gary Franklin and Diane Martin, respectively, Research Professor in the Department of Environmental and Occupational Health Sciences and Professor in the Department of Health Services. Drs. Kopjar, Zimmerman and Watts from the Department of Health Services and Dr. Kaufman from the Department of Environmental and Occupational Health Sciences also serve as core faculty members for this program.

Curriculum

No changes were made to the curriculum during the reporting period. HSRT trainees meet all of the academic requirements of Health Services PhD students, but take elective courses offered through the Department of Environmental and Occupational Health Sciences. [See Appendix A, pages 56-59 for the PhD curriculum and sample plan of study.]

Responsible Conduct of Science

HSRT trainees participate in university courses and training activities related to the ethical conduct of research. All trainees are required to complete the Biomedical Research Integrity lecture series sponsored by the University of Washington's School of Medicine, Department of Medical History & Ethics. In addition, the Health Services doctoral program has quarterly seminars that discuss ethics in research, and HSRT trainees attend this seminar for the first two years of their program.

Program Activities and Accomplishments

Discussion of Progress

During the report period, the HSRT program supported four trainees in different stages of their doctoral work. One student, Larkin Strong, completed her dissertation in June 2006 and accepted a fellowship at the University of Michigan School of Public Health. For her dissertation, Ms. Strong studied the effect of a community-based prevention program on pesticide exposure among migrant farm workers and their families. A second trainee, Colleen Daly, expects to complete her dissertation during the fall of 2006. The program will be supporting two trainees in 2006-2007, Jeanne Sears and Sarah Veele-Brice. Jeanne Sears expects to complete her dissertation in the spring of 2007. Thus, by the end of the 06-07 reporting period (June 2007), the HSRT program will have graduated four PhD students. Reflecting the breadth of the field of health

services, dissertation research conducted by these four trainees examines a diverse set of questions and target populations. Specific topics explored include the effect of community-based prevention programs to limit pesticide exposure among migrant farm workers, measurement of disability related to upper extremity musculoskeletal injuries, the effects of telecommuting on stress and health behaviors, and the effects of state legislation on access to occupational health care services in rural areas.

There were no new faculty appointments during the reporting period. Program faculty continued their teaching and research activities. Due to budget limitations, the HSRT program could not recruit any new students for the upcoming academic year. The program will support the two students discussed previously.

Trainee Recruitment

The HSRT program, like the larger Health Services PhD program, views as a high priority the recruitment of underrepresented students. We market the HSRT program at major conferences, e.g., annual public health and health services research meetings, and seek to attract underrepresented students. Students exploring advanced degrees in health services are given information about the availability of funding and research opportunities for those interested in occupational health related research careers.

Program Products

Program core faculty and trainees published 23 research articles (listed in Appendix C, page 99-101). Dr. Wickizer and Jeanne Sears, an HSRT trainee, gave presentations at the 2005 Annual Meeting of the American Public Health Association held in Philadelphia in December 2005. HSRT trainee Larkin Strong graduated in June of 2006 and is now a post-doc fellow in the University of Michigan's Department of Health Policy and Management in Ann Arbor, MI. Ms. Strong's dissertation title was Identifying Strategies to Promote Adoption of Pesticide Safety Practices in Farmworkers and Their Families.

Future Plans: July 2006 – June 2007

We anticipate continuing the training and research activities of the HSRT program as previously described. We plan to support two trainees, one of whom will graduate. We will be recruiting a replacement for that trainee to begin the program in the fall of 2007 and try to recruit an additional student using NORA program funds. No changes in program faculty composition are anticipated.

NORA PROGRAM

Program Director: Noah Seixas

Program Highlights: July 1, 2005 to June 30, 2006

- Three trainees received NORA traineeships: a doctoral student in Health Services Research Training, a doctoral student in Occupational Health Nursing, and an Occupational Medicine resident.
- A NORA Special Projects Research program was set up and funded six small projects, each of which provided support to graduate students while addressing a NORA research topic.
- A quarterly Interdisciplinary Research Seminar was continued, presenting current research of Center faculty and trainees.
- Center faculty and staff helped organize and present a successful NORA Town Hall meeting in conjunction with the Pacific Northwest Agricultural Safety and Health Center and NIOSH.

Program Description

Goals and Objectives

The NORA program of the Northwest Center for Occupational Health and Safety is designed to further the essential goals of the Center – providing advanced graduate education in disciplines dedicated to the prevention of occupational disease and injury, and to serving Region X professionals with continuing education and other services. The NORA program provides a further focus on the development of research proficiency in the OH&S disciplines, and concentrates on those areas of research identified in the National Occupational Research Agenda.

Faculty Participation

No change in faculty participation occurred during the reporting year. The NORA program continues to draw on the substantial support and involvement of each of the discipline-specific program directors, and their core faculties, as described in each program narrative.

Curriculum

The NORA program does not designate a particular curriculum – rather, the curriculum specified by each discipline's program is supported by the NORA program.

Responsible Conduct of Science

As described in each program's narrative, all trainees are required to complete the Biomedical Research Integrity lecture series sponsored by the University of Washington's School of Medicine, Department of Medical History & Ethics. The lecture series this year included four lectures and 53 discussion groups on three mandated PHS topics: conflict of interest, collaborative science, and research misconduct. The lecture series is offered in the summer quarter, although trainees are allowed to attend the lectures via videotape at the UW libraries throughout the year. Trainees can also attend lectures from prior years that are offered via videotape sessions. These lectures cover additional PHS topics relevant to scientific research ethics such as: data collection; data management and ownership; mentor-trainee responsibilities; human subjects' research and conflict of interest.

The NORA research projects that were supported by the program during the reporting year (see below) also required that each investigator obtain IRB approval for any project involving human subjects. In fact, all trainees involved in human subjects research have some training and involvement with the requirements of our IRB, including preparation of IRB applications, providing informed consent, and reporting of research results to participants or other affected groups. Additional training in the responsible conduct of science is contained in numerous courses in the individual programs.

Program Activities and Accomplishments

Needs Assessment

The formal needs assessment was completed in time for the site review in 2004. Identified needs included professional training, research and consulting services, especially in the area of ergonomics and safety. We continue to try to meet these needs through CE, outreach services and through the NORA Projects, discussed below. Other on-going needs assessment activities occur through our involvement with regional meetings and CE needs assessment surveys.

Interdisciplinary Research and Training

Several activities of note address our interdisciplinary research training. We have continued our quarterly interdisciplinary research seminar in which advanced graduate students present research methods and findings for an audience that includes trainees from all disciplines and the major faculty from each program. These seminars are also open to the broader university community. Our first seminar this year addressed health and safety issues in small businesses (OHN faculty presentation), cholinesterase depression among pesticide handlers (occupational epidemiology doctoral student methods presentation), and racial and ethnic disparities in occupational injuries (health services doctoral student research). Our winter seminar included presentations on biomarkers for diesel exposure, immunological effects of silica exposure and effect of telecommuting on worker health behaviors. The truly interdisciplinary nature of these topics demonstrates the breadth of subject matter encompassed by our center.

Several required and elective classes in the various curricula attract students from each of the programs, allowing for a rich interdisciplinary interaction. Trainees have also participated in a wide range of regional and national interdisciplinary research meetings – notably the Northwest Occupational Health Conference and the joint University of Washington-University of British Columbia (Canada) Semiahmoo research symposium, and professional meetings such as the American Industrial Hygiene Conference and Exposition and the American College of Occupational and Environmental Medicine Annual Meeting.

In addition to our focus on NORA topics in many of our courses and seminars, this year we hosted the NORA Town Hall Meeting on January 17, 2006 and encouraged our faculty, students and regional research partners to take part. The meeting was highly successful, with about 125 attendees, and about 42 presentations. Interesting regional issues were identified, including the need for research on training effectiveness, addressing the needs of immigrant laborers, and the need for continued emphasis on basic health and safety research, in addition to applied intervention-style research. Other issues included the changing nature of work and the workforce, high technology issues, and the importance of international occupational health and safety.

This was the first year for a new program of directly supporting small Special Research Projects with a NORA focus. The program was designed to support research projects with a NORA focus that included research training for a graduate student and furthered the overall goals of the Northwest Center. Through this mechanism, the Center was able to broaden our support of UW students to help attract students in closely allied fields (such as epidemiology and industrial engineering) into occupational health and safety research careers. A request for proposals was released, submitted proposals were peer reviewed by researchers outside the UW, and the Northwest Center Program Directors reviewed and rank ordered the submitted proposals. Six projects were eventually funded. The funded projects include:

- Identification of Risk Factors for Pesticide Over-Exposure Among Applicators in Washington State
- Evaluation of Vehicle Vacuuming Intervention for Cherry Pickers, Workplace Exposure Determinants of Take Home Exposure
- Computer Exposure Assessment and Intervention Project: UW Computer Odometer Program
- Organization of Work in Assisted Living: Occupational Health and Safety Implications for Direct Care
- Survey of Occupational Safety and Health Needs of Day Laborers
- Does Changing Work Organization through Telecommuting Affect Individual Health Behaviors?

These projects represent a wide range of NORA topics and allow us to broaden the support that we would be able to provide under individual student activities. The accomplishments of the NORA Special Projects will be reported by the participants in the Interdisciplinary Research Seminar in Autumn, 2006.

Future Plans: July 2006 – June 2007

We will continue to use NORA Training funds to support the overall mission of the Center, including coordination and administration of training programs, interdisciplinary research training, outreach to our regional partners, and needs assessment and planning. Some funds will continue to be used for support of trainee and faculty travel to NORA related research meetings, and to help support the regional research meeting at Semiahmoo. In particular, Glenise McKenzie, a past trainee who is now Assistant Professor at Oregon Health and Science University School of Nursing, will be supported with travel funds to participate in the interdisciplinary research seminar on NORA research.

NORA funds will be used to help support the incorporation of the new Directors of CE/Outreach and Occupational Health Nursing into the research activities of the Northwest Center.

NORA funds will be used to support graduate student traineeships, and NORA research projects. The NORA research projects have been awarded to five projects, one of which is from Oregon Health and Science University, a regional partner institution.

HAZARDOUS SUBSTANCE TRAINING

Program Director: Steven Hecker

Program Highlights: July 1, 2005 to June 30, 2006

- Twenty-seven Hazardous Substance Training (HST) classes have been provided, delivering training to 778 individuals. Online courses account for just under half of these courses and students.
- HST Training through well-established courses in *Hazardous Waste Refresher*, and *Hazardous Materials Incident Response* are well-attended and meet regional needs.
- A new course series was developed and delivered in February for “new generation” emergency response personnel (e.g., utility and non-police and fire public sector personnel), providing opportunities for a new and important group of frontline workers to gain experience with hazard awareness, instrumentation, and sampling in emergency situations.

Program Description

Goals and Objectives

The goal of the HST program is to provide high quality and innovative courses to satisfy environmental and workplace hazardous materials regulatory requirements, with a specific emphasis on assisting state and local health, environmental, and public safety agencies in meeting the needs of their personnel.

Faculty reputation and strength

Our Director, Scott MacKay, has left the program and been replaced by Steven Hecker, who will serve as both CE/Outreach and HST program director. Maribeth Moore led the program during the transition with oversight from the Center Director, Dr. Seixas.

The Northwest Center for Occupational Health and Safety (NWCOS) HST program continues to use a combination of Department of Environmental and Occupational Health Sciences (DEOHS) instructional staff and contract instructors. Chuck Mitchell worked during this grant period as Training Coordinator for the Hazardous Substance and Emergency Response courses as well as an instructor. John Malool, a lecturer affiliated with the NIOSH-funded New York/New Jersey Education and Research Center, continued his series of seven well-attended *8-Hour Hazardous Waste Refreshers*.

Program Activities and Accomplishments

Discussion of Progress

The HST program has added courses to appeal to a wider range of public sector employees with hazardous materials responsibilities, in particular front-line agency personnel not traditionally considered emergency responders. The initial offerings of these “new generation” courses this year were successful, but we have also learned of the need to differentiate courses to target the experience levels of participants. Future offerings will take this into account. The Northwest Center’s participation in the NIEHS-funded Western Regional University Consortium has provided excellent synergy with the HST program in terms of additional training experience with diverse audiences and important interaction with hazardous materials instructors throughout the region and nationally as well.

The Northwest Center’s *Hazardous Waste Refresher* courses continue to be extremely successful and well-attended. Numerous participants report that this 8-hour course in most venues is frequently dull and rarely offers new information for them to use, whereas our courses truly serve the purpose of refreshing knowledge and giving participants new perspectives and useable material for dealing with hazardous waste issues.

Needs Assessment

The NWCOS CE program develops its programs with the assistance of a well-established needs assessment process. The 2004-05 needs assessment compilation included information from 490 surveys. The three most popularly requested HST and Emergency Response training programs were *Homeland Defense & Bio*

terrorism (16%), *Safety and Health in Confined Spaces* (16%), and *Hazardous Waste Annual 8-hr Refresher* (12%).

In response to the 2004-05 needs assessment, a newly designed series of courses, *Hazards Awareness for the New Generation Responder*, *Basic Instruments for the New Generation Responder*, and *Safety and Sampling Awareness for the New Generation Responder*, was offered Feb. 14-16, 2006. Primarily targeting public utility workers, public health personnel, and local and county maintenance staff, the courses are available individually or as a three-day series. This development demonstrates the Northwest Center's efforts to expand beyond its reliance on one-day courses as recommended by NIOSH in its latest site visit.

The annual *Hazardous Materials Incidents: Improving Interagency Response* course was scheduled for April, 2006 in Richland, WA, but was postponed until October due to a conflict with a major Department of Homeland Security conference on an overlapping topic. This course utilizes a combination of classroom training and role-playing scenarios to train rural and under-served public sector emergency response personnel to work together as an effective interagency response team. Key personnel from area agencies have been involved in the detailed planning of the course.

Program Products

Courses Offered During the Reporting Period [See complete listing in Appendix B, pages 87-89.]

The NWCOHS CE program delivers HST training through a combination of open enrollment, online, and contract training. Student subsidy funds received from NIOSH are utilized to support eligible students in the following classes:

Open Enrollment:

- Seven *8-hour Hazardous Waste Refreshers* were offered in Olympia and Seattle in July 2005 and January 2006. One hundred eighty-two students participated.

Online

- The CE program continues to work with Bright Brains in the presentation of short topic online training. A total of 380 individuals have been trained in these courses to date. Per a request by NIOSH, improvements have been made in both determining and listing the occupation of online participants and their employer. Faculty member Rick Gleason monitors student progress, responds to email questions within 24 hours, and assures accuracy in curriculum content.
- Eight online HST courses are offered students annually, including the 8-hr refresher. The *8-hr Refresher* was the most popular of these courses, with 165 enrollees.

Contract Training

- In September 2005, Chuck Mitchell delivered two *2-Hr Emergency Responder HazMat Tech* courses to members and employees of the Southern Ute Tribes in Durango, CO.

Coordination with Agencies

Two courses have been developed and one delivered in close coordination with other public agencies. The new 3-day course, *New Generation Responder: Hazards Awareness, Basic Instruments, and Safety and Sampling Awareness*, was developed and presented in close coordination with the local Environmental Protection Agency (EPA) and a representative of the Federal Emergency Management Agency (FEMA). Enrollees came from the WA Dept. of Labor and Industries, National Oceanic and Atmospheric Administration (NOAA) Hazmat, WA Dept. of Health, King County Solid Waste, the Indian Health Service, and city governments.

The *Hazardous Materials Incidents: Improving Interagency Response* course has been planned with a committee including WISHA (Dept. of Labor and Industries), HSEES (Hazardous Substances Emergency Event Surveillance), WA Dept. of Health, WA Dept. of Transportation, WA Dept. of Public Works, Dept. of Ecology, US EPA, US Coast Guard, US Occupational Safety and Health Administration (OSHA), US Federal Bureau of Investigation (FBI), US FEMA, NOAA's Office of Response and Restoration, Hazardous Materials Response Division, LEPC (the Local Emergency Planning Committee), the local Red Cross, local hospitals and fire departments.

Future Plans: July 2006 – June 2007

The *Hazardous Materials Incident Response* course is being proposed by the Hazardous Waste Advisory Committee for presentation in the Vancouver area in southwest Washington. Based on the information in the needs assessment, the Hazardous Waste Advisory Committee has suggested that a course be developed and offered in *Confined Space Safety and Health*. Rick Gleason, DEOHS faculty, is reviewing how the existing OSHA *Confined Space* course can be adapted for this purpose. A Certified Hazardous Materials Managers review course is scheduled for November 2006, and we are offering the popular sequential “Small Dose of Toxicology” and “Larger Dose of Toxicology” in Portland in December 2006, directed by Steve Gilbert.

The DEOHS CE program is a participant in an NIEHS hazardous waste worker training program which includes other universities along the West Coast and in Arizona. Many of the courses offered under this grant to general workers can be expanded to include public sector employees traditionally reached by the HST program. The recruitment and training in this program will continue to be developed and implemented in 2006-07, providing leverage to the HST resources. Instructors will continue to gain valuable experience through the synergy of these programs and participation in NIEHS trainers’ exchanges.

HAZARDOUS SUBSTANCE ACADEMIC TRAINING

Program Director: John Kissel

Program Highlights: July 1, 2005 to June 30, 2006

- Three HSAT trainees were awarded MS degrees during the reporting period.
- Two papers by a 2004 MS graduate and former HSAT trainee were published during the reporting period.
- Four posters authored or co-authored by five current or former HSAT trainees were presented at the annual meeting of the International Society of Exposure Analysis in Tucson, AZ in late 2005.

Program Description

Goals and Objectives

In accordance with statutory mandate, HSAT training is intended to prepare professional personnel to properly supervise and/or participate in hazardous substance response and site remediation activities. The overall goal is protection of the workforce engaged in such tasks. That goal is accomplished through delivery of specialized academic training to safety and health professionals to prepare them for practice.

Faculty Participation

Core faculty, including John Kissel, Richard Fenske, David Kalman, Scott Meschke, Michael Morgan, Gwy-Am Shin, and Michael Yost, contributed to the program's success. Drs. Kissel, Meschke, and contributing faculty member Dr. Faustman, participated taught required courses and supervised HSAT MS candidates in the conduct of their Master's research project during the reporting period. Core faculty member, Sally Liu, was on leave during the 05-06 year, and has recently been given a revised appointment as a Research Associate Professor. Dr. Liu will continue to contribute to the program through mentorship of student research projects.

Curriculum

The HSAT curriculum did not change. One course, Pathogens in the Environment, was assigned a permanent course number and is now ENVH 541. It had been ENVH 497. [See Appendix A, pages 60-64 for the MS curriculum and sample plan of study.]

Responsible Conduct of Science

All trainees are required to complete the Biomedical Research Integrity lecture series sponsored by the University of Washington's School of Medicine, Department of Medical History & Ethics. The lecture series this year included four lectures and 53 discussion groups on three mandated PHS topics: conflict of interest, collaborative science, and research misconduct. Over 300 student trainees from across the UW campus participated in the series. The lecture series is offered in the summer quarter, although trainees are allowed to attend the lectures via videotape at UW-affiliated libraries throughout the year. These lectures cover additional PHS topics relevant to scientific research ethics such as: data collection; data management and ownership; mentor-trainee responsibilities; human subjects' research and conflict of interest.

Program Activities and Accomplishments

Discussion of Progress

In the reporting period, three students supported for a portion of their tenure under the HSAT program were awarded the MS degree. All three MS graduates also obtained HAZWOPER 40 hour certification before graduating and all three are currently employed. One has found employment with a consulting firm that does site assessment and remediation. A second is employed with a firm that provides environmental laboratory services. The third has taken a position with an aircraft manufacturer. A fourth HSAT student is expected to graduate in August 2006. Enrollment and graduation are both steady, averaging two ERC funded HSAT students per year.

A plan for delivery of HAZWOPER 40 hour training to more students (whether or not ERC funded) was initiated in the 2005-2006 academic year. Past trainees have obtained certification via outside commercial programs.

Because of the cost, training was limited to formally supported HSAT students. Under the new scheme, eight hours of supplemental training covering respirator fit testing and other hands-on activities were delivered by an experienced trainer in the context of EnvH 446 Hazardous Waste Management. Students satisfactorily completing that activity and receiving B or better grades in EnvH 446, EnvH 453 Industrial Hygiene, and EnvH 405 Toxic Chemicals and Human Health will be eligible for HAZWOPER certification. In the first year of this activity, 14 students completed the 8-hour short course. Of those, four, including one HSAT student, completed all other requirements in the reporting period and were awarded certification. Most of the remainder are continuing students who will complete requirements in the next year.

Trainee Recruitment

HSAT trainees are recruited from the larger pool of persons enrolled in eligible MS curricula based on orientation and likelihood of relevant subsequent employment. The eligible pool is always larger than the number of students for whom funds are available. At the UW, students receiving HSAT support typically receive support for three of seven quarters required to complete the MS. HSAT funds are leveraged by virtue of the fact that students are supported from other sources during the remaining four quarters.

Program Products

Publications

Two papers by former ERC-supported HSAT trainee and 2004 MS graduate Marley Shoaf were published within the reporting period and are listed in Appendix C, page 102. In addition, four posters authored or co-authored by four former or current ERC-supported HSAT trainees were presented at the annual meeting of the International Society of Exposure Analysis in Tucson in late 2005 (trainee names are underlined):

Kissel JC, Norman AM, Smith JA, Shirai JH, Bunge AL. Comparison of CSTR, Approximate membrane, and true membrane skin models in application to PBPK models of human dermal exposure to VOCs in water. Annual meeting of the ISEA, Tucson, AZ; October/November 2005.

Shirai JH, Shoaf MB, Kedan G, Kissel JC. Surface-area weighted dermal sediment loads following adult and child activities in tide flats. Annual meeting of the ISEA, Tucson, AZ; October/November 2005.

Smith JA, Kissel JC, Shirai JH, Morgan MK, Sheldon LS. Analysis of Concordance of Probabilistic Aggregate Exposure Predictions with Observed Biomonitoring Results: An Example Using CTEPP Data. Annual meeting of the ISEA, Tucson, AZ; October/November 2005.

Spalt EW, Kissel JC, Shirai JS. Comparing concentration normalized fluxes from soil to Potts-Guy permeability coefficients. Annual meeting of the ISEA, Tucson, AZ; October/November 2005.

Student Research

Students in the HSAT program and others in the Environmental Health program completed theses during the reporting period and graduated from the program. The thesis titles are listed below:

Student	Thesis Title
Laura McLaughlin, MS	Chlorine and UV-Disinfection as Drinking Water Treatment Options for Rural Areas of Less Developed Countries
John Shultz, MS	Baseline characteristics and Predictors of Mesothelioma in the CARET Asbestos cohort
Elizabeth Spalt, MS	Dermal Absorption of Contaminants from Soil: A Review of Current Literature and Investigations with DEET
Karen Takatani, MS	Persistence of E.coli O157:H7, S. typhimurium, and Coliphage MS2 in a Model Home Water System after Ultraviolet (UV) Disinfection Treatment
Whitney Webber, MS	Comparison of methods to estimate on-bus pollution from diesel school buses – a pilot study

Future Plans: July 2006 - June 2007

We have recruited a strong class of four new students entering Autumn, 2006 into the Environmental Health MS program. Two of these students will follow the HSAT curriculum and be supported by the HSAT program. No significant changes in curriculum are planned, and the 8-hour HAZWOPER add-on to ENVH 446 will be offered again Winter, 2007.

Research accomplishments of current and past students will continue to be presented. Three posters authored or co-authored by HSAT trainees will be presented at the annual meeting of ISEA and ISEE in Paris in September, 2006, and a platform presentation co-authored by an HSAT trainee will be presented at the annual meeting of the Society for Risk Analysis in Baltimore in December, 2006. Several manuscripts from past HSAT students are in preparation and should be submitted in the coming year.

CONTINUING EDUCATION AND OUTREACH

Program Director: Steven Hecker

Program Highlights: July 1, 2005 to June 30, 2006

- Sixty-two courses serving 2,607 trainees have been delivered (figures do not include HST courses). About 70% of the trainees have taken online training.
- Occupational Medicine Grand Rounds continue to be highly successful events and will be enhanced in the coming year by recruiting nationally recognized speakers and making digital recordings available on the Internet.
- Training delivered by contract to specific agencies and companies is an increasing focus of the program to complement open enrollment courses.
- Scott MacKay stepped down as Continuing Education and Outreach (CE/O) Director and has been replaced by Steven Hecker who will assume full-time duties in September, 2006. Sharon Morris has retired from the UW and Mr. Hecker will also assume her outreach responsibilities.

Program Description

Goals and Objectives

The overall mission of the CE/O program is to provide Region X with innovative, high quality continuing education and training for all disciplines of occupational health and safety practitioners, employers, and employees. Specific objectives of the CE/O program are to:

- Make topical training available in a variety of formats accessible to multiple audiences
- Translate current research into usable information for practitioners and workplaces
- Provide forums for exchange of experience and expertise among practitioners, workers, and employers
- Satisfy current needs of our constituents while introducing cutting edge issues and seeking to reach underserved populations
- Continuously improve pedagogy and curriculum of courses.

Faculty Reputation and Strength

The faculty who teach in the Northwest Center for Occupational Health and Safety (NWCOHS) CE program include leaders in the field of occupational safety and health within the Pacific Northwest, throughout the United States, and internationally. Joining NW Center faculty this year have been over thirty noteworthy presenters including: Lee S. Glass, MD, JD with the WA State Dept. of Labor and Industries (*OM Practice Guidelines*, 11/10), Michael Brauer, ScD, Professor and Director, School of Occupational and Environmental Hygiene, Univ. of British Columbia (*Wood Smoke: Burning Health Issues*, 10/26), and William E. Smith, MD, Regional Health Services Manager, The Boeing Company (*As Workers Grow Older: Achieving Safety & Productivity*, 9/27).

Program Activities and Accomplishments

Discussion of Progress

The CE program has made good progress in maintaining and expanding accessibility through a combination of classroom and online offerings. The program continues to innovate with new topics while satisfying ongoing needs on more traditional subjects. Personnel changes during the 2005-06 year delayed initiatives on pedagogy and evaluation, but with new staff in place, these issues will receive increasing focus in the coming year.

Steven Hecker assumed full-time directorship of CE in September 2006. Mr. Hecker has 25 years' experience in worker and professional training and education and has a special interest in worker-centered education and training evaluation.

Needs Assessment

The NWCOHS CE program develops its programs with the assistance of a well-established needs assessment process. Information is gathered through surveys filled out by students in existing classes, from hundreds of

surveys mailed to Region X Occupational Safety and Health professionals, from visitors to the website who can fill out and submit an electronic form and from surveys handed out to participants at the Pacific Northwest Occupational Health and Safety Conference. Results are tabulated and discussed with the Department's Outreach Committee and Program Directors in formulating training plans. The 2004-05 needs assessment compilation includes information from 490 surveys. The most popularly requested training programs were Homeland Defense & Bio-terrorism (16%), Comprehensive Review of Industrial Hygiene (13%), Risk Communication and Risk Assessment (12%), Legal Aspects of Safety and Health (12%), Leadership Skills in Occupational Health and Safety (12%), and Evaluating Health and Safety Programs (12%).

Program Products

Courses Offered by Specialty Area [See complete listing in Appendix B, pages 81-94.]

Occupational Health Nursing

The 12th Conference on Occupational Hazards to Health Care Workers scheduled for April 26-28, 2005 was postponed until the 2006-07 calendar year due to the resignation from the UW of course director, Michelle Kom Gochour. Michelle continues on the committee; however, course chair duties were assumed by Mary Salazar and to accommodate these changes the course dates were postponed until September 13-14, 2006.

Occupational Medicine

The Occupational Medicine program offered its fourth season of Grand Rounds including the following topics and presenters:

- 10/6, *Emergency Public Health: Lessons for OEM from the Indian Ocean Tsunami*, Mark Oberle, MD, MPH
- 11/10, *OM Practice Guidelines: No One's Going to Tell Me How to Practice*, Lee Glass, MD, JS
- 2/9, *Pesticide Safety and the Organophosphate Monitoring Rule: Prevention through Risk Assessment and Communication*, Matthew Keifer, MD, MPH
- 3/9, *Preventing Injuries and Disability in an Aging Workforce*, Michael Silverstein, MD, MPH
- 4/20, *Workers' Compensation Quality Improvement Intervention*, Thomas Wickizer, PhD, MPH
- 5/25, *Challenges of World Trade for Occupational and Environmental Health*, Tim Takaro, MD, MPH, MS

Industrial Hygiene

Risk Communication Unplugged, featuring presentations on both theoretical and practical aspects of risk communication, was presented as part of the NW Occupational Health Conference, October, 13-14, 2005.

Safety/Ergonomics

Subsidized by a NIOSH Training Grant and in partnership with the WA Dept. of Labor & Industries SHARP (Safety and Health Assessment and Research for Prevention) Program, CE administered *The Changing Nature of Musculoskeletal Disorder Risk: the Effects of Obesity and Aging in the American Workplace*, on September 7-8, 2005. This has led to continuing curriculum development in the area of safety and health of the aging workforce.

Accident and Incident Investigation was presented in Seattle on February 22, 2006.

Two scheduled *Applied Office Ergonomics* courses had to be cancelled due to low enrollments, one in Boise, Idaho, and another in Anchorage, Alaska. Anchorage has supported other courses well, so we consider this to have been an anomaly of topic, scheduling, and cost. Idaho has been consistently more difficult as a site, but we now have an active advisory committee member from Boise State University and we are looking for improvement.

Other Disciplines

Wood Smoke: Burning Health Issues, was presented on October 26, 2005 and *Zoonotic and Vector-Borne Disease: Current and Emerging Issues*, March 14, 2006. Both were well-attended and positively evaluated.

Courses Delivered Using Technology

In the past year, all six Grand Rounds were digitally recorded, edited and recently made available to the public for viewing via DVD technology. For those desiring it, CME Credit 1 can be awarded for a reasonable fee to those who view these presentations.

The CE program continues to work with Bright Brains in the presentation of short topic online training. Since July 1, 2005, 1,803 individuals have registered and completed an online course. Per requests by NIOSH,

improvements have been made in both determining and listing the occupation of online participants and their employer. Table 12b contains this information (see Appendix B, pages 93-94). In addition, faculty member Rick Gleason now monitors student progress, responds to email questions within 24 hours and assures accuracy in curriculum content.

Contract Training

Contract training continues to grow as a method of delivering Occupational Safety and Health Training in the Region. Of particular note was a course offered by Rick Gleason to nine Alaska-based instructors in the North Shore Training Cooperative in Anchorage, Alaska. In July of 2005, Mr. Gleason also presented a workshop to 22 high school industrial arts educators in rural Eastern Oregon entitled *Safety and Health for High School Shop Educators*.

Outreach Progress Report

Occupational Medicine Outreach:

Educational Development

Curriculum was developed for a summer program serving a largely Hispanic population of students, giving them opportunities to interact with practicing professionals, experiencing both research and practice aspects of occupational medicine and health.

Presentations/Lectures/Awareness Seminars

Occupational Medicine faculty made numerous presentations assisting other local agencies with their training, such as the Washington State Department of Health (*Pesticide Applicator Recertification*). Lectures have been given to Family Medicine Residents at three Seattle hospitals. Faculty participate in national and international conferences through giving presentations, e.g., a *Border Air Quality* seminar delivered to 50 Canadian researchers in Vancouver, B.C.

Consultations

Occupational Medicine faculty serve as consultants to government and private organizations, such as the Washington State Department of Labor and Industries Center for Occupational Health Excellence, the EPA-funded Migrant Clinicians Network Professional Trainings in Pesticide Diagnosis and Management, and the Washington State Building Trades Council.

Industrial Hygiene Outreach:

Educational Development

A hearing conservation training program curriculum was developed in conjunction with the Association of General Contractors of Washington and has been delivered to construction contractors and workers. The NW Center is cooperating with the Greater Portland Construction Partnership and the Oregon Construction Ergonomics Initiative in planning a November 2006 working conference on best practices in construction safety and ergonomics.

Presentations/Lectures/Awareness Seminars

Industrial Hygiene faculty have given presentations to local and state government bodies, including one on pesticide exposure given in Yakima to the House Commerce and Labor Committee (Washington State Legislature) as part of its *Work Session on Workplace Safety on Agricultural Operations*. Other venues and presentations have included Avista (electrical utility) in Spokane, *Motivating for Safety and Health in the Electrical Power Generation Facilities*; a keynote safety presentation to Tri State Construction, Bellevue, WA, entitled *Construction Safety Accidents in Washington, Lessons Learned*. Faculty were active in giving presentations at the Washington Governor's Safety Conference, including *Mold in Schools and Commercial Buildings*. A presentation on *Evaluating the Design of the next Generation Microsoft Mouse* was given at Microsoft and another one given on the *Use of Biomarkers in Forensic Science* at the Forensic Toxicology, American Academy of Forensic Science Annual Meeting. At the Pesticide Incident Reporting and Tracking Panel (PIRT Panel) meeting in Olympia, WA, a talk was given on *Occupational and Bystander Exposures to Pesticide Drift*. *Para-occupational Exposures of Children* was presented at the EPA Workshop in Research Triangle Park on the Analysis of Children's Measurement Data. The Field Research and Consultation Group

gave presentations to numerous companies and government organizations, including *Developing a Noise Control Strategy*, *Ergonomics for Teens*, and *Wood Floor Refinishing-Exposure and Controls*.

Consultations

Ergonomics faculty consulted on topics including Whole Body Vibration Exposures in King County Metro Bus Drivers and the evaluation of Vault Lid Removal Tools for the Seattle Public Utilities.

Nursing Outreach:

Educational Development

Faculty in the School of Nursing have been involved in the ongoing development of the UW School of Nursing's community health nursing curriculum, assuring the inclusion of content related to occupational health and safety. Other faculty have assisted with the development of web-based materials focusing on occupational and environmental health nursing.

Presentations/Lectures/Awareness Seminars

Lectures to local and regional conferences are often given on a variety of topics by faculty. Recent examples include *Occupational Hazards Among Orchard Workers* and *Occupational Health of Immigrant Workers*.

Consultations

Consultation occurs with a variety of educators, researchers and community workers regionally, nationally and internationally. International work is currently underway at the University of Baghdad and Burapha University in Thailand.

Hazardous Substance Academic Training Outreach:

Presentations/Lectures/Awareness Seminars

At the annual meeting of the International Society of Exposure Analysis in Tucson, AZ, faculty and students presented one paper and three posters, and co-chaired a symposium on *Assessment of Environmental Exposures to Microbiological Agents*.

Center Administration and NORA Research Training Outreach:

Presentations/Lectures/Awareness Seminars

The Center partnered with the Pacific Northwest Center for Agricultural Safety and Health (PNASH) to organize and host the NORA Town Hall Meeting on behalf of NIOSH on January 17, 2006. A presentation was given at the Northwest Occupational Health Conference in Bellingham, WA, addressing training challenges for Occupational Safety and Health and the response of the NWCOHS. The Center invited regional research institution partners to attend the annual UW-University of British Columbia Occupational health and safety conference held in Blaine, WA.

Consultations

Center management included several ERC trainees, students from both regional and national institutions, and community professionals in an organizational safety climate project conducted in relationship with Israeli Industrial Psychologist Dov Zohar and the Port of Seattle.

Future Plans: July 2006 – June 2007

For 2005-06 and 2006-07, the CE program has been awarded a grant from DEOHS to enhance the Grand Round series to include more national and internationally known speakers from outside Region X (travel and honorarium awards), and to transfer the Grand Rounds recordings for delivery via the web. Future plans also include expanding our contract training outreach opportunities within the region. Synergy with UW's OSHA Training Center and NIEHS (National Institute of Environmental Health Sciences) Worker Training and Education program has increased the Northwest Center's visibility and opened up new audiences. A new calendar of courses, including 15 traditional courses, has been planned for the 2006-07 year. The new Washington legislation on patient handling in hospitals will likely lead to strong demand for training on effective committee process and implementation of safe patient handling programs, and CE staff are in discussions with stakeholders as implementation of the law begins. Incoming CE/O Director Steve Hecker brings additional emphasis on pedagogy and evaluation to the CE program.

**NORTHWEST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY
IMPACT LIST: July 1, 2005 to June 30, 2006**

- 1) IH Master's student Maggie Trabeau conducted a model R2P investigation addressing the effectiveness of the train-the-trainer approach to worker training on hearing protection devices. The research linked a funded research project on HPD intervention to an on-going question from the Association of General Contractors of Washington: Is it effective to disseminate training through the train-the-trainer approach? The results of the study demonstrate no difference in effectiveness between expert-delivered and peer-trainer-delivered messages. Ms. Trabeau has submitted her findings for publication and has begun work as an Industrial Hygienist for the Boeing Company.
- 2) OHN Master's student Luiza Marinescu completed a project with Weyerhaeuser Company that focused on health and productivity. In particular, she developed a business approach for integrating health benefits into their organization. Her project was so impressive that she was invited by the corporate nurse manager, Denise Souza, to present her project to the entire health and safety team. Denise indicated that this information has assisted her in her conversations with management to begin to consider new ways of delivering services. Luiza and Denise will be presenting their work at the national occupational health nursing meeting this year.
- 3) Another OHN master's student, Suzy Bramwell, has developed innovative strategies to improve employee compliance with the flu vaccine at Children's Hospital. While the program has not yet been implemented, the occupational health nursing staff at Children's are very optimistic that this will have a positive effect on their program.
- 4) Annie Bruck, the OHN assistant program director, was one of a very few people selected to participate in the UW Diversity Climate Grant Series Workshops. The goal of this grant series is to provide faculty with knowledge and skills that enable them to promote a climate within their worksites that supports and encourages diversity. Annie is a champion for diversity, and it is manifested in her work and her teaching. As a result of her work, she was nominated for an "excellence in promoting diversity through teaching" award.
- 5) Annie Bruck and OHN core faculty member Randal Beaton are both very involved in improving emergency preparedness in work settings. Annie has provided direct services to UW employee health services by updating and modifying policies and procedures aimed at improving preparedness within the employee clinic. Dr. Beaton serves on the UW's emergency management planning committee and is principal investigator of a disaster behavioral health training program for Washington State. He has participated in several mock drills intended to evaluate and improve emergency preparedness in the state of Washington.
- 6) OHN Professor Mary Salazar completed the third edition of the Core Curriculum for Occupational and Environmental Health Nursing (2006). She has received feedback from nurses from across the country indicating that it has made a difference in their own practice by providing a practical and easy to use guide for various aspects of their practice.
- 7) David Schwartz, MD, MPH, former UW OM fellow and pulmonary fellow, assumed directorship of the National Institute of Environmental Health Sciences (NIEHS).
- 8) James E Blessman, MD, former UW OM fellow and Assistant Professor, Wayne State University, was appointed and serves on the National Advisory Committee on Occupational Safety & Health for the Occupational Safety and Health Administration (OSHA)

- 9) Michael R. Grey, MD, MPH, former UW OM fellow and Acting Division Chief, Occupational-Environmental Medicine at the University of Connecticut Medical Center, became Principal Investigator for the University's NIOSH-supported residency Training Grant Program.
- 10) Paul Darby, MD, MPH, former UW OM fellow, became medical director of the Tacoma Port Clinic and serves as a board member of the Northwest Association of Occupational and Environmental Medicine.
- 11) Victor Van Hee, MD, first year fellow, established a computerized tracking system for incoming calls on the occupational medicine call line. This system will help keep track of worker and physician inquiries regarding health safety issues and will assist with the clinic referral process when needed.
- 12) Brian Burke, MD, second year fellow, helped produce a report and worker advisory on heat stress with Dr. David Bonauto (a former UW OM fellow and now UW faculty member) at L&I /SHARP after assisting with an analysis of WA workers' compensation claims for heat-related illness.
- 13) David Bonauto, MD, MPH, former UW OM fellow and Associate Medical Director Washington State Department of Labor and Industries Safety and Health Assessment and Research for Prevention Program (SHARP), leads Washington State's occupational health and safety surveillance program. He is the Principal Investigator of the NIOSH-funded Washington Occupational Surveillance Program. He serves on the NORA-2 Trade and Service Sector Councils.
- 14) Dr. Chris Carlsten completed a fellowship in Occupational Medicine in June 2006 and will complete a fellowship in Pulmonary Medicine and Critical Care Medicine in June 2007. In addition to ERC support, Dr. Carlsten had been supported by a T32 training grant in Pulmonary/Critical Care Medicine. His MPH thesis addressed immunological effects of silica exposure among construction workers, and was supervised by Dr. Joel Kaufman (OM) and Dr. Noah Seixas (IH); this work is in press in Arthritis Care and Research. Dr. Carlsten is now working with Dr. Kaufman on research pertaining to effects of diesel exhaust on blood coagulation and inflammation. He has submitted both NRSA and K23 grants to NIH for continuing research at the UW. Dr. Carlsten was also a recipient of the UW School of Public Health and Community Medicine's Outstanding Student Awards for the 2005-2006 school year.
- 15) HSRT trainee Jeanne Sears completed a report to the WA State legislature presenting the results of an analysis she conducted to determine the impact of a state law regarding the delivery of occupational health care by physicians assistants (PAs) and Advanced Registered Nurse Practitioners (ARNPs). The law was intended to facilitate the delivery of occupational health care, especially in rural areas, by these two providers groups.
- 16) Tom Wickizer, HSRT Director, completed a report to the Department of Labor and Industries regarding the effects of a multi-year quality improvement pilot in Spokane, WA the department is funding. Based upon this report, and other reports written by Dr. Wickizer from the same pilot, the Department of Labor and Industries is considering expanding the intervention on a statewide basis. The specific aim of the intervention is to reduce disability among injured workers by promoting occupational health best practices within the workers' compensation delivery system.
- 17) HSAT Master's student Joseph Smith III made original contributions to three research projects: children's exposure to pesticides, dermal exposure to water contaminants, and biological hazards from discharges from cruise ships. His thesis project on exposure pathways may directly affect regulation of residential use of pesticides. In addition, he was appointed by the UW School of Public Health and Community Medicine as one of two recipients of the Gilbert S. Omenn Graduate Student Award for Academic Excellence for 2005-2006.

- 18) "As Workers Grow Older: Achieving Safety and Productivity," a CE course on health and safety implications of the aging workforce held in September, 2005, has led to the development of a curriculum to assist workplaces in establishing policies and programs to address aging workforce issues. The project is led by Michael Silverstein who directed the course and he is being assisted by other ERC faculty. The draft curriculum will be available for piloting in early 2007 and small, medium, and large private and public sector employers will be recruited to participate in pilot training sessions.
- 19) The NW Center co-sponsored the NIOSH working conference "The Changing Nature of Musculoskeletal Disorder Risk: The Effects of Obesity and Aging in the American Workplace" Sept. 7-8, 2005. The proceedings of this conference include specific research to practice recommendations that are being incorporated into the aging workforce curriculum. In terms of impact on practitioners, a 90-day follow-up evaluation elicited these comments from practitioners:
- " . . .the information on aging issues in particular has been applicable in my ergonomic consulting work."
"The work groups provided excellent points for consideration of managing injury risk on the job."
- 20) Occupational Medicine Grand Rounds provides a monthly forum for area physicians and other occupational health practitioners to interact around the specific topic of the session and general practice issues. In the past year participants were particularly enthusiastic about the sessions dealing with occupational medicine practice guidelines and aging issues for medicine practice.
- 21) The New Generation Responder series gave a number of enrollees their first opportunity to work with monitoring instruments. The course serves as a conduit for students into more in-depth training.
- 22) Numerous participants in Hazardous Waste Refreshers reported application of the course directly to their work:
- "Part of my responsibility is to provide practical consultations to institutions including hospitals and juvenile facilities and I found this course to be very valuable in performing my job."
"One specific example is the development on site-specific health and safety plans. We received regulatory issues, necessary components and a few examples. Very useful!"
"Fifteen years of refreshers became anything but refreshing until I heard about your class and Mr. Malool. Finally new information that is real and pertaining to reality! Thank you."

NORTHWEST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

TABLE OF CONTENTS – PROGRAM CURRICULA

	<i>Page</i>
V.A. Appendix A Program Curricula	
Industrial Hygiene	37
Occupational Health Nursing	42
Occupational and Environmental Medicine.....	53
Health Services Research Training.....	56
Hazardous Substance Academic Training	60

INDUSTRIAL HYGIENE

Master of Science, Industrial Hygiene Program Curriculum and Course Requirements

MS Industrial Hygiene students are required to complete the MS core courses, the Industrial Hygiene required courses, and 12 credits from the Industrial Hygiene representative electives.

Master of Science Core Courses

Course #	Credits	Quarter	Course Title
ENVH 580	1,1,1	A, W, Sp	Environmental Health Seminar
ENVH 581	1	A	Environmental Health Reading I
ENVH 583	1	Sp	Environmental Health Reading III
ENVH 700	9	A, W, Sp, S	Master's Thesis
BIOST 511 OR BIOST 517 or higher*	4 4	A, S A	Medical Biometry I Biostatistics I
EPI 511*	4	A	Introduction to Epidemiology

*Higher level Biostatistics and Epidemiology courses can be substituted for BIOST 511 or 517, and EPI 511.

Industrial Hygiene Required Courses

Course #	Credits	Quarter	Course Title
ENVH 405	3	Sp	Toxic Chemicals in the Environment
ENVH 553	3	W	Instrumental Methods for IH Measurement (Lecture)
ENVH 555	3	Sp	Instrumental Methods for IH Measurement (Lab)
ENVH 557	4	W	Workplace Exposure Controls
ENVH 560	4	A	Organizing and Administering Industrial Safety & Health Programs
ENVH 564	4	A	Recognition of Health and Safety Problems in Industry
BIOST 512 OR BIOST 518 or higher	4	W	Medical Biometry II Applied Biostatistics II
ENVH 552 OR ENVH 570	3 3	W Sp	Environmental Chemistry of Pollution Occupational and Environmental Epidemiology

Industrial Hygiene Electives

Course #	Credits	Quarter	Course Title
ENVH 417	2	W (odd yrs)	Nonionizing Radiation and Electrical Safety
ENVH 446	3	W	Hazardous Waste Management
ENVH 457	3	Sp	Industrial and Environmental Noise
ENVH 556	3	W	Quantitative Occupational Exposure Analysis
ENVH 559	3	Sp	Applied Industrial Hygiene
ENVH 562	3	W	Technical Aspects of Safety and Health
ENVH 566	3	W	Introduction to Ergonomics
ENVH 584	3	Sp	Occupational Health and Safety: Policy and Politics
ENVH 596	2	W*	Current Issues in Occupational Medicine

*Although ENVH 596 is also offered Autumn and Spring quarters, IH students are directed to take it during winter quarter when IH content is covered.

Doctor of Philosophy, Environmental and Occupational Hygiene

Learning objectives

Upon satisfactory completion of the Doctor of Philosophy program in Environmental and Occupational Hygiene, students should be able to:

- * Conceive, develop and conduct original research leading to significant advances in the knowledge of mechanisms of toxic action or in the assessment of risk deriving from exposure to toxicants
- * Apply advanced methodology to research projects in environmental health and develop new research methods to address environmental or occupational problems
- * Demonstrate written and oral skills by preparing papers and presentations for peer scientists and the community at large.

Program Curriculum and Course Requirements

PhD Environmental and Occupational Hygiene students are required to complete the PhD core courses, the Environmental and Occupational Hygiene Required courses, and twenty elective credits.

Doctor of Philosophy Core Courses

Requirement	Courses	Minimum Credits
Core Sciences ¹	Sequence of 3 in one area	11-12
Biostatistics	BIOST 512 or 518 or higher	3
Epidemiology	EPI 511 or higher	3
Env. Health Seminar	ENVH 580	6
Dissertation	ENVH 600/800	27
Lab Rotations ²	ENVH 595	6-9

¹ Selection must be approved by preceptor. Environmental and Occupational Hygiene allows selection from one of the following: Chemistry, Engineering, Applied Mathematics, Biostatistics, Physiology, Biochemistry, or Epidemiology.

² Two rotations required with previous relevant Masters Degree, three otherwise.

Environmental and Occupational Hygiene Required Courses

Requirement	Courses	Minimum Credits
Industrial Hygiene	ENVH 553 and 555	6
Toxicology	ENVH 405 or more advanced	3
Environmental Chemistry	ENVH 552	3
Occup. Env. Epidemiology	ENVH 570	3
Electives*	Variable	20

* Ten elective credits are unspecified and ten must be in courses taught by Industrial Hygiene or Environmental Health program faculty.

Sample Plan of Study for the Industrial Hygiene Program Industrial Hygiene Option

YEAR 1		Credits
<u>Fall Quarter</u>		
ENVH 564	Recognition of Health and Safety Problems in Industry	4
EPI 511	Intro to Epidemiology ¹	3-4
ENVH 581	Environmental Health Reading I	1
BIOST 517 or Electives	Biostatistics	4
<u>Winter Quarter</u>		
BIOST 518 or	Biostatistics II	4
ENVH 553	Instrumental Methods for IH Measurement (Lecture)	3
ENVH 557	Workplace Exposure Assessment	4
ENVH 596	Current Issues in Occupational Medicine	2
<u>Spring Quarter</u>		
ENVH 405	Toxic Chemicals in the Environment	3
ENV H 555	Instrumental Methods for IH Measurement (Lab)	3
ENVH 583	Environmental Health Reading III	1
Electives		
<u>Summer Quarter</u> ²	Internship with industry or a regulatory agency, or ENVH 700 Master's Thesis and Electives	

¹ Take BIOST 517 or 511 only if you are not qualified to take BIOST 518 or 512 (in the Winter). If taken, move EPI 511 to second year.

² Registration during the summer while serving as an intern is not required, and ordinarily academic credit is not awarded for the internship. In special cases, however, credit for the internship may be earned through ENVH 599A (Field Studies). Students supported by a research assistantship summer quarter must be registered for at least 2 credit hours. Students supported by stipends must be registered for at least 10 credit hours.

YEAR 2**Credits**Fall Quarter

ENVH 580	Environmental Health Seminar	1
ENVH 700	Master's Thesis	9
ENVH 560	Organizing and Administering Industrial Safety & Health Programs	4
EPI 511	Intro to Epidemiology ¹	3-4
Electives		

Winter Quarter

ENVH 580	Environmental Health Seminar	1
ENVH 700	Master's Thesis	9
ENVH 552	Environmental Chemistry of Pollution	3
Electives		

Spring Quarter

ENVH 580	Environmental Health Seminar	1
ENVH 700	Master's Thesis	9
ENVH 570	Occupational & Environmental Epidemiology	3
Electives		

¹ Take BIOST 517 or 511 only if you are not qualified to take BIOST 518 or 512 (in the Winter). If taken, move EPI 511 to second year.

OCCUPATIONAL HEALTH NURSING

Master of Nursing, Occupational Health Nursing - Administrator Option Program Curriculum and Course Requirements

The Master of Nursing program provides the opportunity for advanced study in selected areas of nursing science, professional foundations, related sciences, and modes of systematic inquiry related to advanced and specialized professional nursing practice. MN Occupational Health Nursing students are required to complete the MN core courses for Advanced Practice Community Health Systems Nursing (APCHSN), a minimum of the following: 15 credits of Nursing Science and Professional Foundations courses¹, 6 credits of Clinical Practice courses, 10-13 credits of Scholarly Inquiry courses, and 6 credits of Related Course Work. Additionally, the students take all of the required Occupational Health required courses, as well as 6 credits of cognate electives and 6 credits of electives focusing on business, management, leadership or policy.

Master of Nursing, APCHSN Core Courses

Scholarly Inquiry Course #	Credits	Quarter	Course Title
EPI 511	4	A	Introduction to Epidemiology
NMETH 700 or NMETH 598	9 or 6 total	W, Sp, S, A, W, Sp	Master's Thesis or Special Project
NMETH 520	4	S, W	Methods of Research in Nursing
Clinical Practice Course #			
NCLIN 599	2, 3, 3	A, W, Sp	Independent Study Clinical Practicum-APCHSN
Nursing Science & Professional Foundations Course #			
NURS 576	3	Sp	Assessment and Collaboration
NURS 578	3	A	Social Determinants of Health
NURS 523	3	Sp	Communities, Populations, & Systems

¹ Nursing Science and Professional Foundations courses: Some courses are listed in the Table above; some are listed in the Table of Occupational Health Required courses on the next page.

Occupational Health Required Courses

Course #	Credits	Quarter	Course Title
ENVH 405	3	Sp	Toxic Chemicals in the Environment
NCLIN 554	3	W	Occupational Health Nursing: Practice Issues
NCLIN 558	3	W	Occupational Health Nursing: Program Development
ENVH 596/ NURS 580*	2, 2	W*	Current Issues in Occupational and Environmental Medicine
NCLIN 599	7 total	S, A, W, Sp	Independent Study Clinical Practicum-OHN
ENVH 564	4	A	Recognition of Health and Safety Problems in Industry
ENVH 572	3	S	Occupational Medicine
or ENVH 570	3	Sp	Occupational and Environmental Epidemiology

*Although ENVH 596 is also offered autumn and spring quarters, OHN students are suggested to take it during winter quarter when interdisciplinary content is covered.

Occupational Health Electives

Cognate Course Example Options #	Credits	Quarter	Course Title
ENVH 559	3	Sp	Applied Industrial Hygiene
ENVH 562	3	W	Technical Aspects of Safety and Health
ENVH 566	3	W	Introduction to Ergonomics
UCONJ 446	2	Sp	Bioterrorism Preparedness
UCONJ 445	1	W	Bioterrorism Awareness
NURS 566	3	A	Occupational Stress
Business/Leadership/Management/Policy Course Example Options #			
ENVH 584	3	Sp	Occupational Health and Safety: Policy and Politics
ENVH 596/NURS 580*	2	A, W*, Sp*	Current Issues in Occupational Medicine
Business/Leadership/Management/Policy courses from any department on campus, 300 level or above	Varied	Varied	

Master of Nursing, Occupational Health Nursing - Nurse Practitioner Option Program Curriculum and Course Requirements

The Master of Nursing program provides the opportunity for advanced study in selected areas of nursing science, professional foundations, related sciences, and modes of systematic inquiry related to advanced and specialized professional nursing practice. OHN/NP students take all of the required NP courses for the MN, plus one elective course with a focus on family. Additionally, the students take a portion of the required Occupational Health.

Master of Nursing, FNP Core Courses

Scholarly Inquiry Course #	Credits	Quarter	Course Title
NMETH 700 or NMETH 598	9 or 6 total	W, Sp, S, A, W, Sp	Master's Thesis or Special Project
NMETH 520	4	W or S	Methods of Research in Nursing
Clinical Practice Course #			
NCLIN 500/501	6	A	Health Assessment for Advanced Practice
NCLIN 502	2	A	Pediatric Health Assessment and Promotion
NCLIN 553	2	A	Seminar in Primary Care I: Health Promotion
NCLIN 556	3	W	Seminar in Primary Care II: Management of Common Health Concerns
NCLIN 557	3	Sp	Seminar in Primary Care III: Management of Common Health Concerns
NCLIN 559	3 or 5	F	Seminar in Primary Care IV: Management of Common Health Concerns
NCLIN 560	1-11	W, Sp	Seminar in Primary Care V: Complex Clinical Decision Making
Nursing Science & Professional Foundations Course #			
NURS 551	2	A	Advanced Practice Role Development: Issues for Primary Care
NURS 552	3	A	Health Promotion
NURS 510	3, 3, 3	W, Sp, W	Primary Care Foundations: Diagnosis and Management of Common Health Concerns
NURS 518	3	W	Pediatric Primary Care Management
PHARM 514	3	Sp	Primary Care Pharmacotherapeutics
NURS 531 C	1	Sp	Special Topic: Pediatric Pharmacology
MEDEX 452	6	A	Basic Clinical Pathology for the MEDEX Practitioner
NURS 521 B	1	A	Special Topics: Pathophysiology
NURS 573	2	W	Professional Issues for Nurse Practitioners

Occupational Health Required Courses

Course #	Credits	Quarter	Course Title
ENVH 405	3	Sp	Toxic Chemicals in the Environment
NCLIN 554	3	W	Occupational Health Nursing: Practice Issues
NCLIN 558	3	W	Occupational Health Nursing: Program Development
ENVH 596/ NURS 580*	2, 2	W	Current Issues in Occupational and Environmental Medicine
NCLIN 599	3 total	S, A, W, Sp	Independent Study Clinical Practicum-OHN
ENVH 564	(4)	A	Recognition of Health and Safety Problems in Industry
ENVH 572	3	S	Occupational Medicine
or ENVH 570	(3)	Sp	Occupational and Environmental Epidemiology

*Although ENVH 596 is also offered autumn and spring quarters, OHN students are suggested to take it during winter quarter when interdisciplinary content is covered.

Doctor of Philosophy in Nursing, Occupational Health Nursing

The Doctor of Philosophy in Nursing Science program prepares scientists capable of advancing occupational health nursing practice and education through research and scholarly activity.

Learning objectives

- To prepare nursing scholars capable of generating knowledge that is inventive and rigorously tested within a selected area of nursing science;
- To prepare scholars with multiple perspectives of knowing who acknowledge multidisciplinary contributions to knowledge generation;
- To prepare individuals informed by social, cultural and political issues related to their area of scholarship;
- To prepare individuals who will provide leadership in nursing as well as various professional and public groups; and
- To prepare individuals who will test, generate, and extend knowledge relevant to nursing practice within a variety of clinical settings.

Program Curriculum and Course Requirements

The doctoral program is designed to provide an educational opportunity for individuals seeking to develop a research and/or academic career in occupational health nursing science. The program requires a minimum of 99 credits for completion. In addition to participation in selected courses related to occupational safety and health, students complete a dissertation in this field of study.

Doctor of Philosophy in Nursing Science Core Courses

Requirement	Courses	Minimum Credits
Theory and Domain of Knowledge	NURS 588 (3), NURS 589 (3), NURS 590 (5), NURS 592(4), NURS 593 or NURS 594 (3), NURS 595 (3), NURS 587 (4), Graduate Nursing Courses (6), Related fields (12).	Minimum 43 credits
Scholarly Inquiry		Minimum 56 credits
1. Methodological Perspectives in Nursing Science	NMETH 580 (5)	5
2. Design/Methods/ Analysis Sequence		
• Advanced Methods	NMETH 591 (4), NMETH 592 (2-4), NMETH 582 (4) NMETH 583 (4), NMETH 581 (2-6), NMETH 593 (4), NMETH 584 (4), NMETH 586 (4), NMETH 587 (4), NMETH 585 (4).	8
• Statistics (optional courses)	BIOST 511 (4), BIOST 512 (4), BIOST 513 (4), EDPSY 592 (3), EDPSY 593 (5), EDPSY 594 (5), PSYCH 513 (4), PSYCH 514 (4), PSYCH 515 (4), SOC 424 (3), SOC 425 (3).	10 total of Statistics
• Statistics (Optional Advanced Statistics)	BIOST 524 (3), BIOST 574 (3), SOC 526 (3), SOC 529 (3).	10 total of Statistics

3. Colloquium • Scientific Content and Dissertations	NURS 596	6
4. Dissertation	NMETH 800	27

Occupational Health Required Courses

Course #	Credits	Quarter	Course Title
ENVH 405	3	Sp	Toxic Chemicals in the Environment
NCLIN 554	3	W	Occupational Health Nursing: Practice Issues
NCLIN 558	3	W	Occupational Health Nursing: Program Development
ENVH 596/ NURS 580*	2, 2	W	Current Issues in Occupational and Environmental Medicine
ENVH 564	4	A	Recognition of Health and Safety Problems in Industry
ENVH 572	3	S	Occupational Medicine
or ENVH 570	3	Sp	Occupational and Environmental Epidemiology

*Although ENVH 596 is also offered autumn and spring quarters, OHN students are suggested to take it during winter quarter when interdisciplinary content is covered.

Sample Plan of Study for the Occupational Health Nursing Program Administrator Option

YEAR 1		Credits
<u>Fall Quarter</u>		
EPI 511	Introduction to Epidemiology	4
ENV H 564	Recognition of Health and Safety Problems in Industry	4
NURS 578	Social Determinants of Health	3
NCLIN 599	Independent Study Clinical Practicum	2
 <u>Winter Quarter</u>		
NMETH 520	Methods of Research in Nursing	4
NCLIN 554	Occupational Health Nursing: Practice Issues	3
ENVH 596/ NURS 580	Current Issues in Occupational and Environmental Medicine	2
NCLIN 599	Independent Study Clinical Practicum	3
 <u>Spring Quarter</u>		
ENVH 405	Toxic Chemicals in the Environment	3
NURS 576	Assessment and Collaboration	3
NCLIN 599	Independent Study Clinical Practicum	3
 YEAR 2		
<u>Fall Quarter</u>		
NCLIN 599	OHN Practicum	4
Elective	Business Management of Cognate	6
NMETH 598 or NMETH 700	Special Projects/Master's Thesis	2-3
 <u>Winter Quarter</u>		
NCLIN 558	Occupational Health Nursing: Program Development	3
ENVH 596/ NURS 580	Current Issues in Occupational and Environmental Medicine	2
Elective	Business Management or Cognate	3
NMETH 598 or NMETH 700	Special Projects/Master's Thesis	2-3
NCLIN 599	OHN Practicum	3
 <u>Spring Quarter</u>		
ENVH 570	Occupational and Environmental Epidemiology	3
NMETH 598 or NMETH 700	Special Projects/Master's Thesis	2-3
NURS 523	Communities, Populations, & Systems	3
Elective	Business Management or Cognate	3

**Sample Plan of Study for the Occupational Health Nursing Program
Nurse Practitioner Option**

YEAR 1		Credits
<u>Fall Quarter</u>		
NCLIN 500/501	Health Assessment for Advanced Practice	6
NCLIN502	Pediatric Health Assessment and Promotion	2
NURS 551	Advanced Practice Role Development: Issues for Primary Care	2
NURS 552	Health Promotion	3
NCLIN 553	Seminar in Primary Care I: Health Promotion	2
<u>Winter Quarter</u>		
NURS 510	Primary Care Foundations: Diagnosis and Management of Common Health Concerns	3
NURS 518	Pediatric Primary Care Management	3
NMETH 520	Methods of Research in Nursing	4
NCLIN 556	Seminar in Primary Care II: Management of Common Health Concerns	3
NCLIN 558	Occupational Health Nursing: Program Development	3
NURS580/ ENVH 596	Current Issues in Occupational Health and Environmental Medicine	2
<u>Spring Quarter</u>		
NURS 510	Primary Care Foundations: Diagnosis and Management of Common Health Concerns	3
PHARM 514	Primary Care Pharmacotherapeutics (includes Peds.)	3
NCLIN 557	Seminar in Primary Care III: Management of Common Health Concerns	3
NURS 531C	Special Topic: Pediatric Pharmacology	1
ENVH 405	Toxic Chemicals in the Environment	3
YEAR 2		Credits
<u>Fall Quarter</u>		
NURS 510	Primary Care Foundations: Diagnosis and Management of Common Health Concerns	3
NCLIN 559	Seminar in Primary Care IV: Management of Common Health Concerns	3 or 5
MEDEX 452	Basic Clinical Pathology for the MEDEX Practitioner	6
NURS 531 B	Special Topics: Pathophysiology	1
ENVH 564	Recognition of Health and Safety Problems in Industry	4
NMETH 598 or NMETH 700	Scholarly Project/Master's Thesis	2-3

		Credits
<u>Winter Quarter</u>		
NURS 573	Professional Issues for Nurse Practitioners	2
NCLIN 560	Seminar in Primary Care V: Complex Clinical Decision Making	1-11
UCONJ 505	Professional Interpersonal Styles of Communication with Families	3
NCLIN 554	Occupational Health Nursing: Practice Issues	3
NURS580/ ENVH 596	Current Issues in Occupational Health and Environmental Medicine	2
NMETH 598 or NMETH 700	Scholarly Project/Master's Thesis	2-3
<u>Spring Quarter</u>		
NCLIN 560	Seminar in Primary Care V: Complex Clinical Decision Making	1-11
ENVH 570	Occupational Epidemiology	3
NCLIN 599	OHN Practicum	3
NMETH 598 or NMETH 700	Scholarly Project/Master's Thesis	2-3
Elective	Family Course	3

**Doctor of Philosophy in Nursing Science, Occupational Health Nursing
Sample Doctoral Program of Study**

YEAR 1Autumn Quarter

		Credits
NURS 588	Philosophical Basis of Nursing Inquiry	3
NURS 587	Role Transition Seminar	2
ENVH 596	Current Issues in Occupational and Environmental Health	2
EPI 511	Introduction to Epidemiology	4

Winter Quarter

NURS 589	Theoretical Perspective in Nursing Science	3
NURS 590	Ecology of Human Health	3
ENVH 596	Current Issues in Occupational and Environmental Health	2
NURS 599	Selected Readings in Nursing Science	2

Spring Quarter

NURS 592	The Science of Nursing Therapeutics	4
NURS 587	Role Transition Seminar	2
ENVH 405	Toxic Chemicals	3
NMETH 580	Methodological Perspectives in Nursing Science	5

Summer Quarter

ENVH 572	Clinical Occupational Medicine	3
NURS 527	Managing Effective Access and Utilization Within Care Systems	3
NMETH 600	Independent Study	4
NURS 595	Synthesis of Nursing Science	3

YEAR 2Autumn Quarter

EDPSY 490	Basic Educational Statistics	3
ENVH 564	Health and Safety Problems in Industry	4
NMETH 591	Clinical Outcomes Research I	4

Winter Quarter

EDPSY 581	Seminar in Educational Psychology	1
EDPSY 593	Experimental Design and Analysis	5
NCLIN 558	Occupational Health Nursing Program Development	3
NURS 512	Critical and Interdisciplinary Approaches to Women's Health	3

Spring Quarter

HSERV 582	Health Behavior and Preventive Medicine: Theor. Prospec	3
ENVH 584	Occupational Safety and Health: Policy and Politics	3
EDPSY 594	Advanced Correlational Techniques	5
EDPSY 581	Seminar in Educational Statistics	1

YEARS 3 and 4

Dissertation - minimum 27 credits required

NMETH 800	Doctoral Dissertation	Credits
		27

Other courses to be taken

NCLIN 554	Occupational Health Nursing: Practice Issues	3
NURS 566	Occupational Stress and Stress Management	3
NMETH 582	Interpretative Methods in Nursing Research I	4
ENVH 566	Introduction to Ergonomics	3
NMETH 583	Interpretative Methods in Nursing Research II	4
NMETH 592	Clinical Outcome Research II	4
NMETH 586	Instrument Development and Testing	4
NMETH 587	Methods of Theory Testing: Causal Modeling	4
NURS 596	Colloquium (three quarters)	

OCCUPATIONAL & ENVIRONMENTAL MEDICINE RESIDENCY/FELLOWSHIP

Master of Public Health, Occupational and Environmental Medicine Program Curriculum and Course Requirements

The Occupational and Environmental Medicine curriculum leads to a MPH degree and serves as a core component of qualifications for Board-certification in Occupational and Environmental Medicine. Students enrolled in the Occupational and Environmental Medicine (OEM) Residency/ Fellowship have additional requirements including practica (consult program offices). An acceptable research thesis is required for completion of the MPH degree. The research topic is of the student's choice in conjunction with his/her thesis advisor. The MPH candidate must also complete a total of 63 credits.

Master of Public Health Required Courses

Course #	Credits	Quarter	Course Title
BIOST 511 OR BIOST 517	4 4	A,S A	Medical Biometry I Applied Biostatistics
EPI 511 OR EPI 512-513	4 4,4	A A,W	Introduction to Epidemiology Epidemiologic Methods I, II
HSERV 511	3	A,S	Intro to Health Care & Public Health Service
HSERV 510	3	W	Society & Health
ENVH 516	3	Sp	Env. & Occ. Toxicology III
ENVH 564 OR ENVH 453	4 3	A A	Recognition of Health & Sfty. Prob. In Industry Exposure Assessment for Occ. & Env. Health
ENVH 580	1,1,1	A, W, Sp	Env. Health Seminar; Must take 3 quarters
ENVH 572	2	S	Clinical Occupational Medicine
ENVH 583	1	Sp	Env. Health Readings
ENVH 590	2	S	Special Topics: Clinical Preventive Medicine
ENVH 596	2-6	A, W, Sp	Current Issues in Occup. & Env. Medicine
HSMGMT 560 OR HSMGMT512	3 3	Sp S	Mgmt. Prac. in Health Care & Public Hlth. Org. Introduction to Mgmt. in Health Services
ENVH 599B	2-6	A, W, Sp, S	Occup. & Environmental Medicine Practicum
ENVH 700	9	A, W, Sp, S	Masters Thesis

OEM Electives

Course #	Credits	Quarter	Course Title
ENVH 514	3	A	Environmental & Occupational Toxicology I
ENVH 515	3	W	Environmental & Occupational Toxicology II
ENVH 566	3	W	Introduction to Ergonomics
ENVH 567	3	A	Mechanisms of Carcinogenesis
ENVH/EPI 570	3	Sp	Occupational and Environmental Epidemiology
ENVH 577	3/4	A	Risk Assessment for Enviro. Hlth. Hazards
ENVH 584	3	Sp	Occupational Health & Safety: Policy & Politics
BIOST 512	4	W	Medical Biometry II
BIOST 513	4	Sp	Medical Biometry III
BIOST 518	4	W	Applied Biostatistics II
EPI 514	4	Sp	Application of Epidemiologic Methods

Occupational and Environmental Medicine Sample Plan of Study

YEAR 1

Summer Quarter
HSERV 511C Intro to Health Care & Public Health
HSERV 512C Intro to Mgt in Health Services
ENVH 572 Clinical Occup & Envir Medicine

Autumn Quarter	Winter Quarter	Spring Quarter
ENVH 564 Hlth/Sfty Prob Ind	ENVH 580 Seminar	ENVH 516 Env/Occ Tox III
ENVH 580 Seminar	EPI 513 Epi Methods II	ENVH 580 Seminar
EPI 512 Epid Methods	BIOST 518 Applied Biostat II	ENVH 596 Curr Iss OEM
BIOST 517 Applied Biostat I	ENVH 596 Curr Iss OEM	HSERV 581 Health Prom & Disease Prev
ENVH 596 Curr Iss OEM	ENVH 515 Env/Occ Tox II	HSMGMT 560 Mgt Pract
		ENVH 570 Occ/Env Epi
		ENVH 583 Env Hlth Reading III

YEAR 2

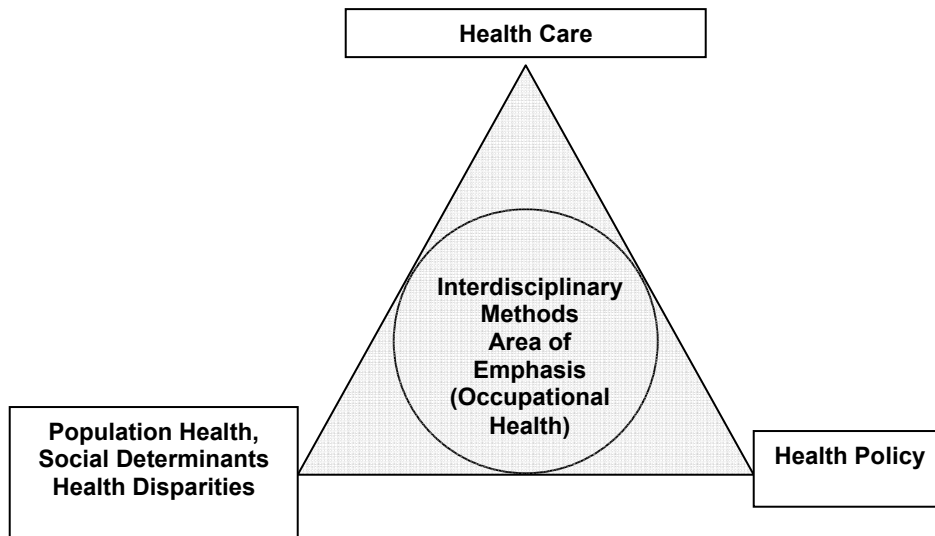
Summer Quarter
ENVH 599B Practicum
ENVH 700 Master's Thesis
HSERV 512C Intro Mgt in Health Services

Autumn Quarter	Winter Quarter	Spring Quarter
ENVH 700 Master's Thesis	ENVH 700 Thesis	ENVH 584 Policy and Politics
ENVH 577 Risk Assessment		EPI 514 Applic Epi methods
ENVH 567 Mech Carcinogenesis		ENVH 566 Intro to Ergonomics

HEALTH SERVICES RESEARCH TRAINING

**Doctor of Philosophy in Health Services – Health Services Research Training (HSRT)
Program Curriculum and Course Requirements**

HSRT students take a series of courses and seminars developed for the Health Services doctoral program. The Health Services doctoral program requires students to complete courses, seminars and dissertation research totaling 101 credits. The Health Services curriculum is based on the triangle shown below, and is anchored by two series of courses: one is content based (U.S. Health and Health Care), the other methods based (Advanced Health Services Research Methods and Analysis). Each Health Services Ph.D. student chooses an area of emphasis. For HSRT trainees, the area of emphasis is occupational health, which is shown in the circle within the triangle in the figure below. HSRT students take courses in three areas: (1) core Health Services courses (35 credits), advanced theory and methods and independent research (50 credits), and elective courses/seminars/research projects in Occupational Health (16 credits). The courses/seminars typically taken (some substitution is allowed depending upon the student’s background and prior training) are listed below:



Required Core Health Services Courses:**U.S. Health and Health Care Series**

Course #	Credits	Quarter	Course Title
HSERV 512	3	F	U.S. Health Care
HSERV 513	3	W	Population Health, Social Determinants and Health Disparities
HSERV 514	3	Sp	Health Policy
HSMGMT 514	3	W	Health Economics
HSERV 522	4	A	Health Program Evaluation
EPI 512	4	A	Epidemiologic Methods I
EPI 513	4	W	Epidemiologic Methods II
BIOST 517	4	A	Applied Biostatistics I
BIOST 518	4	W	Applied Biostatistics II
HSERV 592H	3	A, W, Sp	Health Services Research Seminar

Advanced Theory and Methods Required Courses

Course #	Credits	Quarter	Course Title
HSERV 523	4	A	Advanced Health Services Research Methods I
HSERV 524	4	W	Advanced Health Services Research Methods II
HSERV 525	4	Sp	Advanced Health Services Research Methods III

Advanced Theory and Methods Selected Electives

Course #	Credits	Quarter	Course Title
HSERV 590A	3	A	Preparing and Writing Research Proposals
HSERV 590H	3	Sp	Survey Research
HSERV 584	4	W	Assessing Outcomes in Health and Medicine
HSERV 583	4	A	Economic Evaluation in Health and Medicine
HSERV 552	3	A	Health Policy Development
HSERV 587	3	W	Health Policy Economics: The Integration of Values in Resource Allocation
BIOST 519	3	A	Topics in Epidemiologic Methods
BIOST 536	4	A	Categorical Data Analysis in Epidemiology
BIOST 537	4	W	Survival Data Analysis
BIOST 540	3	Sp	Correlated Data Regression
EPI 523	3	Sp	Injury Epidemiology
EPI 528	3	Sp	Exposure Measurement in Epidemiology

Occupational Health and Safety Selected Electives

Course #	Credits	Quarter	Course Title
ENVH 584	3	Sp	Occupational Health and Safety: Policy and Politics
ENVH 570	3	Sp	Occupational and Environmental Epidemiology
ENVH 577	3	A	Risk Assessment for Environmental Health Hazards
ENVH 596	2	A, W, Sp	Current Issues in Occupational and Environmental Medicine
ENVH 511	3	W	Environmental and Occupational Health
ENVH 556	3	W	Quantitative Occupational Exposure Analysis
ENVH 564	4	A	Recognition of Health and Safety Problems in Industry
ENVH 566	3	W	Introduction to Ergonomics

Sample Plan of Study for the Hazardous Substances Research Training Program

YEAR 1

Autumn Quarter	Winter Quarter	Spring Quarter
BIOST 511 (or BIOST 517) Medical Biometry I	BIOST 512 (or BIOST 518) Medical Biometry II	BIOST 513 Medical Biometry III
EPI 512 Epidemiology Methods I	EPI 513 Epidemiology Methods II	HSERV 514 Health Policy
HSERV 512 Health Care Seminar	HSERV 513 Population Health	ENVH 584 (Occupational H&S, Regulation & Politics)
HSERV 592 H PhD Seminar	MSM HSERV 592 H PhD Seminar	HSERV 592 H PhD Seminar
HSERV 522 Program Evaluation	HSMGMT 514 Health Economics	ENVH 583 EH Reading

Summer Quarter

Elective courses or independent research project.

YEAR 2

Autumn Quarter	Winter Quarter	Spring Quarter
HSERV 583 Economic Evaluation in Health and Medicine	HSERV 584 Assessing Health Outcomes	HSERV 590H Survey Methods
HSERV 523 Advanced Research Methods I	HSERV 523 Advanced Research Methods II	HSERV 523 Advanced Research Methods II
BIOST 536 Categorical Data	BIOST 537 Survival Analysis	BIOST 540 Correlated Data
ENVH 596 Current Issues in Occupational Health	ENVH 596 Current Issues in Occupational Health	ENVH 596 Current Issues in Occupational Health
ENVH 564 Recognition of Health and Safety Problems	ENVH 566 Introduction to Ergonomics	Elective

Summer Quarter

Elective courses or independent research project.

HAZARDOUS SUBSTANCE ACADEMIC TRAINING

**Option in MS Industrial Hygiene & MS Environmental Health
Program Curriculum and Course Requirements**

Students choosing the HSAT concentration may follow either of two MS curricula offered through the Department of Environmental and Occupational Health Sciences, Industrial Hygiene (IH) or Environmental Health (EH). (The programs are effectively merged at the PhD level and jointly manage the PhD in Environmental and Occupational Hygiene.) There are four categories of MS course requirements for HSAT students: 1) departmental core course and thesis requirements applicable to all DEOHS students; 2) IH or EH program required courses; 3) program specific approved electives; and 4) the HSAT core courses. Because IH and EH program core and elective requirements are different, credit hour totals and distributions are typically different for graduates of the respective programs. HSAT core requirements also overlap to different extents with the curricula otherwise normally required for the IH and EH MS degrees. This may contribute to further disparities in credit hour totals, (however, students typically accumulate more than the minimum credit hours required in any case). Completion of the 40 hour HAZWOPER course occurs outside the University system and also represents an additional effort for HSAT students. HSAT option requirements under either program are tabulated comparatively below. Sample plans of study are presented beginning on page 63.

HSAT Option Curricula

Master of Science Core Course Requirements – common to all DEOHS students

Course #	Credits	Quarter	Course Title
ENVH 580	1,1,1	A, W, Sp	Environmental Health Seminar
ENVH 581	1	A	Environmental Health Reading I
ENVH 583	1	Sp	Environmental Health Reading III
ENVH 700	9	A, W, Sp, S	Master's Thesis
BIOST 511 OR BIOST 517*	4 4	A, S A	Medical Biometry I OR Applied Biostatistics I
EPI 511*	4	A	Introduction to Epidemiology
Total	22		

*Higher level Biostatistics and Epidemiology courses can be substituted for BIOST 511 or 517, and EPI 511.

Required Program Courses - common to both MS IH and MS EH

Course #	Credits	Quarter	Course Title
ENV H 405	3	Sp	Toxic Chemicals in the Environment
ENV H 552**	3	W	Environmental Chemistry of Pollution
Total	6		

**General IH students can choose either ENVH 552 or ENVH 570, but an HSAT student would be advised to choose 552.

Remaining Required Program Courses – MS IH

Course #	Credits	Quarter	Course Title
BIOST 512 OR BIOST 518 ¹	4	W	Med. Biometry II OR Applied Biostatistics II
ENVH 553	3	W	Instrumental Methods for IH Measurement
ENVH 555	3	Sp	Instrumental Methods for IH Measurement Laboratory
ENVH 557	4	W	Workplace Exposure Controls
ENVH 560	4	A	Organizing and Administering Industrial Safety and Health Programs
ENVH 564	4	A	Recognition of Health & Safety Hazards in Industry
Total	22		

¹Higher level Biostatistics courses can be substituted for BIOST 512 or 518.

Remaining Required Program Courses – MS EH

Course #	Credits	Quarter	Course Title
ENVH 453	3	A	Industrial Hygiene
ENVH 541	3	A	Ecology of Environmentally Transmitted Microbial Agents
ENVH 577 OR ENVH 543	3	A Sp	Risk Assessment for Environmental Health Hazards OR Microbial Risk Assessment
ENVH 594	1	W	Current Topics in Environmental Health
<i>2 of the following 3 options:</i>			
ENVH 445 OR ENVH 446	3	Sp W	Solid Waste Management OR Hazardous Waste Management
ENVH 490	3	Sp	Community Air Pollution
ENVH 545	3	A	Water, Wastewater, and Health
Total	16		

Required HSAT Courses - common to both MS IH and MS EH HSAT

Course #	Credits	Quarter	Course Title
ENVH 446*	3	W	Hazardous Waste Management
ENVH 541	3	A	Ecology of Environmentally Transmitted Microbial Hazards
ENVH 574	3	Sp	Probabilistic Exposure Analysis
ENVH 577	3	A	Risk Assessment of Environmental Health Hazards
ENVH 584	3	Sp	Occupational Health Policy
Total	15		

*Includes 8 hr hands-on HAZWOPER training (optional for non HSAT students)

In addition to the 22 departmental core credits, and 28 or 22 program course requirements, the IH and EH programs require 12 and 9 hours of graded electives, respectively. Electives pre-approved by each program are presented in the table below.

Selected Electives Accepted by both MS IH and MS EH

Course #	Credits	Quarter	Course Title
ENVH 457	3	Sp	Industrial and Environmental Noise
ENVH 556	4	W	Occupational Exposure Analysis
ENVH 570	3	Sp	Occupational & Environmental Epidemiology

EH students may also take as electives courses that are required by the IH program. Examples are shown in the following table.

Examples of IH Program Requirements Accepted as Electives by EH

Course #	Credits	Quarter	Course Title
BIOST 512 OR BIOST 518	4 4	W W	Med Biometry II OR Applied Biostatistics II
ENVH 553	3	W	Instrumental Methods for IH Measurement
ENVH 555	3	Sp	Instrumental Methods for IH Measurement Laboratory

Sample Plans of Study for IH and EH HSAT students

YEAR 1*

IH HSAT Students			EH HSAT Students		
Autumn	Winter	Spring	Autumn	Winter	Spring
ENVH 564 Health/Safety Hazards in Industry	ENVH 553 IH Methods	ENVH 555 IH Methods Lab	ENVH 453 Industrial Hygiene	ENVH 446 Hazardous Waste Management	ENVH 490 Community Air Pollution
ENVH 580 EH Seminar	ENVH 580 EH Seminar	ENVH 580 EH Seminar	ENVH 580 EH Seminar	ENVH 580 EH Seminar	ENVH 580 EH Seminar
ENVH 581 EH Reading I	ENVH 596 Current Issues in OccMed	ENVH 583 EH Reading III	ENVH 581 EH Reading I	ENVH 594 Current Topics in EH	ENVH 583 EH Reading III
ENVH 577 Risk Assessment for EH Hazards	ENVH 552 Environmental Chemistry	ENVH 405 Toxic Chemicals	ENVH 577 Risk Assessment for EH Hazards	ENVH 552 Environmental Chemistry	ENVH 405 Toxic Chemicals
BIOST 511 OR 517	BIOST 512 OR 518	ENVH 574 Probabilistic Expo Analysis	BIOST 511 OR 517	BIOST 512 OR 518	ENVH 574 Probabilistic Expo Analysis

Summer Quarter*
Both IH and EH HSAT Students
ENV H 700 Master's Thesis and Electives or Internship with industry or a regulatory agency**

*Shaded courses are HSAT core courses.

** Students supported by a Research Assistantship during the summer quarter must be registered for at least 2 credit hours. Students supported by stipends must be registered for at least 10 credit hours. Registration during the summer while serving as an intern is not required, and ordinarily academic credit is not awarded for the internship. In special cases, however, credit for the internship may be earned through ENVH 599, Field Studies.

YEAR 2*

IH HSAT Students		
Autumn	Winter	Spring
ENVH 700 Thesis	ENVH 700 Thesis	ENVH 700 Thesis
ENVH 560 Org/Admin Indus Safety	ENVH 557 Workplace Expo Controls	<i>ENVH 584</i> Occ Health Policy
<i>EPI 511</i> Intro to Epidemiology	ENVH 446 Hazardous Waste Management	
<i>ENVH 541</i> Ecol Environ Trans Micro Hazards	Electives	Electives

EH HSAT Students		
Autumn	Winter	Spring
ENVH 700 Thesis	ENVH 700 Thesis	ENVH 700 Thesis
<i>ENVH 545</i> Water, Wastewater and Health		<i>ENVH 584</i> Occ Health Policy
<i>EPI 511</i> Intro to Epidemiology		
<i>ENVH 541</i> Ecol Environ Trans Micro Hazards	Electives	Electives

*Shaded courses are HSAT core courses.

FACULTY AND TRAINEE PUBLICATIONS July 1, 2005 to June 30, 2006

[Trainee names are underlined. Core faculty names are in **boldface**.]

[This list does not include: reports, chapters, or lay publications; articles submitted, in review, accepted, or in press. Only publications available online or in print are included.]

INDUSTRIAL HYGIENE

Weppner S, Elgethun K, Lu C, Hebert V, **Yost MG, Fenske RA**. The Washington aerial spray drift study: children's exposure to methamidophos in an agricultural community following fixed-wing aircraft applications. *J Expo Anal Environ Epidemiol* 2006;16:387-396.

Fenske RA. State of the art measurement of agricultural pesticide exposures. *Scand J Work Environ Health* 2005; 31 suppl 1:67-73.

Fenske RA, Lu C, Curl CL, Shirai JH, Kissel JC. Biological monitoring to characterize organophosphorus pesticide exposure among children and workers: an analysis of recent studies in Washington State. *Environ Health Perspect* 2005; 113:1651-1657.

Fenske RA, Bradman A, Whyatt RM, Wolff MS, Barr DB. Lessons learned for the assessment of children's pesticide exposure: critical sampling and analytical issues for future studies. *Environ Health Perspect* 2005; 113:1455-1462.

Lu C, Toepel K, Irish R, **Fenske RA**, Barr DB, Bravo R. Organic Diets Significantly Lower Children's Dietary Exposure to Organophosphorus Pesticides. *Environ Health Perspect* 2006; 114(2):260-3.

Johns DO, Dills RL, **Morgan MS**. Evaluation of dynamic headspace with GC/MS for the analysis of 1,1,1-trichloroethane, trichloroethanol, and trichloroacetic acid in biological samples. *J Chromatog* 2005; B. 817(2):255-261.

Dennerlein J, **Johnson P**. Different computer tasks affect the exposure of the upper extremity to biomechanical risk factors. *Ergonomics* 2006; 49(1): 45-61.

Johns DO, Daniell WE, Shen DD, **Kalman DA**, Dills RL, **Morgan MS**. Ethanol-induced increase in the metabolic clearance of 1,1,1-trichloroethane in human volunteers. *Toxicological Sciences* 2006; 92(1): 61-70.

Georgoulis LB, **Morgan MS**, Andrianopoulos N, Seferis JC. Swelling of polymeric glove materials during permeation by solvent mixtures. *J Appl Polym Sci* 2005; 97(3): 775-783.

Adams JC, Dills RL, **Morgan MS, Kalman DA**, Pierce CH. A physiologically-based toxicokinetic model of inhalation exposure to xylenes in Caucasian men. *Reg Toxicol Pharmacol* 2005; 43(2):203-14.

Neitzel R, **Seixas NS**. Effectiveness of hearing protection among construction workers. *J Occup Environ Hyg* 2005; 2:227-238.

Jeebay M, Robins T, **Seixas N**, Baatjies R, George DA, Rusford E, Lehrer SB, Lopata AL. Environmental exposure characterization of fish processing workers. *Ann Occup Hyg* 2005; 49:423-437.

Seixas NS, Neitzel R, Sheppard L, Goldman, B. Alternative metrics for noise exposure among construction workers. *Ann Occup Hyg* 2005; 49:493-502.

Seixas NS, Goldman B, Sheppard L, Neitzel R, Norton S, Kujawa SG. Prospective noise induced changes to hearing among construction industry apprentices. *Occup Environ Med* 2005; 62:309-317.

Naidoo RN, Robins TG, **Seixas NS**, Lalloo UG, Becklake M. Differential respirable dust related lung function effects between current and former South African coal miners. *Int Arch Occup Environ Health* 2005; 78:293-302.

Wu CF, Jimenez J, Claiborn C, Gould T, **Simpson C**, Larson T, Liu LJS. Agricultural Burning Smoke in Eastern Washington: Part II. Exposure Assessment. *Atmospheric Environment* 2006; 40:5379-5392.

Jimenez J, Wu CF, Claiborn C, Gould T, **Simpson C**, Larson T, Liu, LJS. Agricultural Burning Smoke in Eastern Washington: Part I. Atmospheric Characterization. *Atmos Environ* 2006; 40(4):639-650.

Dills RL, Paulsen M, Ahmad J, Kalman DA, **Simpson CD**. Evaluation of urinary methoxyphenols as biomarkers of woodsmoke exposure, *Environmental Science and Technology* 2006; 40(7):2163-2170.

Tsai MY, Elgethun K, Ramaprasad J, **Yost MG**, Felsot AS, Hebert VR, **Fenske RA**. The Washington aerial spray drift study: modeling pesticide spray drift deposition from an aerial application. *Atmos Environ* 2005; 39:6194-6203.

Park RM, Schulte PA, Bowman JD, Walker JT, Bondy SC, **Yost MG**, Touchstone JA, Dosemeci M. Potential Occupational Risks for Neurodegenerative Diseases. *Am J Ind Med* 2005; 48(1):63-77.

Mwaiselage J, Braveit M, Moen B, **Yost MG**. Variability in Dust Exposure in a Cement Factory in Tanzania. *Ann Hyg* 2005; 49: 511-519.

Burch JB, **Yost MG**, Johnson W, Allen E. Melatonin, Sleep, and Shift Work Adaptation. *J Occup and Environ Med* 2005; 47(9):893-901.

Burch JB, Clark M, **Yost MG**, Fitzpatrick CTE, Bachand AM, Ramaprasad J, Reif JS. Radio Frequency Non-ionizing Radiation in a Community Exposed to Radio and Television Broadcasting. *Environ Health Perspectives* 2006; 114(2):248-53.

OCCUPATIONAL HEALTH NURSING

Beaton R, Stergachis A, Oberle M, Bridges L, Nemuth M, Thomas T. The sarin gas attacks on the Tokyo subway – 10 years later. Lessons learned. *Traumatology* 2005; 11:75-85.

Beaton R. The sarin gas attacks – lessons learned. Guest editor. *Traumatology* 2005; 11:72-74.

Bond E. **Beaton R**. Disaster nursing competency & curriculum development. *Nursing Clinics of North America* 2005; 40:441-451.

Bowman K, **Salazar MK**. Racial and ethnic disparities in the workplace – Effects on health and safety. *AAOHN Journal* 2005; 53(5):198-201.

Hill WG, **Butterfield P**, & Larsson LS. Rural parents' perceptions of risks associated with their children's exposure to radon. *Public Health Nursing* 2006; 23(5):392-9.

Harnish KE, **Butterfield P**, Hill WG. Does Dixon's integrative environmental health model inform an understanding of rural parents' perceptions of local environmental health risks? *Public Health Nursing* 2006; 23(5):465-71.

Larsson LS, **Butterfield P**, Christopher S, Hill WG. Rural community leaders' perceptions of environmental health risks: Improving community health. *AAOHN Journal* 2006; 54(3):105-112.

Matt SB, **Butterfield P**. Changing the disability climate: promoting tolerance in the workplace. *AAOHN Journal* 2006; 54(3): 129-133.

Teri L, McKenzie G, LaFazia D. Psychosocial treatment of depression in older adults with dementia. *Clinical Psychology: Science and Practice* 2005; 12(3):303-316.

McKenzie G, **Salazar MK**. The organization of work: effect on worker well-being. *American Association of Occupational Health Nurses Journal* 2005; 53(11):1-4.

Postma JM, **Salazar MK**. Addressing Occupational Health and Safety Issues among Special Populations: An Innovative and Strategic Approach. *AAOHN Journal* 2006; 54(4):144-147.

Robbins W, **Salazar MK**. Adverse Effects of Exposure to Phthalates—Communicating Risks to Workers. *AAOHN Journal* 2005; 53(2):59-62.

Salazar MK, Keifer M, Negrete M, Estrada F, Synder K. Occupational Risk Among Orchard Workers: A Descriptive Study. *Family and Community Health* 2005; 28(3):239-252.

Salazar, MK. Dealing with uncertain risks -When to apply the precautionary principle. *AAOHN Journal* 2006; 54(1):11-13.

Kozuki Y, Kennedy MG, **Tsai JH-C**. Relational experiences of partnered Japanese immigrant women with affect disorders. *Journal of Advanced Nursing* 2006; 53(5):513-523.

Tsai JH-C. Use of computer technology to enhance immigrant families' adaptation. *Journal of Nursing Scholarship* 2006; 38(1):87-93.

OCCUPATIONAL AND ENVIRONMENTAL MEDICINE

Shah SM, **Bonauto D**, Silverstein B, Foley M. Workers' compensation claims for needlestick injuries among healthcare workers in Washington State, 1996-2000. *Infect Control Hosp Epidemiol* 2005; 26:775-81.

Silverstein BA, Viikari-Juntura E, Fan ZJ, **Bonauto DK**, Bao S, Smith C. Natural course of nontraumatic rotator cuff tendinitis and shoulder symptoms in a working population. *Scand J Work Environ Health* 2006; 32:99-108.

Carlsten C, Hunt SC, **Kaufman J D**. Squamous cell carcinoma of the skin and coal tar creosote exposure in a railroad worker. *Environ Health Perspect* 2005; 113(1):96-7.

Svec MA, Ward MH, Dosemeci M, **Checkoway, H**, De Roos AJ. Risk of lymphatic or haematopoietic cancer mortality with occupational exposure to animals or the public. *Occup Environ Med* 2005; 62:726-35.

Costa-Mallen P, Costa LG, **Checkoway H**. Genotype combinations for monoamine oxidase-B intron 13 polymorphism and dopamine D2 receptor TaqIB polymorphism are associated with ever-smoking status among men. *Neurosci Lett* 2005; 385:158-62.

Peretz C, Alexander BH, Nagahama SI, Domino KB, **Checkoway H**. Parkinson's disease mortality among male anesthesiologists and internists. *Mov Disord* 2005; 20(12):1614-7.

De Roos AJ, Ray RM, Gao DL, Wernli KJ, Fitzgibbons ED, Ziding F, Astrakianakis G, Thomas DB, **Checkoway, H**. Colorectal cancer incidence among female textile workers in Shanghai, China: a case-cohort analysis of occupational exposures. *Cancer Causes Control* 2005; 16:1177-88.

Costa-Mallen P, Kelada SN, Costa LG, **Checkoway H**. Characterization of the in vitro transcriptional activity

of polymorphic alleles of the human monoamine oxidase-B gene. *Neurosci Lett* 2005; 383:171-5.

Kelada SN, Costa-Mallen P, **Checkoway H**, Carlson CS, Weller TS, Swanson PD, Franklin GM, Longstreth WT Jr, Afsharinejad Z, Costa LG. Dopamine transporter (SLC6A3) 5' region haplotypes significantly affect transcriptional activity in vitro but are not associated with Parkinson's disease. *Pharmacogenet Genomics* 2005; 15:659-68.

Nielsen SS, Mueller BA, De Roos AJ, Viernes HM, Farin FM, **Checkoway H**. Risk of brain tumors in children and susceptibility to organophosphorus insecticides: the potential role of paraoxonase (PON1). *Environ Health Perspect* 2005; 113:909-13.

Astrakianakis G, Seixas NS, Camp JE, Christiani DC, Feng Z, Thomas DB, **Checkoway H**. Modeling, estimation and validation of cotton dust and endotoxin exposures in chinese textile operations. *Ann Occup Hyg* 2006; 50:573-82.

Wernli KJ, Fitzgibbons ED, Ray RM, Gao DL, Li W, Seixas NS, Camp JE, Astrakianakis G, Feng Z, Thomas DB, **Checkoway H**. Occupational risk factors for esophageal and stomach cancers among female textile workers in Shanghai, China. *Am J Epidemiol* 2006; 163:717-25.

Wong EY, Ray R, Gao DL, Wernli KJ, Li W, Fitzgibbons ED, Feng Z, Thomas DB, **Checkoway H**. Reproductive history, occupational exposures, and thyroid cancer risk among women textile workers in Shanghai, China. *Int Arch Occup Environ Health* 2006; 79:251-8.

Chang CK, Astrakianakis G, Thomas DB, Seixas NS, Ray RM, Gao DL, Wernli KJ, Fitzgibbons ED, Vaughan TL, **Checkoway H**. Occupational exposures and risks of liver cancer among Shanghai female textile workers-a case-cohort study. *Int J Epidemiol* 2006; 35:361-9.

Gold LS, De Roos AJ, Ray RM, Wernli K, Fitzgibbons ED, Gao DL, Astrakianakis G, Feng Z, Thomas D, **Checkoway H**. Brain tumors and occupational exposures in a cohort of female textile workers in Shanghai, China. *Scand J Work Environ Health* 2006; 32:178-84.

Li W, Ray RM, Gao DL, Fitzgibbons ED, Seixas NS, Camp JE, Wernli KJ, Astrakianakis G, Feng Z, Thomas DB, **Checkoway H**. Occupational risk factors for nasopharyngeal cancer among female textile workers in Shanghai, China. *Occup Environ Med* 2006; 63:39-44.

Peretz A, **Checkoway H**, **Kaufman JD**, Trajber I, Lerman Y. Silica, silicosis, and lung cancer. *Isr Med Assoc J* 2006; 8:114-8.

Daniell WE, Fulton-Kehoe D, Chiou LA, **Franklin GM**. Work-related carpal tunnel syndrome in Washington State workers' compensation: Temporal trends, clinical practices, and disability. *Am J Ind Med* 2005; 48:259-269.

Daniell WE, Swan SS, McDaniel MM, Camp JE, Cohen MA, Stebbins JG. Noise exposure and hearing loss prevention programmes after 20 years of regulations in the United States. *Occup Environ Med* 2006; 63:343-51.

Dawson DR, Cantanzaro AM, **Firestone J**, Schwartz M, Stuss DT. Changes in coping style following traumatic brain injury and their relationship to productivity status. *Brain Cogn* 2006; 60:214-6.

Franklin GM, Mai J, Wickizer T, Turner JA, Fulton-Kehoe D, Grant L. Opioid dosing trends and mortality in Washington State workers' compensation, 1996-2002. *Am J Ind Med* 2005; 48:91-9.

Powers KM, Smith-Weller T, **Franklin GM**, Longstreth WT Jr, Swanson PD, Checkoway H. Diabetes, smoking, and other medical conditions in relation to Parkinson's disease risk. *Parkinsonism Relat Disord* 2006; 12:185-9.

Karr C, Lumley T, Shepherd K, Davis R, Larson T, Ritz B, Kaufman J. A case-crossover study of wintertime ambient air pollution and infant bronchiolitis. *Environ Health Perspect* 2006; 114:277-81.

Mar TF, Koenig JQ, Jansen K, Sullivan J, **Kaufman J**, Trenga CA, Siahpush SH, Liu LJ, Neas L. Fine particulate air pollution and cardiorespiratory effects in the elderly. *Epidemiology* 2005; 16:681-7.

Sullivan J, Sheppard L, Schreuder A, **Kaufman J**. Case-crossover studies. *Epidemiology* 2005; 16:593.

Diez Roux AV, Auchincloss AH, Astor B, Barr RG, Cushman M, Dvorchak T, Jacobs DR Jr, **Kaufman J**, Lin X, Samson P. Recent exposure to particulate matter and C-reactive protein concentration in the multi-ethnic study of atherosclerosis. *Am J Epidemiol* 2006; 164:437-48.

Trenga CA, Sullivan JH, Schildcrout JS, Shepherd KP, Shapiro GG, Liu LJ, **Kaufman JD**, Koenig JQ. Effect of particulate air pollution on lung function in adult and pediatric subjects in a Seattle panel study. *Chest* 2006; 129:1614-22.

Salazar MK, Keifer M, Negrete M, Estrada F, Synder K. Occupational risk among orchard workers: a descriptive study. *Fam Community Health* 2005; 28:239-52.

Weyrauch KF, Boiko PE, **Keifer M**. Building informed consent for cholinesterase monitoring among pesticide handlers in Washington State. *Am J Ind Med* 2005; 48:175-81.

Hofmann J, Snyder K, **Keifer M**. (A descriptive study of workers' compensation claims in Washington State orchards. *Occup Med (Lond)* 2006; 56:251-7.

McCauley LA, Anger WK, **Keifer M**, Langley R, Robson MG, Rohlman D. Studying health outcomes in farmworker populations exposed to pesticides. *Environ Health Perspect* 2006; 114:953-60.

Shusterman, D., Matovinovic, E. and Salmon, A. (2006) Does Haber's law apply to human sensory irritation? *Inhal Toxicol* **18**, 457-71.

Silverstein M. Sand N, Glascoe FP, Gupta VB, Tonniges TP, O'Connor KG. Pediatrician practices regarding referral to early intervention services: is an established diagnosis important? *Ambul Pediatr* 2006; 6:105-9.

Bozic KJ, Morshed S, **Silverstein MD**, Rubash HE, Kahn JG. Use of cost-effectiveness analysis to evaluate new technologies in orthopedics. The case of alternative bearing surfaces in total hip arthroplasty. *J Bone Joint Surg Am* 2006; 88:706-14.

Takaro TK, Pepper L. Screening for chronic beryllium disease. *Am J Respir Crit Care Med* 2005; 172:1230.

Strand M, **Vedal S**, Rodes C, Dutton SJ, Gelfand EW, Rabinovitch N. Estimating effects of ambient PM(2.5) exposure on health using PM(2.5) component measurements and regression calibration. *J Expo Sci Environ Epidemiol* 2006; 16(1):30-8.

HEALTH SERVICES RESEARCH TRAINING

[Publications for core faculty Franklin and Kaufman are listed in the OEM Publications section, pages 98-99.]

Kopjar B, Gudrun D, Wiik J. Incidence of hospital admissions for deliberate self-poisoning with drugs in Norway – estimates based on Norwegian Patient Register. *Tidsskr Nor Laegeforen* 2005; 125(13):1798-800.

Audige L, Hanson B, **Kopjar B**. Issues in the planning and conduct of non-randomized studies. *Injury* 2006; 37(4):340-8. Epub Feb 17 2006.

Maynard C, Lowy E, Rumsfeld J, Sales AE, Sun H, **Kopjar B**, Fleming B, Jesse RL, Rusch R, Fihn SD. The Prevalence and Outcomes of In-hospital Acute Myocardial Infarction in the Department of Veterans Affairs Health System. *Arch Intern Med* 2006; 166(13):1410-6.

Grembowski DE, Patrick DL, Williams D, Diehr P, **Martin DP**. Managed care and patient-rated quality of care from primary physicians. *Medical Care Research and Review* 2005; 62(1):31-55.

Grembowski DE, Paschane D, Diehr P, Katon W, **Martin DP**, Patrick DL. Managed care, physician job satisfaction, and the quality of primary care. *Journal of General Internal Medicine* 2005; 20(3):271-7.

Rubinfeld GD, Caldwell E, Peabody E, **Martin DP**, Neff M, Stern EJ, Hudson LH. Incidence and outcomes of acute lung injury. *New England Journal of Medicine* 2005; 353(16):1685-1693.

Bovier PA, **Martin DP**, Perneger TV. Cost-consciousness among Swiss doctors: a cross sectional survey. *BMC Health Services Research* 2005; 5:72.

Bonomi AE, Thompson RS, Anderson M, Rivara FP, Holt VH, Carrell D, **Martin D**. Ascertainment of intimate partner violence using two abuse measurement frameworks. *Injury Prevention* 2006; 12:121-124.

Pearson CR, Simoni JM, Hoff P, Kurth AE, **Martin DP**. Assessing antiretroviral adherence via electronic drug monitoring and self-report: An examination of key methodological issues. *AIDS and Behavior*; Epub June 28 2006. <http://dx.doi.org/10.1007/s10461-006-9133-3>.

Strong LL, **Zimmerman F**. Occupational injury and absence from work among African American, Hispanic, and non-Hispanic White workers in the national longitudinal survey of youth. *Am J Public Health* 2005; 95(7):1226-32.

Hagopian A, Ofosu A, Fatusi A, Biritwum R, Essel A, Hart LG, **Watts C**. The Flight of Physicians from West Africa: Views of African Physicians and Implications for Policy. *Social Science and Medicine* 2005; 61:1750-1760.

Chollet D, **Watts C**. Pooling and Reinsurance in Washington State Health Insurance Markets. *Journal of Insurance Regulation* 2005; 24(2):81-92.

Franklin GM, Mai J, **Wickizer TM**, Turner JA, Fulton-Kehoe D, Grant L. Opioid dosing trends and mortality in Washington State workers' compensation, 1996-2002. *Am J Ind Med* 2005; 48(2):91-9.

Holman JR, **Wickizer TM**. Family physician resource use for inpatient care: a comparison between military medical center and community hospital. *Mil Med* 2006; 171(5):365-9.

Wickizer TM, Krupski A, Stark KD, Campbell K. The effect of substance abuse treatment on medicaid expenditures among general assistance welfare clients in Washington State. *Milbank Q* 2006; 84(3):555-76.

Turner J, Franklin G, Fulton-Kehoe D, Sheppard L, **Wickizer TM**, Wu R, Gluck J, Egan K. Worker recovery expectations and fear-avoidance predict work disability in a population-based workers' compensation back pain sample. *Spine* 2006; 31(6):682-9.

Zimmerman FJ, Christakis DA. Children's Television Viewing and Cognitive Outcomes: A Longitudinal Analysis of National Data. *Archives of Pediatric and Adolescent Medicine* 2005; 159(7):619-625.

McCarty CA, **Zimmerman FJ**, DiGiuseppe D, Christakis DA. Parental Emotional Support and Subsequent Internalizing and Externalizing Problems Among Children. *Journal of Developmental and Behavioral Pediatrics* 2005; 26(4):267-275.

Zimmerman FJ. Social, Demographic and Economic Determinants of Disparities in Mental Health Specialty

Utilization Among Children: Evidence from a National Sample. *Health Services Research* 2005; 40(5):1514-33.

Zimmerman FJ, Katon W. Socioeconomic Status, Depression Disparities, and Financial Hardship: What Lies Behind the Income – Depression Relationship? *Health Economics* 2005; 14(12):12-15.

Christakis DA, Wright JA, Taylor JA, **Zimmerman FJ**. The Association between Initial and Subsequent Antibiotic Prescription for Children with Cough and Cold Symptoms and Parental Satisfaction. *The Pediatric Infectious Disease Journal* 2005; 34(9):774-777.

Bowman SM, **Zimmerman FJ**, Christakis DA, Sharar SR, **Martin DP**. Hospital characteristics associated with the management of pediatric splenic injuries. *Journal of the American Medical Association* 2005; 294(20):2611-7.

Zimmerman FJ, Bell JF. Income Inequality and Physical and Mental Health: Testing Associations Consistent with Proposed Causal Pathways. *Journal of Epidemiology and Community Health* 2006; 60(6):513-521.

HAZARDOUS SUBSTANCE ACADEMIC TRAINING

[Publications for core faculty Fenske, Morgan and Yost, as well as additional publications for Kalman, are listed in the IH Publications section, pages 95-96.]

Adams JC, Dills RL, Morgan MS, **Kalman DA**, Pierce CH. A physiologically-based toxicokinetic model of inhalation exposure to xylenes in Caucasian men. *Regul Toxicol Pharmacol* 2005; 43(2):203-14.

Steinmaus C, Carrigan K, **Kalman D**, Atallah R, Yuan Y, Smith AH. Dietary intake and arsenic methylation in a US population. *Environmental Health Perspectives* 2005; 113(9):1153-1159.

von Ehrenstein OS, Guha Mazumder DN, Hira-Smith M, Ghosh N, Yuan Y, Windham G, Ghosh A, Haque R, Lahiri S, **Kalman D**, Das S, Smith AH. Pregnancy outcomes, infant mortality, and arsenic in drinking water in West Bengal, India. *Am J Epidemiol* 2006; 163(7):662-9. Epub Mar. 8, 2006.

Fenske RA, Lu C, Curl CL, Shirai JH, **Kissel JC**. Biological monitoring to characterize organophosphorus pesticide exposure among children and workers: an analysis of recent studies in Washington State. *Environ Health Perspec* 2005; 113(11):1651-1657.

Sheppard L, Slaughter C, Schildcrout J, **Liu L-JS**, Lumley T. Exposure and measurement contributions to estimates of acute air pollution effects. *J Exposure Analysis & Environmental Epidemiology* 2005; 15(4):366-76. Epub Dec. 15, 2004.

Mar TF, Koenig JQ, Jansen K, Sullivan J, Kaufman J, Trenga CA, Siahpush H, **Liu L-JS**, Neas L. An analysis of the association between air pollution and blood pressure, heart rate and pulse oximetry in elderly subjects. *Epidemiology* 2005; 16:681-687.

Needham LL, Whyatt RM, Barr DB, Wang RY, Akland G, Naeher L, Bahadori T, Bradman A, Fortmann R, **Liu L-JS**, Morandi M, O'Rourke MK, Thomas K, Quackenboss J, Ryan PB, Zartarian V, Özkaynak H. Exposure Assessment in the National Children's Study: Introduction. *Environmental Health Perspectives* 2005; 113(8):1076-1082.

Trenga CA, Sullivan J, Schildcrout J, Shepherd K, Shapiro G, **Liu L-JS**, Kaufman J, Koenig J. Effect of Particulate Air Pollution on Lung Function in Adult and Pediatric Subjects in a Seattle Panel Study. *Chest* 2006; 129:1614-1622.

Jimenez J, Wu C-F, Claiborn C, Gould T, Simpson CD, Larson T, **Liu L-JS**. Agricultural burning smoke in eastern Washington: Part I. Atmospheric characterization. *Atmospheric Environment* 2006; 40(4): 639–650.

Shoaf MB, Shirai JH, Kedan G, Schaum J, **Kissel JC**. Adult Dermal Sediment Loads Following Clam Digging in Tide Flats. *Soil and Sediment Contam* 2005; 14:463-470.

Shoaf MB, Shirai JH, Kedan G, Schaum J, **Kissel JC**. Child Dermal Sediment Loads Following Play in a Tide Flat. *J Expos Anal Environ Epid* 2005; 15:407-412.